GENBA SOPANRAO MOZE COLLEGE OF ENGINEERING Balewadi, Pune - 411045.

Civil Engineering Department

2015 Pattern

Sr. No.	Course Code	Course Name
		Semester - III
1	201001	Building Technology and Material
2	201002	Mechanics of structure
3	201003	Geotechnical Engineering
4	207001	Engineering Mathematics III
5	201006	Survey
		Semester - IV
6	201004	Fluid Mechanics-I
7	201005	APDB
8	201008	Structural Analysis-I
9	207009	Engineering Geology
10	201007	Concrete Technology
		Semester - V
11	301001	Hydrology and Water Resources Engineering
12	301002	Infrastructure Engineering & Construction Techniques
13	301003	Structures Design-I
14	301004	Structural Analysis-II
15	301005	Fluid Mechanics-II
		Semester - VI
16	301007	Advanced Surveying
17	301008	Project Management and Engineering Economics
18	301009	Foundation Engineering
19	301010	Structures Design-II
20	301011	Environmental Engineering I
		Semester - VII 2015 pattern
21	401 001	Environmental Engineering II
22	401002	Transportation Engineering
23	401 003	Structural Design and Drawing-III
24	401004	Elective I [ACT]
25	401 005	Elective II [TQM-MIS]
		Semester - VIII 2015 pattern
26	401007	Dams and Hydraulics Structure
27	401008	Quantity Surveying, Contract
28	401 009	Elective III (APC)
29	401010	Elective-IV CM -2015 PATTERN

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Civil Engineering Department

2019 Pattern

Sr. No.	Course Code	Course Name
Semester - III		
1	201001	Building Technology and Architectural Planning
2	201002	Mechanics of structure
3	201003	Fluid Mechanics
4	207001	Engineering Mathematics III
5	207009	Engineering Geology
Semester - IV		
6	201008	Geotechnical Engineering
7	201009	Survey
8	201010	Concrete Technology
9	201011	Structural Analysis
10	201012	Project management
Semester - V		
11	301001	Hydrology and Water Resources Engineering
12	301002	Water Supply Engineering
13	301003	Design of Steel Structures
14	301004	Engineering Economics and Financial Management
15	301005	Solid Waste Management
16	301006	Seminar
Semester - VI		
17	301012	Waste Water Engineering
18	301013	Design of RC Structures
19	301014	Remote Sensing and GIS
20	301015	ATP
Semester - VII		
21	401001	Foundation Engineering
22	401002	Transportation Engineering
23	401003	APC
24	401004	ACT
Semester - VIII		
25	401011	Dams and Hydraulics Structure
26	401012	Quantity Surveying, Contract nd Tenders
27	401013	HPE
28	401014	TQM-MIS

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Civil Engineering Department

Academic Year 2018-19

Semester III

Subject	CO	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Building Technology and Materials	201001.1	Identify types of building and basic requirements of building components.	2	-	2	-	1	1	1	2	2	2	1	2	2	1	1
	201001.2	Explain types of masonry, formwork, casting procedure and necessity of underpinning and scaffolding.	2	1	1	2	1	1	-	-	2	-	-	-	2	-	-
	201001.3	Elucidate different types of flooring and roofing materials.	2	3	2	3	-	2	2	-	2	1	1		1	2	2
	201001.4	Describe types of doors, windows, arches and lintel.	2		3	2	3	1	1	1	2	3	1	3	1	3	3
	201001.5	Choose appropriate vertical circulation and protective coatings.	2	2	1	-	2	2	3	-	2		3	-	-	-	-
	201001.6	Explain different materials especially eco-friendly materials and safety measures to be adopted at any construction site.	3	2	-	1	2	3	2	-	2	1	-	2	-	2	2
Engineering Mathematics - III	207001.1	Solve higher order linear differential equations and apply to civil engineering problems such as bending of beams and whirling of shafts.	3	2	-	1	1		1	2	-	1	-	1	1	1	1
	207001.2	Solve system of linear equations using direct and iterative numerical techniques and develop solutions to ordinary differential equations using single step and multistep methods applied to structural systems	2	1	1	2	-	1	3	-	2	-	1	2	-	2	2
	207001.3	Apply statistical methods like correlation, regression analysis in analyzing and interpreting experimental data and probability theory applied to construction management	2	2	2	-	2	-	1	2	-	-	3	1	3	1	1
	207001.4	Perform vector differentiation and integration, analyze the vector fields and apply to fluid flow problems.	1	1	-	2	1	2	2	-	1	3	-	3	2	-	-
	207001.5	Solve various partial differential equations such as wave equation, one and two dimensional heat flow equations.	3	-	3	-	1			1	2	1	2	-	1	2	2

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Surveying	201006.1	Operate and use surveying equipment.	2	-	1	-		-	-	-	2	2	-	2	-	2	2
	201006.2	Apply knowledge of leveling to draw plan or map of the existing permanent features on the ground.	3	-	2	1	1	-	1	2	2	1	-	-	2	1	1
	201006.3	Analyze temporary adjustments and check permanent adjustments of the Theodolite.	2	1	1	1	1	1	2	-	2	3	2	-	-	1	1
	201006.4	Determining reduced level and distance using tacheometry and use of Electronic surveying equipment for measurement.	3	3	-	2	-	2		3		1	-	-	3	-	-
	201006.5	Analyze and design of simple curves	2	1	-	-	-	1	3	-	2		1	1	1	3	3
	201006.6	Relating space base positioning systems for construction survey.	2	2	-	-	3	-	1	1	1	1	-	2	-	-	-
Strength of Materials	201002.1	Compute different type of stresses in determinate, indeterminate, homogeneous and composite members.	1	-	2	1	-	-	-	-	-	-	1	1	1	2	2
	201002.2	Develop bending stress and shear stress distribution diagrams across beam secion		1	-	-	-	1	1	-	1	1	1	1	1	2	2
	201002.3	Determine stresses due to torsion, strain energy under different loading conditions and stresses due to impact loading	2	1	-	1	-	1	1	-	1	1	1	1	1	2	2
	201002.4	Explain the concept of principal stresses and stresses due to combined loading	2	-		-	1	-	2	-	1		1	1	2	2	2
	201002.5	Plot loading diagram, Shear Force Diagram (SFD) and Bending Moment Diagram (BMD).	-	-	1		1	-	2	1	1	1	1	1	1	2	2
	201002.6	Analyze axially and eccentrically loaded column	-	1	-	1	-	-	1	-	-	-	1	1	1	2	2

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Geotechnical Engineering	201003.1	Differentiate the different types of soil and their engineering properties and classify them	3	-	3	2	1	-	2	1	-	3	1	-	2	-	-
	201003.2	Determine the soil properties in laboratory and develop a proficiency in handling experimental data	3	1	2	-	3	2	1	2	1	-	3	-	-	2	2
	201003.3	Understand of the concept of effective stress and its influence on soil behavior.	3	-	1	2	2	-	2	-	-	2	2	2	1	2	2
	201003.4	Develop an understanding of the influence of water flow on the engineering behaviour of soils.	3	2	-	2	-	1	-	2	2	1		1	2	1	1
	201003.5	Analyze engineering properties like compaction, permeability, soil shear strength.	3	-	2	2	2	-	3	1	-	-	2	-	-	-	-
	201003.6	Compute the lateral thrust and classify soil slopes.	2	1	-	-	1	2	1			1	1		3	2	2
Fluid Mechanics - I	201004.1	Understand Fluid properties and dimensional analysis for solving fluid flow problems	3	2	-	-	1	-	-	1	2	-	3	1	-	1	1
	201004.2	Apply knowledge to solve fluid static problems	3	2	-	-	-	-	-	-	2	2	-	1	-	-	-
	201004.3	Interpret the concept of fluid kinematics and classify types of fluid flow	2	2	1	2	2	-	-	-	2	-	-	1	-	2	2
	201004.4	Interpret fluid dynamics and understand the application of Bernoullis Equation	2	2	1	-	-	2	1	1	1	1	1	2	3	1	1
	201004.5	Understnd the concept of boundary layer developement	2	2	-	1	3	1	1	2	1	1	3	1	-	2	2
	201004.6	Apply the concept of turbulent flow through pipes and determine the varius losses in pipes	2	2	1	1	-	1	3	2	1	1	1	2	1	-	-

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Semester IV																		
Architectural Planning and Design of Buildings	201005.1	Implementing principles of architectural planning.	3		2		1	1	1	1	-	-	1	1	2	-	-
	201005.2	Analyze the available primary or secondary data and plan different types of structures considering futuristic need of an area.	3	2	2	2	1	1	2	-	1	2	1	3	2	-	-
	201005.3	Improve the status of existing structures by proposing appropriate green measures.	2	1	-	1	2	2	1	1	-	-	-	2	1	2	2
	201005.4	Plan effectively various types of buildings according to their utility.	2	-	2	1	2	2	-	1	2	-	1	1	2	2	2
	201005.4	Understand and resolve contemporary issues at multi-dimensional functional levels.	3	2	2	-	-	-	2		2	2	3	-	3	1	1
Structural Analysis - I	201008.1	Evaluate static and kinematic indeterminacy of structures. Determine slope and deflection in determinate beams using double integration method, area moment theorem, conjugate beam method and castigliano's theorem	3	-	-	1	2	-	-	-	1	-	1	1	1	2	2
	201008.2	Analyze indeterminate beams and frames using three moment theorem and castigliano's theorem	3	2	-	-	-	-	1	3	-	-	2	2	2	2	2
	201008.3	Analyze determinate and indeterminate trusses using castigliano's theorem	3	2	1	-	2	-	2	2	1	3	2	1	-	-	-
	201008.3	Apply influence line diagrams for the analysis of structures under moving load.	3	-	-	-	3	-	-	-	2	3	-	2	2	-	-
	201008.3	Analyze two and three hinged parabolic and circular arches	2	2	2	-	-	-	-	2	1	-	-	-	-	2	2
	201008.3	Apply static and kinematic method to find collapse load in indetrminate beams and frames using plastic analysis	2	-	2	1	-	2	1	-	-	-	-	-	-	2	2

Engineering Geology	207009.1	Explain the basic concepts of engineering geology in terms of rock types and their applications in civil engineering.	3	-	2	1	-	2	2	-	3	1	3	1		1	1
	207009.2	Discuss physical properties and classification of minerals. Describe Structural geology, mountain building activity and plate tectonics theory.	3	-	-	1	-	2	2	1	2	-	2	2	1		
	207009.3	Illustrate Geomorphology and historical geology with physiographic divisions of india,principles of stratigraphy and geological time scale.	3	3	1	2	-	2	2	-	-	-	-	3	2		
	207009.4	Describe methods of preliminary geological explorations and applications of Remote sensing and GIS in civil engineering.	3	-	2	-	2	2	2	3	3	1	-	1	2	2	2
	207009.5	Assess the Importance of geological nature of the site, precautions and treatments to improve the site conditions for dams, reservoirs, and tunnels.	3	1	2	1	-	2	2				-	1		2	2
	207009.6	Explain geological hazards and importance of ground water and uses of common building stones.	3	1	2	1	-	2	2	3	3	1	-	1	1	1	1
Concrete Technology	201007.1	Understand chemistry, properties, and classification of cement, fly ash, aggregates and admixtures, and hydration of cement in concrete.	2	2	-	2	-	-	-	-	3	-	-	2		1	1
	201007.2	Prepare and test the fresh concrete	2	-	-	-	-	-	-		3	1	1	2	1	1	1
	201007.3	Test hardened concrete with destructive and nondestructive testing instruments	2	-	-	-	-	2	-	2	2	-	-	2	2	1	1
	201007.4	Get acquainted to concrete handling equipments and different special concrete types.	3	2	-	-	2	2	-	2	2	-	-	2	1	1	1
	201007.5	Design concrete mix of desired grade	3	2	2	-	-	2	-	3	3	2	2	2	3	1	1
	201007.6	Predict deteriorations in concrete and repair it with appropriate methods and techniques.	3	2	-	-	-	2	-	-	-	2	2	2	-	1	1

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Semester V																	
Hydrology and Water Resourse Engineering	301001.1	Estimating missing rainfall data	3	2	1	2	-	-	-	-	-	-	-	-	1	-	-
	301001.2	Compute water requirement of crops	2	2	-	-	-	-	-	-	-	-	-	-	1	2	2
	301001.3	Recognize various ground water distribution systems	3	2	2	2	-	-	2	-	1	2	-	2	1	2	2
	301001.4	Identify the concepts of hydrographs	3	2	-	-	-	2		-	-	-	2	-	1	2	2
	301001.5	DescribeApply the flood routing techniques to find flood frequency	2	1	-	-	-	2	2	-	-	-	-	-	1	2	2
	301001.6	Discuss water management, water logging & drainage concepts.	2	-	-	1	-	2	2	-	2		2	2	1	2	2
Infrastructure Engineering and Construction Techniques	301002.2	Describe the meaning and importance of Infrastructure Engineering	3	-	1	1	-	2	-	1	-	2	-	1	1	-	-
	301002.3	Classify railway systems and to select appropriate construction techniques	2	1	-	-	-	2	-	3	-		-	1	1	1	1
	301002.3	Interpret construcion techniques	3		-	-	-	2	-		-		-	1	1	3	3
	301002.4	Differentiate tunneling and its construction techniques	3	1	-	2	-	2	-	1	-	1	-	1	1	2	2
	301002.5	Compare docks and harbours along with their importance	3	1	-		2	2	2	-	-	-	-	1	1	-	-
	301002.6	Appraise various construction equipment's in Civil Engineering	3	-	3	1	-	2	2	-	-	1	-	1	1	-	-

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Structural Design - I	301003.1	Identify various limit states, load combinations, material properties, types of section, safety factors from IS:800-2007. Designing of tension member in steel structures	3	-	3	1	1	3	-	3	2	3	1	2	1	1	1
	301003.2	Analyse and design various Compression members in steel Structure.	3	2	3	-	-	3	2	3	2	2	-	2	1	2	2
	301003.3	Designing of various column bases in steel Structure.	3	-	3	-	-	3	-	3	2	-	2	2	1	2	2
	301003.4	Analyse and design a flexural member and beam to column connections	3	2	3		-	3	2	3	2	2	-	2	1	2	2
	301003.5	Designing of Welded plate girder	3	-	3	2	-	3		3	2		2	2	1	2	2
	301003.6	Analyse and design a Steel Truss and a Gantry Girder	3	3	-	1	-	-	2	3	2	2	-	2	1	-	-
Structural Analysis - II	301004.1	Analyse the indetermiant beams and frames by Slope Deflection method	3	3	-	-		-	2	2	-	-	1	1	1	-	-
	301004.2	Construct moment diagrams for indetermiant beams and frames by Moment Distribution method	3	-	2	-	2	2	2	-	2	-	2	1	-	1	1
	301004.3	Determine stress resultants in the indetermiant beams and frames by Flexibility method	3	-	1	-	-	3	3	-	2	-	-	1	1	-	-
	301004.4	Analyse the indetermiant beams and frames by Stiffness method	3	3	1	1	1	-	-	1	-	-		1	-	-	-
	301004.5	Construct BMD in highly indeterminate frames using cantilever and portal frame method. Determine slope and deflection in determinate beams approximately using Finite Difference Method	3	-	3	1	-	1	2	2	3	1	1	1	3	-	-
	301004.6	Apply basic concepts of finite element method to solve elementary problems	3	-	-	3	-	-	-	-	-	-	–	1	-	-	-
	301005.1	Describe fliud flow around submerged objects and classify the unsteady flow	3	3	3	-	1	1	1	-	3	2		2	-	1	1
	301005.2	Discuss open channel flow and derive depth energy relationship	3	2	-	1	3		2	-	3	-	2	-	-	1	1

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Fluid Mechanics - II	301005.3	Design the most economical channel section, demonstrate hydraulic jump	3	2	2	-	-	2	-	-	3	2	-	2	3	1	1
	301005.4	Understand the concept impact of jet, study of centrifugal pumps	3	2	-	3	2	2	2	2	3	-	2	-	3	1	1
	301005.5	Understand, analyse and design various types of Turbines.	2	-	1	-	-	3	-	-	3	-	2	2	-	1	1
	301005.6	Recognize and compute the GVF profiles by various methods	2	-	3	3	2	-	2	2	2	2	2	2	-	1	1
Semester VI																		
Adavanced Surveying	301007.1	Perform Geodetic Survey and understand the GNSS and triangulation survey.	2	-	-	-	1	-	-	-	-	-	-	2	2	-	-
	301007.2	Explain the concept of hydrographic surveying	3	2	1	-	-	-	-	-	-	-	2	-	2	-	-
	301007.3	Relate the concept of modern surveying techniques and their applications in various field of Civil Engineering.	3	2	2	3	2	2	2	2	2	-	-	-	2	-	-
	301007.4	Solve to adjust geodetic traverse and understand laws of weights	3	2	3	2	-	-	-	2	-	3	-	-	2	-	-
	301007.5	Interpret aerial photography data to study terrain.	3	2	-	2	-	1	1	-		3	-	-	-	2	2
	301007.6	Calculate the relative altitudes and distances of different points on ground.	3	2	-	-	3	-	1	-	2	3	-	2	-	2	2

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Project Management and Engineering Economics	301008.1	Understand the project planning & scheduling.	3	-	2	1	-	1	1	-	-	3	3	-	-	-	-
	301008.2	Implement appropriate resources at right time in project.	3	2	2	-	2	3	2	3	-	3	3	-	2	-	-
	301008.3	Examine the Team work and its impact on project progression.	3	2	-	1	3	1	3	3	3	3	3	-	2	2	2
	301008.4	Judge correct alternative in sells and purchase activities by understanding basics of engineering economics	3	-	2	2	3	1	2	2	3	3	3	-	-	2	2
	301008.5	Defend Investment and its stages in suggesting resource allocation	2	2	2	-	3	1	2	2	-	-	3	-	2	2	-
	301008.6	Summarize types of project appraisal and project reports	2	-	2	2	3	1	2	2	-	2	3	1	-	2	2
Foundation Engineering	301009.1	Complete site investigation program,including types,number,and location of boring	3	2	-	-	3	1	2	-	2	2	-	1	1	1	1
	301009.2	Evaluate bearing capacity and settlement for both shallow and deep foundation	3	2	-	2	-	1	2	2	2	-	-	1	1	-	2
	301009.3	Relate and study drilled piers and caisson.	3	-	-	2	3	-	2	2	2	-	-	-	-	2	-
	301009.4	Select appropriate design principles of foundation on black cotton soil	2	-	1	-	3	2	2	2	2	-	-	-	-	2	2
	301009.5	Priotize and suggest geosynthetic- reinforced soil structures	2	-	1	-	3	2	2		2	-	1	3	3	2	1
	301009.6	Adapt effect of earthquake techniques on structures	2	-	-	1	3	-	2	2	2	-	-	-	-	-	-

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Structural Design - II	301010.1	Compare the design philosophies – WSM, ULM, and LSM	3	3	3	1	3	-	1	2	2	1	3	2	-	-	-
	301010.2	Compute the moment of resistance of rectangular / flanged section by WSM and LSM	3	3	3	3	3	2	3	3	3	3	3	2	1	1	1
	301010.3	Examine or Select the cross section for slabs, beam, column and foundation conforming to IS 456:2000	3	3	3	3	3	2	-	3	1	-	1	2	-	1	1
	301010.4	Design the G+2 storey residential/commercial/public building conforming to IS 456:2000	3	2	3	2	-	3	-	3	2	1	1	2	1	3	3
Environmental Engineering -I	301011.1	To explain the source, control and effect of air and noise pollution	2	3	3	-	1	3	3	1	-	1	1	2	-	-	-
	301011.2	To describe the fundamentals of water treatment units and parts of water supply system.	3	2	2	-	-	2	3	1	-	1	1	2	2	2	2
	301011.3	To explain and design of Water treatment units	3	2	2	-	2	2	3	1	-	-	1	2	-	3	3
	301011.4	To describe the fundamentals of coagulation, flocculation and filtration in water supply system.	3	2	-	2	2	2	3	1	1	-	1	2	-	3	3
	301011.5	Describe the Miscellaneous treatment systems for drinking water	2	1	1	1	-	2	3	1	-	1	1	2	-	-	-
	301011.6	Demonstrate water distribution system, rain water harvesting and PWTP	3	2	1	1	-	2	3	1	1	1	1	2	-	-	-

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Semester VII

Environmental Engineering -II	401001.1	Explain the quality and characteristics of sewage and the concept of stream sanitation.	3	2	2	-	3	2	2	2	-	-	-	2	-	3	3
	401001.2	Describe the sewage treatment processes with the design of screen chamber, grit chamber, and primary sedimentation tank.	3	2	2	-	3	2	2	-	2	2	2	-	2	3	3
	401001.3	Describe and design the secondary treatment units with special emphasis on activated sludge process and trickling filter.	3	2	1	2	3	2	2	2	2	3	-	-	2	3	3
	401001.4	Explain low cost treatment methods with the design of oxidation pond, aerated lagoon.	3	2	2		3	2	2	2	2	3	-	-	2	3	3
	401001.5	Describe anaerobic treatment processes as anaerobic digester, up flow anaerobic sludge blanket and they also able to design septic tank.	3	2	2	2	3	2	2	2	2	33	-	2	-	3	3
	401001.6	Explain the characteristics and the treatment process of industrial wastewater of sugar,dairy and distillery industry .	3	2	2	2	-	2	3	2	-	-	-	2	3	-	-
Transportation Engineering	401002.1	Interpretition and study of rural road development vision and on-going road development projects.	3	2	2	-	2	2	-	-	-	3	-	2		-	-
	401002.2	Evaluate Gemometric design of highways.	3			2	3	2	-	2	2		-		2	-	-
	401002.3	Categorizing road traffic regulation and control devices.	2	2	2	2	3	2	-	2	2	2	-	2		-	-
	401002.4	Experimenting and Validating Pavement materials suiatbility in mix-design.	3	2	-	2	3	2	2	-	-	2	-	-		-	-
	401002.5	Design of pavement using IS Code and IRC guidelines.	2	-	2	2	3	2	2	2	2	2	-	-	2	-	-
	401002.6	Adapting the Modern Trends in Pavement Construction.	3	2	-	2	3	-	-	2	2	-	2	2	-	-	

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ructural Design d Drawing - III	401003.1	Compute the stresses and losses in PSC Structures	3	3	3			2		2			-			-	-
	401003.2	Designing of PSC rectangular and flanged beams with end block, one way and 2 way post tensioned slabs conforming to IS: 1343:2012	3	3	3	3	2	2	2	3	2	3	-	2	3	-	-
	401003.3	Designing of PT flat slab conforming to IS:456-2000, IS: 1343:2012	3	3	3	3	-	2	2	3	2	3	-	2	-	2	2
	401003.4	Analysis and design of RCC cantilever T and L shape retaining walls conforming to IS 456:2000	3	3	3	3	-	2	2	3	2		3	2	2	2	2
	401003.5	Analyze and Design Liquid Retaining Structures resting on ground conforming to IS:3370-2009	3	3	-	3	-		2	3	2	3	-	2		2	2
	401003.6	Derive the equations of motion for free, forced, un-damped and damped vibrations. Estimate the EQ forces by seismic coeffiecient method conforming to IS 1893:2002	3	3	3	3	3	3	3	3	–		3	3	3	3	3
ACT	401004.1	Understand the chemistry of cement and its effect on properties of concrete	2	-	2	-	-	3	2	2	2	2	-	2	-	-	-
	401004.2	Apply the knowledge of supplementary cementitious materials to produce sustainable concretes	1	-	-	2	-	1	2	2	1	2	-	-	-	-	-
	401004.3	Understand the mechanism of working of admixtures and their effect on properties of concrete	2	2	2	-	-	3	2	-	2	3	-	-	-	-	-
	401004.4	Evaluate the characteristic properties of fiber reinforced concrete	2	2	2	-	2	2	2	2	2	3	-	2	2	2	2
	401004.5	Understand the durability properties of concrete	1	2	2	2	2	3	2	2	-	3	-	2	2	2	2
	401004.6	Interpret the properties of concrete through advance testing methods	1	2	2	2	3	2	2	2	-	2	-	2	22	-	-

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Total Quality Management	401005.1	Recognise quality & contribution of quality gurus.	3	-	2			2		2	2	-	2	-	-	-	-	
	401005.2	Relate the functioning and application of TQM & Six Sigma	3	-	2	2	3	2	2	2	2	-	2	-	2	-	-	
	401005.3	Implement ISO 9001 principles in preparation of quality manual	3	-	-	-	-	-	-	2	2	-	2			2	2	
	401005.4	Construct & apply management control & certification systems.	2	-	1	2	1		1	-	2	-	2	1	2			
	401005.5	Execute TQM Implementation and various Quality Awards	2	-	-	1	1	1	1	1	2	2	2		1	1	1	
	401005.6	Justify MIS & its application in construction sector.	3	3	-	2	3	3				2	2	1	1	1	1	
Semester VIII																		
Dams and Hydraulic Structures	401007.1	Differentiate the types of dams and explain the importance of instrumentation for safety of dams	3	2	-	2	-	-	2	1	2	2	-	1	1	1	1	
	401007.2	Analyze the Stability of gravity dam and describe the Concept of Arch Dam	3	3	2	-	2	2	2	1	2	2	-	1	1			
	401007.3	Design the spillways with appropriate given data and explain the concept of Spillway gates	3	2	2	2	2	2	2	-	1	-	2	1	1	-	-	
	401007.4	Explain the types Earthen dam ,failures and Diversion head works.	3	2	-	-	2	2	3	-	-	2	-	1	1	1	1	
	401007.5	Describe and use of the canal lining and canal structures.	2	-	2	2	2	2	3	2	2	2	2	1	1	1	1	
	401007.6	Explain the importance of River training works and CD works.	3	2	-	-	-	-	3		2	2	2	1	1	1	1	

Quantity Surveying, Contracts and Tenders	401008.1	Choose the appropriate principles of computations related to quantity surveying.	3	2	-	-	-		–	2	2	2	2	2	2	2	2
	401008.2	Formulate the detail estimates and bill of quantities for various civil engineering projects.	3	-	-	3	2	-	–	2	2	2	3	3	2	2	2
	401008.3	Excersize computer software for schedule of rates and specifications	3	2	-	2	2	2	–	2	-	-	3	-	2	2	2
	401008.4	Analyses the rates and prepare valuation report.	2	-	3	2	-	-	–	-	-	-	3	3	-	-	-
	401008.5	Draft tender and work execution processes.	2	-	-	2	-	2	–	-	-	2	2	3	-	-	-
	401008.6	Apply the skill to defend a contract by knowing arbitration laws.	3	2	-	2	-	2	–	-	-	-	2	3	-	-	-
Air Pollution and Control	401009.1	Explore the meteorological aspects, Gaussian model and Emission inventory.	3	2	3	2	-	2	2	1	3	3	-	1	3	3	3
	401009.2	Classify and analyze Air sampling methods.	3	2	-	2	-	3	2	-	-	-	-	1	-	-	-
	401009.3	Select methods for control and prevention of air pollution.	3	2	2	2	3	2	2	-	3	3	3	1	2	3	3
	401009.4	Design of air pollution control equipment's.	2	-	-	2	2	2	2	3	-	3	-	1	2		
	401009.5	Discuss Air Pollution prevention and control Act.	3	2	-	2	-	3	2	2	-	2			2	3	3
	401009.6	Explore the Environmental impact assessment and management.	2	-	-	2	2	2	3		2	2	-	2	2		
	401010.1	Appraise the basic concepts of construction management such as types and functions of management, project participants and reporting system	3	2	2	2	2	2	2	2	2	3	3	2	22	3	3
	401010.2	Evaluate the progress of projects by using WBS breakdown Structure (WBS) and line of balance technique.	3	-	2	2	–	2	3	3	2	2	3	2	3	2	2

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Construction Management	401010.4	Implement the labour laws and various financial aspects for smooth functioning of project	3	2	2	2	–	2	-	2	-		3	2	–	1	1
	401010.4	Apply the risk management and value analysis models	2	2	2	2	3	-	-	-	3	–	2	3	–	3	3
	401011.5	Apply material management and HR management techniques	2	-	-	3	-	3	3	3		3	3	-	3	3	3
	401011.6	Recognize the importance and application of artificial intelligence technique	3	3	3	3	3	3	3	2	3	2	2	-	-	3	3

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Civil Engineering Department

Academic Year 2019-20

Semester III

Subject	CO	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Building Technology and Materials	201001	Identify types of building and basic requirements of building components.	2	-	2	-	1	1	1	2	2	2	1	2	2	1	1
	201001	Explain types of masonry, formwork, casting procedure and necessity of underpinning and scaffolding.	2	1	1	2	1	1	-	-	2	-	-	-	2	-	-
	201001	Elucidate different types of flooring and roofing materials.	2	3	2	3	-	2	2	-	2	1	1		1	2	2
	201001	Describe types of doors, windows, arches and lintel.	2		3	2	3	1	1	1	2	3	1	3	1	3	3
	201001	Choose appropriate vertical circulation and protective coatings.	2	2	1	-	2	2	3	-	2		3	-	-	-	-
	201001	Explain different materials especially eco-friendly materials and safety measures to be adopted at any construction site.	3	2	-	1	2	3	2	-	2	1	-	2	-	2	2
Engineering Mathematics III	207001	Solve higher order linear differential equations and apply to civil engineering problems such as bending of beams and whirling of shafts.	3	2	-	1	1		1	2	-	1	-	1	1	1	1
	207001	Solve system of linear equations using direct and iterative numerical techniques and develop solutions to ordinary differential equations using	2	1	1	2	-	1	3	-	2	-	1	2	-	2	2
	207001	Apply statistical methods like correlation, regression analysis in analyzing and interpreting experimental data and probability theory applied to	2	2	2	-	2	-	1	2	-	-	3	1	3	1	1
	207001	Perform vector differentiation and integration, analyze the vector fields and apply to fluid flow problems.	1	1	-	2	1	2	2	-	1	3	-	3	2	-	-

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Surveying	201006	Operate and use surveying equipment.	2	-	1	-		-	-	-	2	2	-	2	-	2	2
	201006	Apply knowledge of leveling to draw plan or map of the existing permanent features on the ground.	3	-	2	1	1	-	1	2	2	1	-	-	2	1	1
	201006	Analyze temporary adjustments and check permanent adjustments of the Theodolite.	2	1	1	1	1	1	2	-	2	3	2	-	-	1	1
	201006	Determining reduced level and distance using tacheometry and use of Electronic surveying equipment for measurement.	3	3	-	2	-	2		3		1	-	-	3	-	-
	201006	Analyze and design of simple curves	2	1	-	-	-	1	3	-	2		1	1	1	3	3
	201006	Relating space base positioning systems for construction survey.	2	2	-	-	3	-	1	1	1	1	-	2	-	-	-
Strength of Materials	201002	Compute different type of stresses in determinate, indeterminate, homogeneous and composite members.	1	-	2	1	-	-	-	-	-	-	1	1	1	2	2
	201002	Develop bending stress and shear stress distribution diagrams across beam secion		1	-	-	-	1	1	-	1	1	1	1	1	2	2
	201002	Determine stresses due to torsion, strain energy under different loading conditions and stresses due to impact loading	2	1	-	1	-	1	1	-	1	1	1	1	1	2	2
	201002	Explain the concept of principal stresses and stresses due to combined loading	2	-		-	1	-	2	-	1		1	1	2	2	2
	201002	Plot loading diagram, Shear Force Diagram (SFD) and Bending Moment Diagram (BMD).	-	-	1		1	-	2	1	1	1	1	1	1	2	2
	201002	Analyze axially and eccentrically loaded column	-	1	-	1	-	-	1	-	-	-	1	1	1	2	2

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Geotechnical Engineering	201003	Differentiate the different types of soil and their engineering properties and classify them	3	-	3	2	1	-	2	1	-	3	1	-	2	-	-
	201003	Determine the soil properties in laboratory and develop a proficiency in handling experimental data	3	1	2	-	3	2	1	2	1	-	3	-	-	2	2
	201003	Understand of the concept of effective stress and its influence on soil behavior.	3	-	1	2	2	-	2	-	-	2	2	2	1	2	2
	201003	Develop an understanding of the influence of water flow on the engineering behaviour of soils.	3	2	-	2	-	1	-	2	2	1		1	2	1	1
	201003	Analyze engineering properties like compaction, permeability, soil shear strength.	3	-	2	2	2	-	3	1	-	-	2	-	-	-	-
	201003	Compute the lateral thrust and classify soil slopes.	2	1	-	-	1	2	1			1	1		3	2	2
Fluid Mechanics - I	201004	Understand Fluid properties and dimensional analysis for solving fluid flow problems	3	2	-	-	1	-	-	1	2	-	3	1	-	1	1
	201004	Apply knowledge to solve fluid static problems	3	2	-	-	-	-	-	-	2	2	-	1	-	-	-
	201004	Interpret the concept of fluid kinematics and classify types of fluid flow	2	2	1	2	2	-	-	-	2	-	-	1	-	2	2
	201004	Interpret fluid dynamics and understand the application of Bernoullis Equation	2	2	1	-	-	2	1	1	1	1	1	2	3	1	1
	201004	Understnd the concept of boundary layer developement	2	2	-	1	3	1	1	2	1	1	3	1	-	2	2
	201004	Apply the concept of turbulent flow through pipes and determine the varius losses in pipes	2	2	1	1	-	1	3	2	1	1	1	2	1	-	-

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Semester IV																		
Architectural Planning and Design of Buildings	201005	Implementing principles of architectural planning.	3		2		1	1	1	1	-	-	1	1	2	-	-
	201005	Analyze the available primary or secondary data and plan different types of structures considering futuristic need of an area.	3	2	2	2	1	1	2	-	1	2	1	3	2	-	-
	201005	Improve the status of existing structures by proposing appropriate green measures.	2	1	-	1	2	2	1	1	-	-	-	2	1	2	2
	201005	Plan effectively various types of buildings according to their utility.	2	-	2	1	2	2	-	1	2	-	1	1	2	2	2
	201005	Understand and resolve contemporary issues at multi-dimensional functional levels.	3	2	2	-	-	-	2		2	2	3	-	3	1	1
Structural Analysis - I	201008	Evaluate static and kinematic indeterminacy of structures. Determine slope and deflection in determinate beams using double integration method, area moment theorem, conjugate beam method and castigliano's theorem	3	-	-	1	2	-	-	-	1	-	1	1	1	2	2
	201008	Analyze indeterminate beams and frames using three moment theorem and castigliano's theorem	3	2	-	-	-	-	1	3	-	-	2	2	2	2	2
	201008	Analyze determinate and indeterminate trusses using castigliano's theorem	3	2	1	-	2	-	2	2	1	3	2	1	-	-	-
	201008	Apply influence line diagrams for the analysis of structures under moving load.	3	-	-	-	3	-	-	-	2	3	-	2	2	-	-
	201008	Analyze two and three hinged parabolic and circular arches	2	2	2	-	-	-	-	2	1	-	-	-	-	2	2
	201008	Apply static and kinematic method to find collapse load in indetrminate beams and frames using plastic analysis	2	-	2	1	-	2	1	-	-	-	-	-	-	2	2

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Engineering Geology	207009	Explain the basic concepts of engineering geology in terms of rock types and their applications in civil engineering.	3	-	2	1	-	2	2	-	3	1	3	1		1	1
	207009	Discuss physical properties and classification of minerals. Describe Structural geology, mountain building activity and plate tectonics theory.	3	-	-	1	-	2	2	1	2	-	2	2	1		
	207009	Illustrate Geomorphology and historical geology with physiographic divisions of india,principles of stratigraphy and geological time scale.	3	3	1	2	-	2	2	-	-	-	-	3	2		
	207009	Describe methods of preliminary geological explorations and applications of Remote sensing and GIS in civil engineering.	3	-	2	-	2	2	2	3	3	1	-	1	2	2	2
	207009	Assess the Importance of geological nature of the site, precautions and treatments to improve the site conditions for dams, reservoirs, and tunnels.	3	1	2	1	-	2	2				-	1		2	2
	207009	Explain geological hazards and importance of ground water and uses of common building stones.	3	1	2	1	-	2	2	3	3	1	-	1	1	1	1
Concrete Technology	201007	Understand chemistry, properties, and classification of cement, fly ash, aggregates and admixtures, and hydration of cement in concrete.	2	2	-	2	-	-	-	-	3	-	-	2		1	1
	201007	Prepare and test the fresh concrete	2	-	-	-	-	-	-		3	1	1	2	1	1	1
	201007	Test hardened concrete with destructive and nondestructive testing instruments	2	-	-	-	-	2	-	2	2	-	-	2	2	1	1
	201007	Get acquainted to concrete handling equipments and different special concrete types.	3	2	-	-	2	2	-	2	2	-	-	2	1	1	1
	201007	Design concrete mix of desired grade	3	2	2	-	-	2	-	3	3	2	2	2	3	1	1
	201007	Predict deteriorations in concrete and repair it with appropriate methods and techniques.	3	2	-	-	-	2	-	-	-	2	2	2	-	1	1

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Semester V																		
Hydrology and Water Resourse Engineering	301001	Estimating missing rainfall data	3	2	1	2	-	-	-	-	-	-	-	-	1	-	-
	301001	Compute water requirement of crops	2	2	-	-	-	-	-	-	-	-	-	-	1	2	2
	301001	Recognize various ground water distribution systems	3	2	2	2	-	-	2	-	1	2	-	2	1	2	2
	301001	Identify the concepts of hydrographs	3	2	-	-	-	2		-	-	-	2	-	1	2	2
	301001	DescribeApply the flood routing techniques to find flood frequency	2	1	-	-	-	2	2	-	-	-	-	-	1	2	2
	301001	Discuss water management, water logging & drainage concepts.	2	-	-	1	-	2	2	-	2		2	2	1	2	2
Infrastructure Engineering and Construction Techniques	301002	Describe the meaning and importance of Infrastructure Engineering	3	-	1	1	-	2	-	1	-	2	-	1	1	-	-
	301002	Classify railway systems and to select appropriate construction techniques	2	1	-	-	-	2	-	3	-		-	1	1	1	1
	301002	Interpret construcion techniques	3		-	-	-	2	-		-		-	1	1	3	3
	301002	Differentiate tunneling and its construction techniques	3	1	-	2	-	2	-	1	-	1	-	1	1	2	2
	301002	Compare docks and harbours along with their importance	3	1	-		2	2	2	-	-	-	-	1	1	-	-
	301002	Appraise various construction equipment's in Civil Engineering	3	-	3	1	-	2	2	-	-	1	-	1	1	-	-

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Structural Design - I	301003	Identify various limit states, load combinations, material properties, types of section, safety factors from IS:800-2007. Designing of tension member in steel structures	3	-	3	1	1	3	-	3	2	3	1	2	1	1	1
	301003	Analyse and design various Compression members in steel Structure.	3	2	3	-	-	3	2	3	2	2	-	2	1	2	2
	301003	Designing of various column bases in steel Structure.	3	-	3	-	-	3	-	3	2	-	2	2	1	2	2
	301003	Analyse and design a flexural member and beam to column connections	3	2	3		-	3	2	3	2	2	-	2	1	2	2
	301003	Designing of Welded plate girder	3	-	3	2	-	3		3	2		2	2	1	2	2
	301003	Analyse and design a Steel Truss and a Gantry Girder	3	3	-	1	-	-	2	3	2	2	-	2	1	-	-
Structural Analysis - II	301004	Analyse the indeterminant beams and frames by Slope Deflection method	3	3	-	-		-	2	2	-	-	1	1	1	-	-
	301004	Construct moment diagrams for indeterminant beams and frames by Moment Distribution method	3	-	2	-	2	2	2	-	2	-	2	1	-	1	1
	301004	Determine stress resultants in the indeterminant beams and frames by Flexibility method	3	-	1	-	-	3	3	-	2	-	-	1	1	-	-
	301004	Analyse the indeterminant beams and frames by Stiffness method	3	3	1	1	1	-	-	1	-	-		1	-	-	-
	301004	Construct BMD in highly indeterminate frames using cantilever and portal frame method. Determine slope and deflection in determinate beams approximately using Finite Difference Method	3	-	3	1	-	1	2	2	3	1	1	1	3	-	-
	301004	Apply basic concepts of finite element method to solve elementary problems	3	-	-	3		-	-	-	-	-	--	1	-	-	-

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Fluid Mechanics - II	301005	Describe fliud flow around submerged objects and classify the unsteady flow	3	3	3	-	1	1	1	-	3	2		2	-	1	1
	301005	Discuss open channel flow and derive depth energy relationship	3	2	-	1	3		2	-	3	-	2	-	-	1	1
	301005	Design the most economical channel section, demonstrate hydraulic jump	3	2	2	-	-	2	-	-	3	2	-	2	3	1	1
	301005	Understand the concept impact of jet, study of centrifugal pumps	3	2	-	3	2	2	2	2	3	-	2	-	3	1	1
	301005	Understand, analyse and design various types of Turbines.	2	-	1	-	-	3	-	-	3	-	2	2	-	1	1
	301005	Recognize and compute the GVF profiles by various methods	2	-	3	3	2	-	2	2	2	2	2	2	-	1	1
Semester VI																		
Adavanced Surveying	301007	Perform Geodetic Survey and understand the GNSS and triangulation survey.	2	-	-	-	1	-	-	-	-	-	-	2	2	-	-
	301007	Explain the concept of hydrographic surveying	3	2	1	-	-	-	-	-	-	-	2	-	2	-	-
	301007	Relate the concept of modern surveying techniques and their applications in various field of Civil Engineering.	3	2	2	3	2	2	2	2	2	-	-	-	2	-	-
	301007	Solve to adjust geodetic traverse and understand laws of weights	3	2	3	2	-	-	-	2	-	3	-	-	2	-	-
	301007	Interpret aerial photography data to study terrain.	3	2	-	2	-	1	1	-		3	-	-	-	2	2
	301007	Calculate the relative altitudes and distances of different points on ground.	3	2	-	-	3	-	1	-	2	3	-	2	-	2	2

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Project Management and Engineering Economics	301008	Understand the project planning & scheduling.	3	-	2	1	-	1	1	-	-	3	3	-	-	-	-
	301008	Implement appropriate resources at right time in project.	3	2	2	-	2	3	2	3	-	3	3	-	2	-	-
	301008	Examine the Team work and its impact on project progression.	3	2	-	1	3	1	3	3	3	3	3	-	2	2	2
	301008	Judge correct alternative in sells and purchase activities by understanding basics of engineering economics	3	-	2	2	3	1	2	2	3	3	3	-	-	2	2
	301008	Defend Investment and its stages in suggesting resource allocation	2	2	2	-	3	1	2	2	-	-	3	-	2	2	-
	301008	Summarize types of project appraisal and project reports	2	-	2	2	3	1	2	2	-	2	3	1	-	2	2
Foundation Engineering	301009	Complete site investigation program,including types,number,and location of boring	3	2	-	-	3	1	2	-	2	2	-	1	1	1	1
	301009	Evaluate bearing capacity and settlement for both shallow and deep foundation	3	2	-	2	-	1	2	2	2	-	-	1	1	-	2
	301009	Relate and study drilled piers and caisson.	3	-	-	2	3	-	2	2	2	-	-	-	-	2	-
	301009	Select appropriate design principles of foundation on black cotton soil	2	-	1	-	3	2	2	2	2	-	-	-	-	2	2
	301009	Priotize and suggest geosynthetic- reinforced soil structures	2	-	1	-	3	2	2		2	-	1	3	3	2	1
	301009	Adapt effect of earthquake techniques on structures	2	-	-	1	3	-	2	2	2	-	-	-	-	-	-

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Structural Design - II	301010	Compare the design philosophies – WSM, ULM, and LSM	3	3	3	1	3	-	1	2	2	1	3	2	-	-	-
	301010	Compute the moment of resistance of rectangular / flanged section by WSM and LSM	3	3	3	3	3	2	3	3	3	3	3	2	1	1	1
	301010	Examine or Select the cross section for slabs, beam, column and foundation conforming to IS 456:2000	3	3	3	3	3	2	-	3	1	-	1	2	-	1	1
	301010	Design the G+2 storey residential/commercial/public building conforming to IS 456:2000	3	2	3	2	-	3	-	3	2	1	1	2	1	3	3
Environmental Engineering - I	301011	To explain the source, control and effect of air and noise pollution	2	3	3	-	1	3	3	1	-	1	1	2	-	-	-
	301011	To describe the fundamentals of water treatment units and parts of water supply system.	3	2	2	-	-	2	3	1	-	1	1	2	2	2	2
	301011	To explain and design of Water treatment units	3	2	2	-	2	2	3	1	-	-	1	2	-	3	3
	301011	To describe the fundamentals of coagulation, flocculation and filtration in water supply system.	3	2	-	2	2	2	3	1	1	-	1	2	-	3	3
	301012	Describe the Miscellaneous treatment systems for drinking water	2	1	1	1	-	2	3	1	-	1	1	2	-	-	-
	301012	Demonstrate water distribution system, rain water harvesting and PWTP	3	2	1	1	-	2	3	1	1	1	1	2	-	-	-

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Semester VII																		
Environmental Engineering - II	401001	Explain the quality and characteristics of sewage and the concept of stream sanitation.	3	2	2	-	3	2	2	2	-	-	-	2	-	3	3
	401001	Describe the sewage treatment processes with the design of screen chamber, grit chamber, and primary sedimentation tank.	3	2	2	-	3	2	2	-	2	2	2	-	2	3	3
	401001	Describe and design the secondary treatment units with special emphasis on activated sludge process and trickling filter.	3	2	1	2	3	2	2	2	2	3	-	-	2	3	3
	401001	Explain low cost treatment methods with the design of oxidation pond, aerated lagoon.	3	2	2		3	2	2	2	2	3	-	-	2	3	3
	401002	Describe anaerobic treatment processes as anaerobic digester, up flow anaerobic sludge blanket and they also able to design septic tank.	3	2	2	2	3	2	2	2	2	33	-	2	-	3	3
	401002	Explain the characteristics and the treatment process of industrial wastewater of sugar,dairy and distillery industry .	3	2	2	2	-	2	3	2	-	-	-	2	3	-	-
Transportation Engineering	401002	Interpretition and study of rural road development vision and on-going road development projects.	3	2	2	-	2	2	-	-	-	3	-	2		-	-
	401002	Evaluate Gemometric design of highways.	3			2	3	2	-	2	2		-		2	-	-
	401002	Categorizing road traffic regulation and control devices.	2	2	2	2	3	2	-	2	2	2	-	2		-	-
	401002	Experimenting and Validating Pavement materials suiatbility in mix-design.	3	2	-	2	3	2	2	-	-	2	-	-		-	-
	401003	Design of pavement using IS Code and IRC guidelines.	2	-	2	2	3	2	2	2	2	2	2	-	-	2	-	-
	401003	Adapting the Modern Trends in Pavement Construction.	3	2	-	2	3	-	-	-	2	2	-	2	2	-	-

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Structural Design and Drawing - III	401003	Compute the stresses and losses in PSC Structures	3	3	3			2		2			-			-	-
	401003	Designing of PSC rectangular and flanged beams with end block, one way and 2 way post tensioned slabs conforming to IS: 1343:2012	3	3	3	3	2	2	2	3	2	3	-	2	3	-	-
	401003	Designing of PT flat slab conforming to IS:456-2000, IS: 1343:2012	3	3	3	3	-	2	2	3	2	3	-	2	-	2	2
	401003	Analysis and design of RCC cantilever T and L shape retaining walls conforming to IS 456:2000	3	3	3	3	-	2	2	3	2		3	2	2	2	2
	401004	Analyze and Design Liquid Retaining Structures resting on ground conforming to IS:3370-2009	3	3	-	3	-		2	3	2	3	-	2		2	2
	401004	Derive the equations of motion for free, forced, un-damped and damped vibrations. Estimate the EQ forces by seismic coeffiecient method conforming to IS 1893:2002	3	3	3	3	3	3	3	3	--		3	3	3	3	3
ACT	401004	Understand the chemistry of cement and its effect on properties of concrete	2	-	2	-	-	3	2	2	2	2	-	2	-	-	-
	401004	Apply the knowledge of supplementary cementitious materials to produce sustainable concretes	1	-	-	2	-	1	2	2	1	2	-	-	-	-	-
	401004	Understand the mechanism of working of admixtures and their effect on properties of concrete	2	2	2	-	-	3	2	-	2	3	-	-	-	-	-
	401004	Evaluate the characteristic properties of fiber reinforced concrete	2	2	2	-	2	2	2	2	2	3	-	2	2	2	2
	401005	Understand the durability properties of concrete	1	2	2	2	2	3	2	2	-	3	-	2	2	2	2
	401005	Interpret the properties of concrete through advance testing methods	1	2	2	2			2	2	-	2	-	2	22	-	-

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Total Quality Management	401005	Recognise quality & contribution of quality gurus.	3	-	2			2		2	2	-	2	-	-	-	-
	401005	Relate the functioning and application of TQM & Six Sigma	3	-	2	2	3	2	2	2	2	-	2	-	2	-	-
	401005	Implement ISO 9001 principles in preparation of quality manual	3	-	-	-	-	-	-	2	2	-	2			2	2
	401005	Construct & apply management control & certification systems.	2	-	1	2	1		1	-	2	-	2	1	2		
	401006	Execute TQM Implementation and various Quality Awards	2	-	-	1	1	1	1	1	2	2	2		1	1	1
	401006	Justify MIS & its application in construction sector.	3	3	-	2	3	3				2	2	1	1	1	1
Semester VIII																			
Dams and Hydraulic Structures	401007	Differentiate the types of dams and explain the importance of instrumentation for safety of dams	3	2	-	2	-	-	2	1	2	2	-	1	1	1	1
	401007	Analyze the Stability of gravity dam and describe the Concept of Arch Dam	3	3	2	-	2	2	2	1	2	2	-	1	1		
	401007	Design the spillways with appropriate given data and explain the concept of Spillway gates	3	2	2	2	2	2	2	-	1	--	2	1	1	-	-
	401007	Explain the types Earthen dam ,failures and Diversion head works.	3	2	-	-	2	2	3	-	-	2	-	1	1	1	1
	401008	Describe and use of the canal lining and canal structures.	2	-	2	2	2	2	3	2	2	2	2	1	1	1	1
	401008	Explain the importance of River training works and CD works.	3	2	-	-	-	-	3	-	2	2	2	1	1	1	1

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Quantity Surveying, Contracts and Tenders	401008	Choose the appropriate principles of computations related to quantity surveying.	3	2	-	-	-		--	2	2	2	2	2	2	2	2
	401008	Formulate the detail estimates and bill of quantities for various civil engineering projects.	3	-	-	3	2	-	--	2	2	2	3	3	2	2	2
	401008	Excersize computer software for schedule of rates and specifications	3	2	-	2	2	2	--	2	-	-	3	-	2	2	2
	401008	Analyses the rates and prepare valuation report.	2	-	3	2	-	-	--	-	-	-	3	3	-	-	-
	401009	Draft tender and work execution processes.	2	-	-	2	-	2	--	-	-	2	2	3	-	-	-
	401009	Apply the skill to defend a contract by knowing arbitration laws.	3	2	-	2	-	2	--	-	-	-	2	3	-	-	-
Air Pollution and Control	401009	Explore the meteorological aspects, Gaussian model and Emission inventory.	3	2	3	2	-	2	2	1	3	3	-	1	3	3	3
	401009	Classify and analyze Air sampling methods.	3	2	-	2	-	3	2	-	-	-	-	1	-	-	-
	401009	Select methods for control and prevention of air pollution.	3	2	2	2	3	2	2	-	3	3	3	1	2	3	3
	401009	Design of air pollution control equipment's.	2	-	-	2	2	2	2	3	-	3	-	1	2		
	401010	Discuss Air Pollution prevention and control Act.	3	2	-	2	-	3	2	2	-	2			2	3	3
	401010	Explore the Environmental impact assessment and management.	2	-	-	2	2	2	3		2	2	-	2	2		

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Construction Management	401010	Appraise the basic concepts of construction management such as types and functions of management, project participants and reporting system	3	2	2	2	2	2	2	2	2	3	3	2	22	3	3
	401010	Evaluate the progress of projects by using WBS breakdown Structure (WBS) and line of balance technique.	3	-	2	2	--	2	3	3	2	2	3	2	3	2	2
	401010	Implement the labour laws and various financial aspects for smooth functioning of project	3	2	2	2	--	2	-	2	-		3	2	--	1	1
	401010	Apply the risk management and value analysis models	2	2	2	2	3	-	-	-	3	--	2	3	--	3	3
	401012	Apply material management and HR management techniques	2	-	-	3	-	3	3	3		3	3	-	3	3	3
	401012	Recognize the importance and application of artificial intelligence technique	3	3	3	3	3	3	3	2	3	2	2	-	-	3	3

Principal

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Civil Engineering Department

Academic Year 2020-21

Semester III

Name of Course	Course Code	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Building Technology and Architectural Planning	201001.1	Identify types of building and basic requirements of building components.	1	3	-	-	-	-	-	-	-	-	-	-	-	1	1
	201001.2	Make use of Architectural Principles and Building byelaws for building construction		2	-	-	-	3	-	3	-	-	-	-	1	1	-
	201001.3	Plan effectively various types of Residential Building forms according to their utility, functions with reference to National Building Code.	1	2	2	-	-	-	3	3	-	3	-	-	1	1	-
	201001.4	Plan effectively various types of Public Buildings according to their utility functions with reference to National Building Code	1	2	2	-	-	-	3	3	-	3	-	-	-	1	-
	201001.5	Make use of Principles of Planning in Town Planning, Different Villages and Safety aspects	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-
	201001.6	Understand different services and safety aspects	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-
Mechanics of structure	201002.1	Understand concept of stress-strain and determine different types of stress, strain in determinate, indeterminate homogeneous and composite structures.	1	1	-	2	1	-	-	-	-	-	-	1	1	1	2
	201002.2	Calculate shear force and bending moment in determinate beams for different loading conditions and illustrate shear force and bending moment diagram.	1		1	-	-	-	1	1	-	1	1	1	1	1	2
	201002.3	Explain the concept of shear and bending stresses in beams and demonstrate shear and bending stress distribution diagram.	1	2	1	-	1	-	1	1	-	1	1	1	1	1	2
	201002.3	Use theory of torsion to determine the stresses in circular shaft and understand concept of Principal stresses and strains.	1	2	-		-	1	-	2	-	1		1	1	2	2
	201002.3	Analyze axially loaded and eccentrically loaded column.	1	-		1		1	-	2	1	1	1	1	1	1	2
	201002.3	Determine the slopes and deflection of determinate beams and trusses.	1	-	1	-	1	-	-	1	-	-	-	1	1	1	2

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Fluid Mechanics	201003.1	Understand the use of Fluid Properties, concept of Fluid statics, basic equation of Hydrostatics, measurement of fluid pressure, buoyancy & floatation and its application for solving practical problems	3	1	2	2	1	1	1	-	1	-	2	1	1	1	1
	201003.2	Understand the concept of fluid kinematics with reference to Continuity equation and fluid dynamics with reference to Modified Bernoulli's equation and its application to practical problems of fluid flow	2	2	1	1	1	1	1	1	2	1	1	1	1	1	1
	201003.3	Understand the concept of Dimensional analysis using Buckingham's π theorem, Similarity & Model Laws and boundary layer theory and apply it for solving practical problems of fluid flow.	2	2	1	2	1	2	1	1	1	1	1	2	1	1	1
	201003.4	Understand the concept of laminar and turbulent flow and flow through pipes and its application to determine major and minor losses and analyze pipe network using Hardy Cross method.	2	2	1	-	2	1	1	2	1	1	3	1	1	1	1
	201003.4	Understand the concept of open channel flow, uniform flow and depth-Energy relationships in open channel flow and make	2	2	-	1	1	1	3	2	1	1	1	2	1	1	1
	201003.4	Understand the concept of gradually varied flow in open channel and fluid flow around	2	2	1	1	1	1	1	1	-	-	1	1	1	1	1
Engineering Geology	207009.1	Explain about the basic concepts of engineering geology, various rocks, and minerals both inlab and on the fields and their inherent characteristics and their uses in civil engineering constructions	2	2	1	2	2	2	2	1	-	-	-	-	3	1	1
	207009.2	Exploring the importance of mass wasting processes and various tectonic processes that hampers the design of civil engineering projects and its implications on environment and sustainability	2	1	1	3	2	2	1	3	1	-	-	-	3	1	1
	207009.3	Recognize effect of plate tectonics, structural geology and their significance and utility in civil engineering activities	2	1	2	2	3	1	2	1	-	-	-	-	3	1	1
	207009.4	Incorporate the various methods of survey, to evaluate and interpret geological nature of therocks present at the foundations of the dams, percolation tanks, tunnels and to infer site alignment/ level free from geological defects/	2	1	1	2	3	1	1	2	1	-	-	-	1	3	1
	207009.4	Assess the Importance of geological nature of the site, precautions and treatments to improve the site conditions for dams, reservoirs, and tunnels	2	-	1	2	3	1	2	1	-	-	-	-	1	3	1
	207009.4	Explain geological hazards and importance of ground water and uses of common building stones.	2	-	1	2	3	1	3	1	-	-	-	-	3	1	-

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Engineering Mathematics III	**207001.1**	Solve Higher order linear differential equations and its applications to modeling and analyzing Civil engineering problems such as bending of beams, whirling of shafts and	2	2	1	2	2	2	2	1	-	-	-	-	3	1	1
	207001.2	Solve System of linear equations using direct & iterative numerical techniques and develop solutions for ordinary differential equations using single step & multistep methods applied to hydraulics, geotechnics and structural systems. (BT-3)	2	1	1	3	2	2	1	3	1	-	-	-	3	1	1
	207001.3	Apply Statistical methods like correlation, regression and probability theory in data analysis and predictions in civil engineering.	2	1	2	2	3	1	2	1	-	-	-	-	3	1	1
	207001.4	Perform Vector differentiation &integration, analyze the vector fields and apply to fluid flow problems.	2	1	1	2	3	1	1	2	1	-	-	-	1	3	1
	207001.4	Solve Partial differential equations such as wave equation, one and two dimensional heat flow equations.	2	-	1	2	3	1	2	1	-	-	-	-	1	3	1
Semester IV																	
Geotechnical Engineering	**201008.1**	Identify and classify the soil based on the index properties and its formation process.	2	3	-	3	-	1	2	-	-	3	-	-	1	-	1
	201008.2	Explain permeability and seepage analysis of soil by construction of flow net.	3	2	3	-	-	-	2	-	-	3	-	-	1	-	1
	201008.3	Illustrate the effect of compaction on soil and understand the basics of stress distribution.	3	2	3	-	-	1	3	-	-	3	-	-	1	-	1
	201008.4	Express shear strength of soil and its measurement under various drainage conditions.	3	3	-	2	-	-	2	-	-	3	-	-	1	-	1
	201008.4	Evaluate the earth pressure due to backfill on retaining structures by using different theories.	3	2	-	-	-	-	2	-	-	-	-	-	1	-	1
	201008.4	Analysis of stability of slopes for different types of soils.	3	2	3	-	-	-	3	-	-	3	-	-	1		1

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Survey	**201009.1**	Define and Explain basics of plane surveying and differentiate the instruments used for it.	3	1	-	-	-	-	-	-	3	-	-	2	3	-	-
	201009.2	Express proficiency in handling surveying equipment and analyze the surveying data from this equipment.	3	1	-	-	1	-	-	-	2	-	-	-	-	-	-
	201009.3	Describe different methods of surveying and find relative positions of points on the surface of earth	3	2	-	-	3	-	-	-	2	-	-	-	2	-	1
	201009.3	Execute curve setting for civil engineering projects such as roads, railways etc.	3	2	2	-	-	-	-	-	2	-	-	-	2	-	1
	201009.3	Articulate advancements in surveying such as space-based positioning systems.	3	-	-	2	3	-	-	-	2	-	-	-	1	-	1
	201009.3	Differentiate map and aerial photographs, also interpret aerial photographs	3	1	-	-	3	-	-	-	3	-	-	2	–	-	1
Concrete Technology	**201010.1**	Understand chemistry, properties, and classification of cement, fly ash, aggregates and admixtures, and hydration of cement in	2	2	-	-	-	-	-	-	3	-	-	-	1	2	3
	201010.2	Develop the skills to Prepare and test the fresh concrete	2	2	-	-	-	-	-	1	3	-	1	1	1	2	2
	201010.3	Recognize hardened concrete with destructive and nondestructive testing instruments	2	-	-	2	-		-	-	2	-	-	-	1	2	1
	201010.4	Design concrete mix of desired grade.	2	-	-	-	-	1	-	-	3	-	-	-	2	2	2
	201010.4	Explain the skill of concrete handling equipment's and understand different special concrete types.	3	3	3	-	-	-	-	-	3	-	-	-	1	1	1
	201010.4	Discuss deteriorations in concrete and repair it with appropriate methods and techniques.	3	2	-	-	-	-	-	-	-	-	-	-	2	2	1
Project management	**201012.1**	Describe project life cycle and the domains of Project ManagementDescribe project life cycle and the domains of	3	3	2	2	2	2	1	1	1	1	2	1	1	1	2
	201012.2	Explain networking methods and their applications in planning and management	3	3	3	1	1	1	1	1	1	1	2	2	1	1	1
	201012.3	Categorize the materials as per their annual usage and also Calculate production rate of construction equipment	3	3	3	2	2	1	1	1	1	1	2	1	2	1	1
	201012.4	Demonstrates resource allocation techniques and apply it for manpower planning.	2	3	2	1	1	1	2	2	1	1	2	2	1	1	1
	201012.4	Understand economical terms and different laws associated with project management	3	3	2	1	2	1	2	1	1	1	1	2	1	2	1
	201012.4	Apply the methods of project selection and recommend the best economical project	3	2	2	1	1	1	1	2	1	2	1	1	1	1	1

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Structural Analysis	**201011.1**	Understand the basic concept of static and kinematic indeterminacy and analysis of Indeterminate beam	1	2	1	2	2	2	1	1	1	1	2	1	1	3	1
	201011.2	Analyze redundant trusses and able to perform approximate analysis of multi-story multi-bay frames	2	3	3	1	1	1	1	1	1	1	2	2	2	1	1
	201011.3	Implement application of the slope deflection method to beams and portal frames.	3	3	3	2	2	1	1	1	1	1	2	1	1	1	2
	201011.3	Analyze beams and portal frames using moment distribution method.	2	3	2	1	1	1	2	2	1	1	2	2	2	2	1
	201011.3	Determine response of beams and portal frames using structure approach of stiffness matrix method	3	3	2	1	2	1	2	1	1	1	1	2	3	1	3
	201011.3	Apply the concepts of plastic analysis in the analysis of steel structures.	3	2	2	1	1	1	1	2	1	2	1	1	1	1	1
Semester V																		
Hydrology and Water Resourse Engineering	301001.1	Estimating missing rainfall data	3	2	1	2	-	-	-	-	-	-	-	-	1	-	-
	301001.2	Compute water requirement of crops	2	2	-	-	-	-	-	-	-	-	-	-	1	2	2
	301001.3	Recognize various ground water distribution systems	3	2	2	2	-	-	2	-	1	2	-	2	1	2	2
	301001.4	Identify the concepts of hydrographs	3	2	-	-	-	2		-	-	-	2	-	1	2	2
	301001.5	DescribeApply the flood routing techniques to find flood frequency	2	1	-	-	-	2	2	-	-	-	-	-	1	2	2
	301001.6	Discuss water management, water logging & drainage concepts.	2	-	-	1	-	2	2	-	2		2	2	1	2	2
Infrastructure Engineering and Construction Techniques	301002.2	Describe the meaning and importance of Infrastructure Engineering	3	-	1	1	-	2	-	1	-	2	-	1	1	-	-
	301002.3	Classify railway systems and to select appropriate construction techniques	2	1	-	-	-	2	-	3	-		-	1	1	1	1
	301002.3	Interpret construcion techniques	3		-	-	-	2	-		-		-	1	1	3	3
	301002.4	Differentiate tunneling and its construction techniques	3	1	-	2		2	-	1	-	1	-	1	1	2	2
	301002.5	Compare docks and harbours along with their importance	3	1	-		2	2	2	-	-	-	-	1	1	-	-
	301002.6	Appraise various construction equipment's in Civil Engineering	3	-	3	1	-	2	2	-	-	1	-	1	1	-	-

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Structural Design - I	301003.1	Identify various limit states, load combinations, material properties, types of section, safety factors from IS:800-2007. Designing of tension member in steel structures	3	-	3	1	1	3	-	3	2	3	1	2	1	1	1
	301003.2	Analyse and design various Compression members in steel Structure.	3	2	3	-	-	3	2	3	2	2	-	2	1	2	2
	301003.3	Designing of various column bases in steel Structure.	3	-	3	-	-	3	-	3	2	-	2	2	1	2	2
	301003.4	Analyse and design a flexural member and beam to column connections	3	2	3		-	3	2	3	2	2	-	2	1	2	2
	301003.5	Designing of Welded plate girder	3	-	3	2	-	3		3	2		2	2	1	2	2
	301003.6	Analyse and design a Steel Truss and a Gantry Girder	3	3	-	1	-	-	2	3	2	2	-	2	1	-	-
Structural Analysis - II	301004.1	Analyse the indetermiant beams and frames by Slope Deflection method	3	3	-	-		-	2	2	-	-	1	1	1	-	-
	301004.2	Construct moment diagrams for indetermiant beams and frames by Moment Distribution method	3	-	2	-	2	2	2	-	2	-	2	1	-	1	1
	301004.3	Determine stress resultants in the indetermiant beams and frames by Flexibility method	3	-	1	-	-	3	3	-	2	-	-	1	1	-	-
	301004.4	Analyse the indetermiant beams and frames by Stiffness method	3	3	1	1	1	-	-	1	-	-		1	-	-	-
	301004.5	Construct BMD in highly indeterminate frames using cantilever and portal frame method. Determine slope and deflection in determinate beams approximately using Finite Difference Method	3	-	3	1	-	1	2	2	3	1	1	1	3	-	-
	301004.6	Apply basic concepts of finite element method to solve elementary problems	3	-	-	3	-	-	-	-	-	-	--	1	-	-	-
Fluid Mechanics - II	301005.1	Describe fliud flow around submerged objects and classify the unsteady flow	3	3	3	-	1	1	1	-	3	2		2	-	1	1
	301005.2	Discuss open channel flow and derive depth energy relationship	3	2	-	1	3		2	-	3	-	2	-	-	1	1
	301005.3	Design the most economical channel section, demonstrate hydraulic jump	3	2	2	-	-	2	-	-	3	2	-	2	3	1	1
	301005.4	Understand the concept impact of jet, study of centrifugal pumps	3	2		3	2	2	2	2	3	-	2	-	3	1	1
	301005.5	Understand, analyse and design various types of Turbines.	2	-	1	-	-	3	-	-	3	-	2	2	-	1	1
	301005.6	Recognize and compute the GVF profiles by various methods	2		3	3	2	-	2	2	2	2	2	2	-	1	1

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Semester VI																	
Adavanced Surveying	301007.1	Perform Geodetic Survey and understand the GNSS and triangulation survey.	2	-	-	-	1	-	-	-	-	-	-	2	2	-	-
	301007.2	Explain the concept of hydrographic surveying	3	2	1	-	-	-	-	-	-	-	2	-	2	-	-
	301007.3	Relate the concept of modern surveying techniques and their applications in various field of Civil Engineering.	3	2	2	3	2	2	2	2	2	-	-	-	2	-	-
	301007.4	Solve to adjust geodetic traverse and understand laws of weights	3	2	3	2	-	-	-	2	-	3	-	-	2	-	-
	301007.5	Interpret aerial photography data to study terrain.	3	2	-	2	-	1	1	-		3	-	-	-	2	2
	301007.6	Calculate the relative altitudes and distances of different points on ground.	3	2	-	-	3	-	1	-	2	3	-	2	-	2	2
Project Management and Engineering Economics	301008.1	Understand the project planning & scheduling.	3	-	2	1	-	1	1	-	-	3	3	-	-	-	-
	301008.2	Implement appropriate resources at right time in project.	3	2	2	-	2	3	2	3	-	3	3	-	2	-	-
	301008.3	Examine the Team work and its impact on project progression.	3	2	-	1	3	1	3	3	3	3	3	-	2	2	2
	301008.4	Judge correct alternative in sells and purchase activities by understanding basics of engineering economics	3	-	2	2	3	1	2	2	3	3	3	-	-	2	2
	301008.5	Defend Investment and its stages in suggesting resource allocation	2	2	2	-	3	1	2	2	-	-	3	-	2	2	-
	301008.6	Summarize types of project appraisal and project reports	2	-	2	2	3	1	2	2	-	2	3	1	-	2	2
Foundation Engineering	301009.1	Complete site investigation program,including types,number,and location of boring	3	2	-	-	3	1	2	-	2	2	-	1	1	1	1
	301009.2	Evaluate bearing capacity and settlement for both shallow and deep foundation	3	2	-	2	-	1	2	2	2	-	-	1	1	-	2
	301009.3	Relate and study drilled piers and caisson.	3	-	-	2	3	-	2	2	2	-	-	-	-	2	-
	301009.4	Select appropriate design principles of foundation on black cotton soil	2	-	1	-	3	2	2	2	2	-	-	-	-	2	2
	301009.5	Priotize and suggest geosynthetic- reinforced soil structures	2		1	-	3	2	2		2	-	1	3	3	2	1
	301009.6	Adapt effect of earthquake techniques on structures	2	-	-	1	3	-	2	2	2	-	-	-	-	-	-

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Structural Design - II	301010.1	Compare the design philosophies – WSM, ULM, and LSM	3	3	3	1	3	-	1	2	2	1	3	2	-	-	-
	301010.2	Compute the moment of resistance of rectangular / flanged section by WSM and LSM	3	3	3	3	3	2	3	3	3	3	3	2	1	1	1
	301010.3	Examine or Select the cross section for slabs, beam, column and foundation conforming to IS 456:2000	3	3	3	3	3	2	-	3	1	-	1	2	-	1	1
	301010.4	Design the G+2 storey residential/commercial/public building conforming to IS 456:2000	3	2	3	2	-	3	-	3	2	1	1	2	1	3	3
Environmental Engineering - I	301011.1	To explain the source, control and effect of air and noise pollution	2	3	3	-	1	3	3	1	-	1	1	2	-	-	-
	301011.2	To describe the fundamentals of water treatment units and parts of water supply system.	3	2	2	-	-	2	3	1	-	1	1	2	2	2	2
	301011.3	To explain and design of Water treatment units	3	2	2	-	2	2	3	1	-	-	1	2	-	3	3
	301011.4	To describe the fundamentals of coagulation, flocculation and filtration in water supply system.	3	2	-	2	2	2	3	1	1	-	1	2	-	3	3
	301011.5	Describe the Miscellaneous treatment systems for drinking water	2	1	1	1	-	2	3	1	-	1	1	2	-	-	-
	301011.6	Demonstrate water distribution system, rain water harvesting and PWTP	3	2	1	1	-	2	3	1	1	1	1	2	-	-	-
Semester VII																			
Environmental Engineering - II	401001.1	Explain the quality and characteristics of sewage and the concept of stream sanitation.	3	2	2	-	3	2	2	2	-	-	-	2	-	3	3
	401001.2	Describe the sewage treatment processes with the design of screen chamber, grit chamber, and primary sedimentation tank.	3	2	2	-	3	2	2	-	2	2	2	-	2	3	3
	401001.3	Describe and design the secondary treatment units with special emphasis on activated sludge process and trickling filter.	3	2	1	2	3	2	2	2	2	3	-	-	2	3	3
	401001.4	Explain low cost treatment methods with the design of oxidation pond, aerated lagoon.	3	2	2		3	2	2	2	2	3	-	-	2	3	3
	401001.5	Describe anaerobic treatment processes as anaerobic digester, up flow anaerobic sludge blanket and they also able to design septic tank.	3	2	2	2	3	2	2	2	2	33	-	2	-	3	3
	401001.6	Explain the characteristics and the treatment process of industrial wastewater of sugar,dairy and distillery industry .	3	2	2	2	-	2	3	2	-	-	-	2	3	-	-

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Transportation Engineering	401002.1	Interpretition and study of rural road development vision and on-going road development projects.	3	2	2	-	2	2	-	-	-	3	-	2		-	-
	401002.2	Evaluate Gemometric design of highways.	3			2	3	2	-	2	2		-		2	-	-
	401002.3	Categorizing road traffic regulation and control devices.	2	2	2	2	3	2	-	2	2	2	-	2		-	-
	401002.4	Experimenting and Validating Pavement materials suiatbility in mix-design.	3	2	-	2	3	2	2	-	-	2	-	-		-	-
	401002.5	Design of pavement using IS Code and IRC guidelines.	2	-	2	2	3	2	2	2	2	2	-	-	2	-	-
	401002.6	Adapting the Modern Trends in Pavement Construction.	3	2	-	2	3	-	-	-	2	2	-	2	2	-	-
Structural Design and Drawing - III	401003.1	Compute the stresses and losses in PSC Structures	3	3	3			2		2			-			-	-
	401003.2	Designing of PSC rectangular and flanged beams with end block, one way and 2 way post tensioned slabs conforming to	3	3	3	3	2	2	2	3	2	3	-	2	3	-	-
	401003.3	Designing of PT flat slab conforming to IS:456-2000, IS: 1343:2012	3	3	3	3	-	2	2	3	2	3	-	2	-	2	2
	401003.4	Analysis and design of RCC cantilever T and L shape retaining walls conforming to IS 456:2000	3	3	3	3	-	2	2	3	2		3	2	2	2	2
	401003.5	Analyze and Design Liquid Retaining Structures resting on ground conforming to IS:3370-2009	3	3	-	3	-		2	3	2	3	-	2		2	2
	401003.6	Derive the equations of motion for free, forced, un-damped and damped vibrations. Estimate the EQ forces by seismic	3	3	3	3	3	3	3	3	--		3	3	3	3	3
ACT	401004.1	Understand the chemistry of cement and its effect on properties of concrete	2	-	2	-	-	3	2	2	2	2	-	2	-	-	-
	401004.2	Apply the knowledge of supplementary cementitious materials to produce sustainable	1	-	-	2	-	1	2	2	1	2	-	-	-	-	-
	401004.3	Understand the mechanism of working of admixtures and their effect on properties of	2	2	2	-	-	3	2	-	2	3	-	-	-	-	-
	401004.4	Evaluate the characteristic properties of fiber reinforced concrete	2	2	2	-	2	2	2	2	2	3	-	2	2	2	2
	401004.5	Understand the durability properties of concrete	1	2	2	2	2	3	2	2	-	3	-	2	2	2	2
	401004.6	Interpret the properties of concrete through advance testing methods	1	2	2	2	3	2	2	2	-	2	-	2	22	-	-

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Total Quality Management	401005.1	Recognise quality & contribution of quality gurus.	3	-	2			2		2	2	-	2	-	-	-	-
	401005.2	Relate the functioning and application of TQM & Six Sigma	3	-	2	2	3	2	2	2	2	-	2	-	2	-	-
	401005.3	Implement ISO 9001 principles in preparation of quality manual	3	-	-	-	-	-	-	2	2	-	2			2	2
	401005.4	Construct & apply management control & certification systems.	2	-	1	2	1		1	-	2	-	2	1	2		
	401005.5	Execute TQM Implementation and various Quality Awards	2	-	-	1	1	1	1	1	2	2	2		1	1	1
	401005.6	Justify MIS & its application in construction sector.	3	3	-	2	3	3				2	2	1	1	1	1
Semester VIII																	
Dams and Hydraulic Structures	401007.1	Differentiate the types of dams and explain the importance of instrumentation for safety of dams	3	2	-	2	-	-	2	1	2	2	-	1	1	1	1
	401007.2	Analyze the Stability of gravity dam and describe the Concept of Arch Dam	3	3	2	-	2	2	2	1	2	2	-	1	1		
	401007.3	Design the spillways with appropriate given data and explain the concept of Spillway gates	3	2	2	2	2	2	2	-	1	--	2	1	1	-	-
	401007.4	Explain the types Earthen dam ,failures and Diversion head works.	3	2	-	-	2	2	3	-	-	2	-	1	1	1	1
	401007.5	Describe and use of the canal lining and canal structures.	2	-	2	2	2	2	3	2	2	2	2	1	1	1	1
	401007.6	Explain the importance of River training works and CD works.	3	2	-	-	-	-	3	-	2	2	2	1	1	1	1
Quantity Surveying, Contracts and Tenders	401008.1	Choose the appropriate principles of computations related to quantity surveying.	3	2	-	-	-		--	2	2	2	2	2	2	2	2
	401008.2	Formulate the detail estimates and bill of quantities for various civil engineering projects.	3	-	-	3	2	-	--	2	2	2	3	3	2	2	2
	401008.3	Excersize computer software for schedule of rates and specifications	3	2	-	2	2	2	--	2	-	-	3	-	2	2	2
	401008.4	Analyses the rates and prepare valuation report.	2	-	3	2	[illegible]	[illegible]	--	-	-	-	3	3	-	-	-
	401008.5	Draft tender and work execution processes.	2	-	-	2	-	2	[illegible]	-	-	2	2	3	-	-	-
	401008.6	Apply the skill to defend a contract by knowing arbitration laws.	3	2	-	2	[illegible]	2	[illegible]	-	-	-	2	3	-	-	-

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Air Pollution and Control	401009.1	Explore the meteorological aspects, Gaussian model and Emission inventory.	3	2	3	2	-	2	2	1	3	3	-	1	3	3	3
	401009.2	Classify and analyze Air sampling methods.	3	2	-	2	-	3	2	-	-	-	-	1	-	-	-
	401009.3	Select methods for control and prevention of air pollution.	3	2	2	2	3	2	2	-	3	3	3	1	2	3	3
	401009.4	Design of air pollution control equipment's.	2	-	-	2	2	2	2	3	-	3	-	1	2		
	401009.5	Discuss Air Pollution prevention and control Act.	3	2	-	2	-	3	2	2	-	2			2	3	3
	401009.6	Explore the Environmental impact assessment and management.	2	-	-	2	2	2	3		2	2	-	2	2		
Construction Management	401010.1	Appraise the basic concepts of construction management such as types and functions of management, project participants and reporting system	3	2	2	2	2	2	2	2	2	3	3	2	22	3	3
	401010.2	Evaluate the progress of projects by using WBS breakdown Structure (WBS) and line of balance technique.	3	-	2	2	--	2	3	3	2	2	3	2	3	2	2
	401010.4	Implement the labour laws and various financial aspects for smooth functioning of project	3	2	2	2	--	2	-	2	-		3	2	--	1	1
	401010.4	Apply the risk management and value analysis models	2	2	2	2	3	-	-	-	3	--	2	3	--	3	3
	401011.5	Apply material management and HR management techniques	2	-	-	3	-	3	3	3		3	3	-	3	3	3
	401011.6	Recognize the importance and application of artificial intelligence technique	3	3	3	3	3	3	3	2	3	2	2	-	-	3	3

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Civil Engineering Department

Academic Year 2021-22

Semester III

Course Code	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
201001	**Building Technology and Architectural Planning**															
201001.1	Identify types of building and basic requirements of building components.	1	3	-	-	-	-	-	-	-	-	-	-	-	1	1
201001.2	Make use of Architectural Principles and Building byelaws for building construction		2	-	-	-	3	-	3	-	-	-	-	1	1	-
201001.3	Plan effectively various types of Residential Building forms according to their utility, functions with reference to National Building Code.	1	2	2	-	-	-	3	3	-	3	-	-	1	1	-
201001.4	Plan effectively various types of Public Buildings according to their utility functions with reference to National Building Code	1	2	2	-	-	-	3	3	-	3	-	-	-	1	-
201001.4	Make use of Principles of Planning in Town Planning, Different Villages and Safety aspects	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-
201001.4	Understand different services and safety aspects	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-
201002	**Mechanics of structure**															
201002.1	Understand concept of stress-strain and determine different types of stress, strain in determinate, indeterminate homogeneous and composite structures.	1	1	-	2	1	-	-	-	-	-	-	1	1	1	2
201002.2	Calculate shear force and bending moment in determinate beams for different loading conditions and illustrate shear force and bending moment diagram.	1		1	-	-	-	1	1	-	1	1	1	1	1	2
201002.3	Explain the concept of shear and bending stresses in beams and demonstrate shear and bending stress distribution diagram.	1	2	1	-	1	-	1	1	-	1	1	1	1	1	2
201002.3	Use theory of torsion to determine the stresses in circular shaft and understand concept of Principal stresses and strains.	1	2	-		-	1	-	2	-	1		1	1	2	2
201002.3	Analyze axially loaded and eccentrically loaded column.	1			1		1	-	2	1	1	1	1	1	1	2
201002.3	Determine the slopes and deflection of determinate beams and trusses.			1		1	-	-	1	-	-	-	1	1	1	2

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207001	**Engineering Mathematics III**																
207001.1	Solve Higher order linear differential equations and its applications to modeling and analyzing Civil engineering problems such as bending of beams, whirling of shafts and mass spring systems.	3	2	-	-	-	-	-	-	1	1	-	1	-	-		
207001.2	Solve System of linear equations using direct & iterative numerical techniques and develop solutions for ordinary differential equations using single step & multistep methods applied to hydraulics, geotechnics and structural systems. (BT-3)	3	2	-	-	-	-	-	-	1	1	-	1	-	-		
207001.3	Apply Statistical methods like correlation, regression and probability theory in data analysis and predictions in civil engineering.	3	3	-	-	-	-	-	-	1	1	-	1	-	-		
207001.4	Perform Vector differentiation &integration, analyze the vector fields and apply to fluid flow problems.	3	3	-	-	-	-	-	-	1	1	-	1	-	-		
207001.4	Solve Partial differential equations such as wave equation, one and two dimensional heat flow equations.	3	2	-	-	-	-	-	-	1	1	-	1	-	-		
									Semester IV								
201008	**Geotechnical Engineering**																
201008.1	Identify and classify the soil based on the index properties and its formation process.	2	3	-	3	-	1	2	-	-	3	-	-	1	-	1	
201008.2	Explain permeability and seepage analysis of soil by construction of flow net.	3	2	3	-	-	-	2	-	-	3	-	-	1	-	1	
201008.3	Illustrate the effect of compaction on soil and understand the basics of stress distribution.	3	2	3	-	-	1	3	-	-	3	-	-	1	-	1	
201008.4	Express shear strength of soil and its measurement under various drainage conditions.	3	3	-	2	-	-	2	-	-	3	-	-	1	-	1	
201008.4	Evaluate the earth pressure due to backfill on retaining structures by using different theories	3	2	-	-	-	-	2	-	-	-	-	-	1	-	1	
201008.4	Analysis of stability of slopes for different types of soils.	3	2	3	-	-	-	3	-	-	3	-	-	1		1	
201009	**Survey**																
201009.1	Define and Explain basics of plane surveying and differentiate the instruments used for	3	1	-	-	-	-	-	-	3	-	-	2	3	-	-	
201009.2	Express proficiency in handling surveying equipment and analyze the surveying data from this equipment.	3	1	-	-	1	-	-	-	2	-	-	-	-	-	-	
201009.3	Describe different methods of surveying and find relative positions of points on the surface of earth	3	2	-	-	3	-	-	-	2	-	-	-	2	-	1	
201009.3	Execute curve setting for civil engineering projects such as roads, railways etc.	3	2	2	-	-	-	-	-	2	-	-	-	2	-	1	
201009.3	Articulate advancements in surveying such as space-based positioning systems.	3	-	-	2	3	-	-	-	2	-	-	-	1	-	1	
201009.3	Differentiate map and aerial photographs, also interpret aerial photographs	3	1	-	-	3	-	-	-	3	-	-	2	–	-	1	

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201010	**Concrete Technology**																
201010.1	Understand chemistry, properties, and classification of cement, fly ash, aggregates and admixtures, and hydration of cement in concrete.	2	2	-	-	-	-	-	-	3	-	-	-	1	2	3
201010.2	Develop the skills to Prepare and test the fresh concrete	2	2	-	-	-	-	-	1	3	-	1	1	1	2	2
201010.3	Recognize hardened concrete with destructive and nondestructive testing instruments	2	-	-	2	-		-	-	2	-	-	-	1	2	1
201010.4	Design concrete mix of desired grade.	2	-	-	-	-	1	-	-	3	-	-	-	2	2	2
201010.4	Explain the skill of concrete handling equipment's and understand different special concrete types.	3	3	3	-	-	-	-	-	3	-	-	-	1	1	1
201010.4	Discuss deteriorations in concrete and repair it with appropriate methods and techniques.	3	2	-	-	-	-	-	-	-	-	-	-	2	2	1
201011	**Structural Analysis**															
201011.1	Understand the basic concept of static and kinematic indeterminacy and analysis of Indeterminate beam	1	2	1	2	2	2	1	1	1	1	2	1	1	3	1
201011.2	Analyze redundant trusses and able to perform approximate analysis of multi-story multi-bay frames	2	3	3	1	1	1	1	1	1	1	2	2	2	1	1
201011.3	Implement application of the slope deflection method to beams and portal frames.	3	3	3	2	2	1	1	1	1	1	2	1	1	1	2
201011.3	Analyze beams and portal frames using moment distribution method.	2	3	2	1	1	1	2	2	1	1	2	2	2	2	1
201011.3	Determine response of beams and portal frames using structure approach of stiffness matrix method	3	3	2	1	2	1	2	1	1	1	1	2	3	1	3
201011.3	Apply the concepts of plastic analysis in the analysis of steel structures.	3	2	2	1	1	1	1	2	1	2	1	1	1	1	1
201012	**Project management**															
201012.1	Describe project life cycle and the domains of Project ManagementDescribe project life cycle and the domains of Project Management	3	3	2	2	2	2	1	1	1	1	2	1	1	1	2
201012.2	Explain networking methods and their applications in planning and management	3	3	3	1	1	1	1	1	1	1	2	2	1	1	1
201012.3	Categorize the materials as per their annual usage and also Calculate production rate of construction equipment	3	3	3	2	2	1	1	1	1	1	2	1	2	1	1
201012.4	Demonstrates resource allocation techniques and apply it for manpower planning.	2	3	2	1	1	1	2	2	1	1	2	2	1	1	1
201012.4	Understand economical terms and different laws associated with project management	3	3	2	1	2	1	2	1	1	1	1	2	1	2	1
201012.4	Apply the methods of project selection and recommend the best economical project	3	2	2	1	1	1	1	2	1	2	1	1	1	1	1

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Semester V																
Course Code	**Name of Course**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
301001	**Hydrology and Water Resources Engineering**															
301001.1	Understand government organizations, apply & analyze precipitation & its abstractions.	3	2	-	2	-	1	-	-	-	-	-	1	1	2	2
301001.2	Understand, apply & analyze runoff, runoff hydrographs and gauging of streams	3	2	-	2	-	-	1	-	-	-	-	1	1	2	2
301001.3	Understand, apply & analyze floods, hydrologic routing & Q-GIS software in hydrology.	2	2	-	2	2	-	1	-	-	-	-	1	1	2	2
301001.4	Understand, apply & analyze reservoir planning, capacity of reservoir & reservoir economics	3	2	2	2	-	-	-	-	-	-	-	1	-	2	2
301001.5	Understand water logging & water management, apply & analyze ground water hydrology	2	2	-	-	-	1	-	-	-	-	-	1	1	2	2
301001.6	Understand irrigation, piped distribution network and canal revenue, apply and analyze crop water requirement.	2	2	-	-	-	-	-	-	-	-	-	1	1	2	2
301002	**Water Supply Engineering**															
301002.1	To make students understand importance of water infrastructure with respect to needs of various users	3	2	1	1	-	1	1	-	-	1	-	1	-	2	2
301002.2	To discuss and demonstrate the principles of water treatment plant and layout.	3	2	1	2	1	1	2	-	-	2	-	1	-	2	2
301002.3	To inculcate and impart design principles and working of WTP components	3	2	3	2	1	1	2	-	-	2	-	1	-	2	2
301002.4	To interpret need of contemporary issues in water treatment.	3	2	1	2	2	1	2	-	-	2	-	1	-	2	2
301002.5	Design elevated service reservoir capacity and understand the rainwater harvesting	3	2	2	2	2	1	2	-	-	2	-	1	-	2	2
301002.6	Understand the requirement of water treatment plant for infrastructure and Government scheme	1	1	1	1	1	1	2	1	-	2	-	1	1	1	1
301003	**Design of Steel Structures**															
301003.1	Demonstrate knowledge of steel structure types, steel code provisions, and the design of an appropriate steel section subjected to tensile force.	3	-	3	-	-	-	-	3	-	-	-	-	2	2	2
301003.2	Establish the suitable steel section for compression load and design built-up columns with lacing and battening.	3	3	3	-	-	-	-	3	-	-	-	-	-	3	3
301003.3	Design an eccentrically loaded column for evaluating section strength and column bases to check axial load and uniaxial bending.	3	-	3	-	-	-	-	3	-	-	-	-	-	3	3
301003.4	Using rolled steel section, design a laterally restrained and unrestrained beam with and without a flange plate.	3	-	3	-	-	-	-	3	-	-	-	-	-	3	3
301003.5	Analyze industrial trusses for dead, live, and wind loads, and design gantry girders for moving loads.	3	2	3	-	3	-	-	3	3	-	-	-	-	3	3
301003.6	Understand the function of welded plate girder components while designing a welded plate girder cross section, including stiffeners and connections.	3	3	3	-				3	3	-	-	-	-	3	3

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301004	**Engineering Economics and Financial Management**																
301004.1	Understand basics of construction economics.	2	1	-	-	-	1	-	1	-	-	3	-	2	3	1
301004.2	Develop an understanding of financial management in civil engineering projects.	2	2	-	-	-	1	-	1	-	-	3	-	3	2	1
301004.3	Prepare and analyze the contract account.	2	2	-	-	-	1	-	1	-	-	3	-	1	3	3
301004.4	Decide on right source of fund for construction projects.	2	2	-	-	-	1	-	1	-	-	3	-	3	2	1
301004.5	Understand working capital and its estimation for civil engineering projects.	2	2	-	-	-	1	-	1	-	-	3	-	3	1	2
301004.6	Illustrate the importance of tax planning & understand role of financial regulatory bodies	3	2	-	-	-	1	-	1	-	-	3	-	3	2	1
301005 d	**Elective I (ACT) 2019 PATTERN**																
301005 d.1	Understand the chemistry of cement and its effect on properties of concrete	3	2	1	1	1	1	3	1	1	1	3	3	1	1	1
301005 d.2	Apply the knowledge of supplementary cementitious materials to produce sustainable concretes	3	1	1	1	2	1	2	1	1	1	3	2	2	1	1
301005 d.3	Understand the mechanism of working of admixtures and their effect on properties of concrete	3	1	2	1	1	1	3	1	1	1	2	3	1	2	1
301005 d.4	Evaluate the characteristic properties of fiber reinforced concrete	3	1	2	1	3	1	2	1	1	1	2	2	2	1	1
301005 d.5	Understand the durability properties of concrete	3	1	2	1	3	1	3	1	1	1	3	3	1	1	2
301005 d.6	Interpret the properties of concrete through advance testing methods	3	1	2	1	2	1	2	1	1	1	2	2	1	2	1
301005c	**Elective I (CM) 2019 PATTERN**																
301005c.1	To understand the overview of construction sector.	-	1	-	-	2	1	1	-	2	3	3	1	2	1	2
301005c.2	Illustrate construction scheduling, work study and work measurement.	-	-	-	-	1	-	-	1	2	3	3	1	3	2	2
301005c.3	Acquaint various labor laws and financial aspects of construction projects.	-	-	-	-	1	2	-	2	1	1	2	1	2	2	1
301005c.4	Explain elements of risk management and value engineering.	1	-	1	1	-	1	-	3	1				2	2	1
301005c.5	State material and human resource management techniques in construction.	-	-	-	-	2	-	1	1	2	2	3	1	2	2	3
301005c.6	To understand basics of artificial intelligence techniques in civil engineering.	-	-	-	-	3	-	-	-	-	-	-	-	2	2	2

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301012	**Waste Water Engineering**	Semester VI														
301012.1	study sanitation infrastructure, quantification and characterization of wastewater, natural purification of stream	2	2	1	1	1	1	3	-	-	1	1	1	1	3	3
301012.2	Design preliminary and primary unit operations in waste water treatment plant	2	2	2	2	2	1	3	-	-	1	1	1	1	3	3
301012.3	Understand theory and mechanism of aerobic biological treatment system and to design activated sludge process	3	3	3	2	1	1	3	-	-	1	1	1	1	3	3
301012.4	Understand and design suspended and attached growth wastewater treatment system	2	2	2	1	1	1	3	-	-	1	1	1	1	3	3
301012.5	Explain and apply concept of contaminant removal by anaerobic, tertiary and emerging wastewater treatment system	1	1	1	1	1	1	3	-	-	1	1	1	1	3	3
301012.6	Compare various sludge management systems and explain the potential of recycle and reuse of wastewater treatment	1	1	1	1	-	1	3	-	-	1	1	1	1	3	3
301013	**Design of RC Structures**															
301013.1	Apply relevant IS provisions to ensure safety and serviceability of structures, understand the design philosophies and behavior of materials: steel and concrete.	3	-	-	-	-	1	-	-	-	-	-	1	-	1	-
301013.2	Recognize mode of failure as per LSM and evaluate moment of resistance for singly, doubly rectangular, and flanged sections.	3	2	3	-	-	1	-	3	2	-	-	2	-	2	-
301013.3	Design and detailing of rectangular one way and two-way slab with different boundary Conditions.	3	3	3	-	1	3	-	3	2	2	-	2	-	-	3
301013.4	Design and detailing of dog legged and open well staircase.	3	3	3	-	1	3	-	3	2	2	-	2	-	-	3
301013.5	Design and detailing of singly/doubly rectangular/flanged beams for flexure, shear, bond	3	3	3	-	1	3	-	3	2	2	-	2	-	-	3
301013.6	Design and detailing of short columns subjected to axial load, uni-axial/bi-axial bending and their footings.	3	3	3	-	1	3	-	3	2	2	-	2	-	-	3
301014	**Remote Sensing and GIS**															
301014.1	Articulate fundamentals and principles of RS techniques.	3	3	1	2	3	2	2	-	-	3	-	2	-	-	1
301014.2	Demonstrate the knowledge of remote sensing and sensor characteristics.	3	2	2	-	3	2	2	-	-	-	-	1	3	-	-
301014.3	Distinguish working of various spaces-based positioning systems.	3	1	3	3	3	2	2	-	-	-	-	1	3	1	1
301014.4	Analyze the RS data and image processing to utilize in civil engineering.	3	3	3	3	3	2	2	-	-	3	-	2	-	3	-
301014.5	Explain fundamentals and applications of RS and GIS.	3	1	2	2	3	3	2	-	-	2	-	1	2	-	1
301014.6	Acquire skills of data processing and its applications using GIS.	3	3	2	[illegible]	2	2	2	-	-	2	-	3	2	-	3

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301015e	**Elective II - ATP**																	
301015e.1	Apply the principles of architectural planning and architectural composition.	1	2	1	2	2	2	2	2	2	1	2	1	2	1	1		
301015e.2	Apply landscaping for improving quality of life.	2	3	3	1	2	1	2	2	1	1	2	2	1	1	2		
301015e.3	Understand the town planning and various schemes for town development.	2	3	3	2	2	1	2	2	1	1	2	1	2	1	1		
301015e.4	Understand the need of civic surveys for DP proposal and Traffic transportation systems.	2	3	2	1	2	1	2	2	1	1	2	2	1	1	2		
301015e.5	Understand and demonstrate planning strategy with reference to different acts, guidelines, norms.	3	3	2	1	2	1	2	2	1	1	1	2	1	2	1		
301015e.6	Appraise the existing condition and to develop the area for betterment	3	2	2	1	1	1	1	2	1	2	1	1	3	1	3		
301015f	**Elective II - SWM**																	
301015f.1	To understand problems of solid waste, estimate and characterize the solid waste and apply the knowledge of laws for municipal solid waste management for handling of MSW.	3	1	1	2	2	2	2	2	1	1	1	1	1	1	1		
301015f.2	To understand government initiatives for management of solid waste, to apply the knowledge of mathematics, science, and engineering for effective solid waste collectionsystems, for waste collection route optimization and its economics.	2	3	3	1	1	1	1	1	1	2	1	2	1	1	1		
301015f.3	To understand processing of solid waste, material recovery facility and to design composting systems, maintain and operate composting process for effective organic waste recycling.	1	2	3	2	1	1	1	1	1	1	1	1	1	1	2		
301015f.4	To understand working of waste to energy system and to design of bio-methnation and incineration system.	2	3	2	1	2	2	2	1	2	1	2	1	1	1	1		
301015f.5	To design & manage construction and operations of landfill facilities and management of legacy solid waste.	3	3	2	2	1	1	2	1	1	1	1	1	2	1	1		
301015f.6	To understand management and legal requirements of special waste and reuse, recycle and material recovery from solid waste.	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1		

Semester VII

Course Code	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
401 001	**Environmental Engineering II(sem 1)**															
401 001.1	study sanitation infrastructure, quantification and characterization of wastewater, natural purification of stream	2	2	1	1	-	1	3	-	-	1	1	1	1	1	1
402 001.2	Design preliminary and primary unit operations in waste water treatment plant	2	2	2	2	2	1	3	-	-	1	1	1	1	1	1
403 001.3	Understand theory and mechanism of aerobic biological treatment system and to design activated sludge process	3	3	3	2	1	1	3	-	-	1	1	1	1	1	1
404 001.4	Understand and design suspended and attached growth wastewater treatment system	2	2	2	2	1	1	3	-	-	1	1	1	1	1	1
405 001.5	Explain and apply concept of contaminant removal by anaerobic, tertiary and emerging wastewater treatment system	1	1	1	2	1	1	3	-	-	1	1	1	1	1	1
406 001.6	Compare various sludge management systems and explain the potential of recycle and reuse of wastewater treatment	1	1	1	2	1	1	3	-	-	1	1	1	1	1	1

401002	**Transportation Engineering**															
401002.1	Understand principles and practices of transportation planning.	1	2	1	2	2	2	2	2	2	1	2	1	1	1	1
401002.2	Demonstrate knowledge of traffic studies, analysis and their interpretation.	2	1	3	1	1	1	1	1	1	1	1	2	1	1	3
401002.3	Design Geometric Elements of road pavement.	1	1	3	1	1	2	2	1	1	1	1	1	2	3	1
401002.4	Evaluate properties of highway materials as a part of road pavement	2	2	2	1	2	1	1	1	1	1	1	2	1	1	1
401002.5	Appraise different types of pavements and their design	1	1	2	1	2	1	2	2	1	1	1	2	3	2	1
401002.6	Understand the fundamentals of Bridge Engineering and Railway Engineering	3	2	2	1	1	1	1	2	1	2	1	1	3	1	3
401 003	**Structural Design and Drawing-III**															
402 003.1	Students will be able to understand the different types of materials used in Prestressed structures and calculate losses in prestress members	3	2	-	-	-	2	3	-	3	-	2	-	-	1	-
403 003.2	Students will be able to design prestressed slab and girders	3	3	-	-	2	3	-	3	-	3	3	-	-	2	3
403 003.3	Students will be able to design prestressed flat slab	3	3	-	-	2	3	-	3	-	3	3	-	-	2	3
404 003.4	Students will be able to design retaining wall with different types of embankments	3	3	-	-	3	3	-	3	-	3	3	-	-	2	3
404 003.5	Students will be able to understand codal provisions and design flexible and rigid water tank	3	3	-	-	3	3	-	3	-	3	3	-	-	1	2
405 003.6	Students will be able to calculate earthquake forces	3	2	-	-	-	-	-	3	-	-	-	-	-	2	-
401004	**Elective I [ACT] -Advanced Concrete Technology**															
401004.1	Undedestand the types of cement & able to select the proportion of concrete to achieve qyality control and quality assurance	2	2	1	1	1	1	3	1	1	1	2	1	2	1	1
401004.2	Undedestand the different types of concrete and their different application	2	3	1	1	1	1	1	1	1	1	1	1	1	1	1
401004.3	Design of different high strength concrete and light weight concrete also perform non destructive testing methods	3	2	1	1	1	1	1	1	2	1	1	1	2	1	1
401004.4	Understand the basic concept, m/cal properties of different FRP concrete	3	3	1	1	1	1	1	2	1	1	1	2	1	1	1
401004.5	Able to check the properties of concrete in fresh and hardened state	3	3	1	1	1	1	1	2	1	1	3	1	1	1	1
401004.6	Understand the properties and specification of Ferrocement in industry as well as precast construction	3	3	1	1	1	1	1	2	1	3	1	1	1	1	1

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401 005	**Elective II [TQM-MIS]**																
401005.1	Students will be able to interpret importance of Quality and Analyze reasons of poor quality	2	1	-	1	-	-	-	-	1	-	2	1	2	-	1
401005.2	Students will be able to analyse causes of defects on construction site and to demonstrate applications of six sigma as qualitative tool	3	1	-	1	3	-	-	-	1	-	2	1	2	2	1
401005.3	Students will be able to identify checklist for various construction activities .	3	1	-	1	-	-	-	2	1	2	2	1	2	-	1
401005.4	Students will be able to evaluate cost of quality	3	1	-	1	-	-	-	-	1	2	2	1	2	-	1
401005.5	Students will be able to understand various techniques of TQM Implementation	2	1	-	-	2	-	-	-	-	2	2	1	2	-	1
401005.6	Students will be able to understand the concept of MIS and DSS as applied in construction projects	2	-	-	-	3	-	-	-	-	-	2	1	2	-	1
	Semester VIII																
401007	**Dams and Hydraulics Structure**																
401007.1	Understand types of dams and instrumentation working.	3	1	1	2	2	2	2	1	1	1	1	1	1	1	1
401007.2	Execute stability analysis of Gravity Dam.	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
401007.3	Understand types of spillways & Design of Ogee spillway.	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1
401007.4	Illustrate the failures and analyze stability of earthen dam.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
401007.5	Design Canals and understand the canal structures.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
401007.6	Analysis of the Diversion headwork and Cross Drainage work .	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1
401008	**Quantity Surveying, Contract nd Tenders**																
401008.1	Understand the concept of estimates and prepare approximate estimates for various civil engineering works.	3	3	1	2	2	2	2	1	1	1	1	1	1	1	1
401008.2	Prepare a detailed estimate of various items of work by different methods and calculate the quantity of steel from the bar bending schedule.	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
401008.3	Apply concepts of specification to draft a brief specification, a detailed specification, and a detailed rate analysis report	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1
401008.4	Evaluate the valuation of property on the basis of its present condition, specifications, and market trend.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
401008.5	Describe the tendering process, and prepare tender documents.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
401008.6	Describe construction contracts, and aspects of Arbitration and prepare the bill	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1

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401 009	Elective III (APC)																
401 009.1	Students will able to understand the effect of meteorological aspects & parameters,	3	2	-	-	-	1	3	-	-	-	-	1	1	2	1
401 009.2	Students will be aware of different methods of sampling for air pollutants, air pollutants including minimum stack height	3	2	2	-	-	1	3	-	-	-	-	1	1	2	1
401 009.3	Students to understand and identify sources, methods of measurement and control various indoor air pollution	3	2	-	2	-	1	3	-	-	-	-	1	-	2	1
401 009.4	Students to understand how to control air pollution, process modifications.	3	2	-	2	2	1	3	-	-	-	-	1	-	2	1
401 009.5	Students will able to correlate the effect of air pollution on society and measures for mitigation	3	2	-	1	-	1	3	-	-	-	-	1	1	2	1
401 009.6	Students will be aware of different national and international legislation related to air pollution &amp Students will able to read, prepare and understand EIA report.	3	2	2	2	1	1	3	2	-	2	-	1	1	2	1
401010	Elective-IV CM -2015 PATTERN															
401010.1	To understand the overview of construction sector.	2	2	-	2	2	1	1	-	2	3	3	1	2	1	2
401010.2	Illustrate construction scheduling, work study and work measurement.	1	-	1	-	1	-	-	1	2	3	3	1	3	2	2
401010.3	Acquaint various labor laws and financial aspects of construction projects.	1	2	1	-	1	2	-	2	1	1	2	1	2	2	1
401010.4	Explain elements of risk management and value engineering.	1	2	-	-	-	1	-	3	1				2	2	1
401010.5	State material and human resource management techniques in construction.	1	-	-	1	2	-	1	1	2	2	3	1	2	2	3
401010.6	To understand basics of artificial intelligence techniques in civil engineering.	1	-	1	-	1	-	-	1	-	-	-	1	2	2	2

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Civil Engineering Department

Academic Year 2022-23

Semester III

Course Code	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
201001	**Building Technology and Architectural Planning**															
201001.1	Identify types of building and basic requirements of building components.	1	3	-	-	-	-	-	-	-	-	-	-	-	1	1
201001.2	Make use of Architectural Principles and Building byelaws for building construction		2	-	-	-	3	-	3	-	-	-	-	1	1	-
201001.3	Plan effectively various types of Residential Building forms according to their utility, functions with reference to National Building Code	1	2	2	-	-	-	3	3	-	3	-	-	1	1	-
201001.4	Plan effectively various types of Public Buildings according to their utility functions with reference to National Building Code	1	2	2	-	-	-	3	3	-	3	-	-	-	1	-
201001.5	Make use of Principles of Planning in Town Planning, Different Villages and Safety aspects	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-
201001.6	Understand different services and safety aspects	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-
201002	**Mechanics of structure**															
201002.1	Understand concept of stress-strain and determine different types of stress, strain in determinate, indeterminate homogeneous and composite structures.	1	1	-	2	1	-	-	-	-	-	-	1	1	1	2
201002.2	Calculate shear force and bending moment in determinate beams for different loading conditions and illustrate shear force and bending moment diagram.	1		1	-	-	-	1	1	-	1	1	1	1	1	2
201002.3	Explain the concept of shear and bending stresses in beams and demonstrate shear and bending stress distribution diagram.	1	2	1	-	1	-	1	1	-	1	1	1	1	1	2
201002.4	Use theory of torsion to determine the stresses in circular shaft and understand concept of Principal stresses and strains.	1	2	-		-	1	-	2	-	1		1	1	2	2
201002.5	Analyze axially loaded and eccentrically loaded column.	1	-				1	-	2	1	1	1	1	1	1	2
201002.6	Determine the slopes and deflection of determinate beams and trusses.	1		1	-		-	-	1	-	-	-	1	1	1	2

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201003	**Fluid Mechanics**																
201003.1	Understand the use of Fluid Properties, concept of Fluid statics, basic equation of Hydrostatics, measurement of fluid pressure, buoyancy &	3	1	2	2	1	1	1	-	1	-	2	1	1	1	1
201003.2	Understand the concept of fluid kinematics with reference to Continuity equation and fluid dynamics with reference to Modified Bernoulli's equation and	2	2	1	1	1	1	1	1	2	1	1	1	1	1	1
201003.3	Understand the concept of Dimensional analysis using Buckingham's π theorem, Similarity & Model Laws and boundary layer theory and apply it for solving practical	2	2	1	2	1	2	1	1	1	1	1	2	1	1	1
201003.4	Understand the concept of laminar and turbulent flow and flow through pipes and its application to determine major and minor losses and analyze pipe network using Hardy Cross method	2	2	1	-	2	1	1	2	1	1	3	1	1	1	1
201003.5	Understand the concept of open channel flow, uniform flow and depth-Energy relationships in open channel flow and make the use of Chezy's and Manning's formulae for uniform flow	2	2	-	1	1	1	3	2	1	1	1	2	1	1	1
201003.6	Understand the concept of gradually varied flow in open channel and fluid flow around submerged objects, compute GVF profile and calculate drag	2	2	1	1	1	1	1	1	-	-	1	1	1	1	1
207009	**Engineering Geology**																
207009.1	Explain about the basic concepts of engineering geology, various rocks, and minerals both inlab and on the fields and their inherent characteristics and their uses in civil engineering	2	2	1	2	2	2	2	1	-	-	-	-	3	1	1
207009.2	Exploring the importance of mass wasting processes and various tectonic processes that hampers the design of civil engineering projects and its implications on environment and	2	1	1	3	2	2	1	3	1	-	-	-	3	1	1
207009.3	Recognize effect of plate tectonics, structural geology and their significance and utility in civil engineering activities	2	1	2	2	3	1	2	1	-	-	-	-	3	1	1
207009.4	Incorporate the various methods of survey, to evaluate and interpret geological nature of therocks present at the foundations of the dams, percolation tanks, tunnels and to infer	2	1	1	2	3	1	1	2	1	-	-	-	1	3	1
207009.5	Assess the Importance of geological nature of the site, precautions and treatments to improve the site conditions for dams, reservoirs, and tunnels	2	-	1	2	3	1	2	1	-	-	-	-	1	3	1
207009.6	Explain geological hazards and importance of ground water and uses of common building stones.	2	-	1	2	3	1	3	1	-	-	-	-	3	1	-

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207001	**Engineering Mathematics III**																	
207001.1	Solve Higher order linear differential equations and its applications to modeling and analyzing Civil engineering problems such as bending of beams, whirling of shafts and	3	2	-	-	-	-	-	-	1	1	-	1	-	-			
207001.2	Solve System of linear equations using direct & iterative numerical techniques and develop solutions for ordinary differential equations using single step & multistep methods	3	2	-	-	-	-	-	-	1	1	-	1	-	-			
207001.3	Apply Statistical methods like correlation, regression and probability theory in data analysis and predictions in civil engineering	3	3	-	-	-	-	-	-	1	1	-	1	-	-			
207001.4	Perform Vector differentiation &integration, analyze the vector fields and apply to fluid flow problems.	3	3	-	-	-	-	-	-	1	1	-	1	-	-			
207001.5	Solve Partial differential equations such as wave equation, one and two dimensional heat flow equations.	3	2	-	-	-	-	-	-	1	1	-	1	-	-			

Semester IV

201008	**Geotechnical Engineering**																	
201008.1	Identify and classify the soil based on the index properties and its formation process.	2	3	-	3	-	1	2	-	-	3	-	-	1	-	1		
201008.2	Explain permeability and seepage analysis of soil by construction of flow net.	3	2	3	-	-	-	2	-	-	3	-	-	1	-	1		
201008.3	Illustrate the effect of compaction on soil and understand the basics of stress distribution.	3	2	3	-	-	1	3	-	-	3	-	-	1	-	1		
201008.4	Express shear strength of soil and its measurement under various drainage conditions.	3	3	-	2	-	-	2	-	-	3	-	-	1	-	1		
201008.5	Evaluate the earth pressure due to backfill on retaining structures by using different theories.	3	2	-	-	-	-	2	-	-	-	-	-	1	-	1		
201008.6	Analysis of stability of slopes for different types of soils.	3	2	3	-	-	-	3	-	-	3	-	-	1		1		

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201009	**Survey**																
201009.1	Define and Explain basics of plane surveying and differentiate the instruments used for it.	3	1	-	-	-	-	-	-	3	-	-	2	3	-	-
201009.2	Express proficiency in handling surveying equipment and analyze the surveying data from this equipment.	3	1	-	-	1	-	-	-	2	-	-	-	-	-	-
201009.3	Describe different methods of surveying and find relative positions of points on the surface of earth	3	2	-	-	3	-	-	-	2	-	-	-	2	-	1
201009.4	Execute curve setting for civil engineering projects such as roads, railways etc.	3	2	2	-	-	-	-	-	2	-	-	-	2	-	1
201009.5	Articulate advancements in surveying such as space-based positioning systems.	3	-	-	2	3	-	-	-	2	-	-	-	1	-	1
201009.6	Differentiate map and aerial photographs, also interpret aerial photographs	3	1	-	-	3	-	-	-	3	-	-	2	–	-	1
201010	**Concrete Technology**															
201010.1	Understand chemistry, properties, and classification of cement, fly ash, aggregates and admixtures, and hydration of cement in concrete	2	2	-	-	-	-	-	-	3	-	-	-	1	2	3
201010.2	Develop the skills to Prepare and test the fresh concrete	2	2	-	-	-	-	-	1	3	-	1	1	1	2	2
201010.3	Recognize hardened concrete with destructive and nondestructive testing instruments	2	-	-	2	-		-	-	2	-	-	-	1	2	1
201010.4	Design concrete mix of desired grade.	2	-	-	-	-	1	-	-	3	-	-	-	2	2	2
201010.5	Explain the skill of concrete handling equipment's and understand different special concrete types.	3	3	3	-	-	-	-	-	3	-	-	-	1	1	1
201010.6	Discuss deteriorations in concrete and repair it with appropriate methods and techniques.	3	2	-	-	-	-	-	-	-	-	-	-	2	2	1

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201011	**Structural Analysis**																
201011.1	Understand the basic concept of static and kinematic indeterminacy and analysis of Indeterminate beam	1	2	1	2	2	2	1	1	1	1	2	1	1	3	1	
201011.2	Analyze redundant trusses and able to perform approximate analysis of multi-story multi-bay frames	2	3	3	1	1	1	1	1	1	1	2	2	2	1	1	
201011.3	Implement application of the slope deflection method to beams and portal frames.	3	3	3	2	2	1	1	1	1	1	2	1	1	1	2	
201011.4	Analyze beams and portal frames using moment distribution method.	2	3	2	1	1	1	2	2	1	1	2	2	2	2	1	
201011.5	Determine response of beams and portal frames using structure approach of stiffness matrix method	3	3	2	1	2	1	2	1	1	1	1	2	3	1	3	
201011.6	Apply the concepts of plastic analysis in the analysis of steel structures.	3	2	2	1	1	1	1	2	1	2	1	1	1	1	1	
201012	**Project management**																
201012.1	Describe project life cycle and the domains of Project ManagementDescribe project life cycle and the domains of Project Management	3	3	2	2	2	2	1	1	1	1	2	1	1	1	2	
201012.2	Explain networking methods and their applications in planning and management	3	3	3	1	1	1	1	1	1	1	2	2	1	1	1	
201012.3	Categorize the materials as per their annual usage and also Calculate production rate of construction equipment	3	3	3	2	2	1	1	1	1	1	2	1	2	1	1	
201012.4	Demonstrates resource allocation techniques and apply it for manpower planning.	2	3	2	1	1	1	2	2	1	1	2	2	1	1	1	
201012.5	Understand economical terms and different laws associated with project management	3	3	2	1	2	1	2	1	1	1	1	2	1	2	1	
201012.6	Apply the methods of project selection and recommend the best economical project	3	2	2	1	1	1	1	2	1	2	1	1	1	1	1	

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Course Code	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	Semester V															
301001	**Hydrology and Water Resources Engineering**															
301001.1	Understand government organizations, apply & analyze precipitation & its abstractions.	3	2	-	2	-	1	-	-	-	-	-	1	1	2	2
301001.2	Understand, apply & analyze runoff, runoff hydrographs and gauging of streams	3	2	-	2	-	-	1	-	-	-	-	1	1	2	2
301001.3	Understand, apply & analyze floods, hydrologic routing & Q-GIS software in hydrology.	2	2	-	2	2	-	1	-	-	-	-	1	1	2	2
301001.4	Understand, apply & analyze reservoir planning, capacity of reservoir & reservoir economics	3	2	2	2	-	-	-	-	-	-	-	1	-	2	2
301001.5	Understand water logging & water management, apply & analyze ground water hydrology	2	2	-	-	-	1	-	-	-	-	-	1	1	2	2
301001.6	Understand irrigation, piped distribution network and canal revenue, apply and analyze crop water requirement.	2	2	-	-	-	-	-	-	-	-	-	1	1	2	2
301002	**Water Supply Engineering**															
301002.1	To make students understand importance of water infrastructure with respect to needs of various users	3	2	1	1	-	1	1	-	-	1	-	1	-	2	2
301002.2	To discuss and demonstrate the principles of water treatment plant and layout.	3	2	1	2	1	1	2	-	-	2	-	1	-	2	2
301002.3	To inculcate and impart design principles and working of WTP components	3	2	3	2	1	1	2	-	-	2	-	1	-	2	2
301002.4	To interpret need of contemporary issues in water treatment.	3	2	1	2	2	1	2	-	-	2	-	1	-	2	2
301002.5	Design elevated service reservoir capacity and understand the rainwater harvesting	3	2	2	2	2	1	2	-	-	2	-	1	-	2	2
301002.6	Understand the requirement of water treatment plant for infrastructure and Government scheme	1	1	1	1	1	1	2	1	-	2	-	1	1	1	1

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301003	**Design of Steel Structures**																
301003.1	Demonstrate knowledge of steel structure types, steel code provisions, and the design of an appropriate steel section subjected to tensile force.	3	-	3	-	-	-	-	3	-	-	-	-	2	2	2
301003.2	Establish the suitable steel section for compression load and design built-up columns with lacing and battening.	3	3	3	-	-	-	-	3	-	-	-	-	-	3	3
301003.3	Design an eccentrically loaded column for evaluating section strength and column bases to check axial load and uniaxial bending.	3	-	3	-	-	-	-	3	-	-	-	-	-	3	3
301003.4	Using rolled steel section, design a laterally restrained and unrestrained beam with and without a flange plate.	3	-	3	-	-	-	-	3	-	-	-	-	-	3	3
301003.5	Analyze industrial trusses for dead, live, and wind loads, and design gantry girders for moving loads.	3	2	3	-	3	-	-	3	3	-	-	-	-	3	3
301003.6	Understand the function of welded plate girder components while designing a welded plate girder cross section, including stiffeners and connections.	3	3	3	-	-	-	-	3	3	-	-	-	-	3	3
301004	**Engineering Economics and Financial Management**																
301004.1	Understand basics of construction economics.	2	1	-	-	-	1	-	1	-	-	3	-	2	3	1
301004.2	Develop an understanding of financial management in civil engineering projects.	2	2	-	-	-	1	-	1	-	-	3	-	3	2	1
301004.3	Prepare and analyze the contract account.	2	2	-	-	-	1	-	1	-	-	3	-	1	3	3
301004.4	Decide on right source of fund for construction projects.	2	2	-	-	-	1	-	1	-	-	3	-	3	2	1
301004.5	Understand working capital and its estimation for civil engineering projects.	2	2	-	-	-	1	-	1	-	-	3	-	3	1	2
301004.6	Illustrate the importance of tax planning & understand role of financial regulatory bodies	3	2	-	-	-	1	-	1	-	-	3	-	3	2	1

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301005 d	**Elective I (ACT) 2019 PATTERN**																
301005 d.1	Understand the chemistry of cement and its effect on properties of concrete	3	2	1	1	1	1	3	1	1	1	3	3	1	1	1	
301005 d.2	Apply the knowledge of supplementary cementitious materials to produce sustainable concretes	3	1	1	1	2	1	2	1	1	1	3	2	2	1	1	
301005 d.3	Understand the mechanism of working of admixtures and their effect on properties of concrete	3	1	2	1	1	1	3	1	1	1	2	3	1	2	1	
301005 d.4	Evaluate the characteristic properties of fiber reinforced concrete	3	1	2	1	3	1	2	1	1	1	2	2	2	1	1	
301005 d.5	Understand the durability properties of concrete	3	1	2	1	3	1	3	1	1	1	3	3	1	1	2	
301005 d.6	Interpret the properties of concrete through advance testing methods	3	1	2	1	2	1	2	1	1	1	2	2	1	2	1	
301005c	**Elective I (CM) 2019 PATTERN**																
301005c.1	To understand the overview of construction sector.	-	1	-	-	2	1	1	-	2	3	3	1	2	1	2	
301005c.2	Illustrate construction scheduling, work study and work measurement.	-	-	-	-	1	-	-	1	2	3	3	1	3	2	2	
301005c.3	Acquaint various labor laws and financial aspects of construction projects.	-	-	-	-	1	2	-	2	1	1	2	1	2	2	1	
301005c.4	Explain elements of risk management and value engineering.	1	-	1	1	-	1	-	3	1				2	2	1	
301005c.5	State material and human resource management techniques in construction.	-	-	-	-	2	-	1	1	2	2	3	1	2	2	3	
301005c.6	To understand basics of artificial intelligence techniques in civil engineering.	-	-	-	-	3	-	-	-	-	-	-	-	2	2	2	

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Semester VI																	
301012	**Waste Water Engineering**																
301012.1	study sanitation infrastructure, quantification and characterization of wastewater, natural purification of stream	2	2	1	1	1	1	3	-	-	1	1	1	1	3	3	
301012.2	Design preliminary and primary unit operations in waste water treatment plant	2	2	2	2	2	1	3	-	-	1	1	1	1	3	3	
301012.3	Understand theory and mechanism of aerobic biological treatment system and to design activated sludge process	3	3	3	2	1	1	3	-	-	1	1	1	1	3	3	
301012.4	Understand and design suspended and attached growth wastewater treatment system	2	2	2	1	1	1	3	-	-	1	1	1	1	3	3	
301012.5	Explain and apply concept of contaminant removal by anaerobic, tertiary and emerging wastewater treatment system	1	1	1	1	1	1	3	-	-	1	1	1	1	3	3	
301012.6	Compare various sludge management systems and explain the potential of recycle and reuse of wastewater treatment	1	1	1	1	-	1	3	-	-	1	1	1	1	3	3	
301013	**Design of RC Structures**																
301013.1	Apply relevant IS provisions to ensure safety and serviceability of structures, understand the design philosophies and behavior of materials: steel and concrete.	3	-	-	-	-	1	-	-	-	-	-	1	-	1	-	
301013.2	Recognize mode of failure as per LSM and evaluate moment of resistance for singly, doubly rectangular, and flanged sections.	3	2	3	-	-	1	-	3	2	-	-	2	-	2	-	
301013.3	Design and detailing of rectangular one way and two-way slab with different boundary Conditions.	3	3	3	-	1	3	-	3	2	2	-	2	-	-	3	
301013.4	Design and detailing of dog legged and open well staircase.	3	3	3	-	1	3	-	3	2	2	-	2	-	-	3	
301013.5	Design and detailing of singly/doubly rectangular/flanged beams for flexure, shear, bond and torsion.	3	3	3	-	1	3	-	3	2	2	-	2	-	-	3	
301013.6	Design and detailing of short columns subjected to axial load, uni-axial/bi-axial bending and their footings.	3	3	3	-	1	3	-	3	2	2	-	2	-	-	3	

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301014	**Remote Sensing and GIS**															
301014.1	Articulate fundamentals and principles of RS techniques.	3	3	1	2	3	2	2	-	-	3	-	2	-	-	1
301014.2	Demonstrate the knowledge of remote sensing and sensor characteristics.	3	2	2	-	3	2	2	-	-	-	-	1	3	-	-
301014.3	Distinguish working of various spaces-based positioning systems.	3	1	3	3	3	2	2	-	-	-	-	1	3	1	1
301014.4	Analyze the RS data and image processing to utilize in civil engineering.	3	3	3	3	3	2	2	-	-	3	-	2	-	3	-
301014.5	Explain fundamentals and applications of RS and GIS.	3	1	2	2	3	3	2	-	-	2	-	1	2	-	1
301014.6	Acquire skills of data processing and its applications using GIS.	3	3	2	-	2	2	2	-	-	2	-	3	2	-	3
301015e	**Elective II - ATP**															
301015e.1	Apply the principles of architectural planning and architectural composition.	1	2	1	2	2	2	2	2	2	1	2	1	2	1	1
301015e.2	Apply landscaping for improving quality of life.	2	3	3	1	2	1	2	2	1	1	2	2	1	1	2
301015e.3	Understand the town planning and various schemes for town development.	2	3	3	2	2	1	2	2	1	1	2	1	2	1	1
301015e.4	Understand the need of civic surveys for DP proposal and Traffic transportation systems.	2	3	2	1	2	1	2	2	1	1	2	2	1	1	2
301015e.5	Understand and demonstrate planning strategy with reference to different acts, guidelines, norms.	3	3	2	1	2	1	2	2	1	1	1	2	1	2	1
301015e.6	Appraise the existing condition and to develop the area for betterment	3	2	2	1	1	1	1	2	1	2	1	1	3	1	3

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301015f	**Elective II - SWM**																
301015f.1	To understand problems of solid waste, estimate and characterize the solid waste and apply the knowledge of laws for municipal solid waste management for handling of MSW.	3	1	1	2	2	2	2	2	1	1	1	1	1	1	1	
301015f.2	To understand government initiatives for management of solid waste, to apply the knowledge of mathematics, science, and engineering for effective solid waste collectionsystems, for waste collection route optimization and its economics.	2	3	3	1	1	1	1	1	1	2	1	2	1	1	1	
301015f.3	To understand processing of solid waste, material recovery facility and to design composting systems, maintain and operate composting process for effective organic waste recycling.	1	2	3	2	1	1	1	1	1	1	1	1	1	1	2	
301015f.4	To understand working of waste to energy system and to design of bio-methnation and incineration system.	2	3	2	1	2	2	2	1	2	1	2	1	1	1	1	
301015f.5	To design & manage construction and operations of landfill facilities and management of legacy solid waste.	3	3	2	2	1	1	2	1	1	1	1	1	2	1	1	
301015f.6	To understand management and legal requirements of special waste and reuse, recycle and material recovery from solid waste.	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1	

Semester VII

Course Code	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
401 001	**Environmental Engineering II(sem 1)**															
401 001.1	study sanitation infrastructure, quantification and characterization of wastewater, natural purification of stream	2	2	1	1	-	1	3	-	-	1	1	1	1	1	1
402 001.2	Design preliminary and primary unit operations in waste water treatment plant	2	2	2	2	2	1	3	-	-	1	1	1	1	1	1
403 001.3	Understand theory and mechanism of aerobic biological treatment system and to design activated sludge process	3	3	3	2	1	1	3	-	-	1	1	1	1	1	1
404 001.4	Understand and design suspended and attached growth wastewater treatment system	2	2	2	2	1	1	3	-	-	1	1	1	1	1	1
405 001.5	Explain and apply concept of contaminant removal by anaerobic, tertiary and emerging wastewater treatment system	1	1	1	2	1	1	3	-	-	1	1	1	1	1	1
406 001.6	Compare various sludge management systems and explain the potential of recycle and reuse of wastewater treatment	1	1	1	2	1	1		-	-		1	1	1	1	

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401002	**Transportation Engineering**															
401002.1	Understand principles and practices of transportation planning.	1	2	1	2	2	2	2	2	2	1	2	1	1	1	1
401002.2	Demonstrate knowledge of traffic studies, analysis and their interpretation.	2	1	3	1	1	1	1	1	1	1	1	2	1	1	3
401002.3	Design Geometric Elements of road pavement.	1	1	3	1	1	2	2	1	1	1	1	1	2	3	1
401002.4	Evaluate properties of highway materials as a part of road pavement	2	2	2	1	2	1	1	1	1	1	1	2	1	1	1
401002.5	Appraise different types of pavements and their design	1	1	2	1	2	1	2	2	1	1	1	2	3	2	1
401002.6	Understand the fundamentals of Bridge Engineering and Railway Engineering	3	2	2	1	1	1	1	2	1	2	1	1	3	1	3
401 003	**Structural Design and Drawing-III**															
402 003.1	Students will be able to understand the different types of materials used in Prestressed structures and calculate losses in prestress members	3	2	-	-	-	2	3	-	3	-	2	-	-	1	-
403 003.2	Students will be able to design prestressed slab and girders	3	3	-	-	2	3	-	3	-	3	3	-	-	2	3
403 003.3	Students will be able to design prestressed flat slab	3	3	-	-	2	3	-	3	-	3	3	-	-	2	3
404 003.4	Students will be able to design retaining wall with different types of embankments	3	3	-	-	3	3	-	3	-	3	3	-	-	2	3
404 003.5	Students will be able to understand codal provisions and design flexible and rigid water tank	3	3	-	-	3	3	-	3	-	3	3	-	-	1	2
405 003.6	Students will be able to calculate earthquake forces	3	2	-	-	-	-	-	3	-	-	-	-	-	2	-

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401004	**Elective I [ACT] -Advanced Concrete Technology**																	
401004.1	Undedestand the types of cement & able to select the proportion of concrete to achieve qyality control and quality assurance	2	2	1	1	1	1	3	1	1	1	2	1	2	1	1		
401004.2	Undedestand the different types of concrete and their different application	2	3	1	1	1	1	1	1	1	1	1	1	1	1	1		
401004.3	Design of different high strength concrete and light weight concrete also perform non destructive testing methods	3	2	1	1	1	1	1	1	2	1	1	1	2	1	1		
401004.4	Understand the basic concept, m/cal properties of different FRP concrete	3	3	1	1	1	1	1	2	1	1	1	2	1	1	1		
401004.5	Able to check the properties of concrete in fresh and hardened state	3	3	1	1	1	1	1	2	1	1	3	1	1	1	1		
401004.6	Understand the properties and specification of Ferrocement in industry as well as precast construction	3	3	1	1	1	1	1	2	1	3	1	1	1	1	1		
401 005	**Elective II [TQM-MIS] (sem1)**																	
401005.1	Students will be able to interpret importance of Quality and Analyze reasons of poor quality	2	1	-	1	-	-	-	-	1	-	2	1	2	-	1		
401005.2	Students will be able to analyse causes of defects on construction site and to demonstrate applications of six sigma as qualitative tool	3	1	-	1	3	-	-	-	1	-	2	1	2	2	1		
401005.3	Students will be able to identify checklist for various construction activities .	3	1	-	1	-	-	-	2	1	2	2	1	2	-	1		
401005.4	Students will be able to evaluate cost of quality	3	1	-	1	-	-	-	-	1	2	2	1	2	-	1		
401005.5	Students will be able to understand various techniques of TQM Implementation	2	1	-	-	2	-	-	-	-	2	2	1	2	-	1		
401005.6	Students will be able to understand the concept of MIS and DSS as applied in construction projects	2	-	-	-	3	-	-	-	-	-	2	1	2	-	1		

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		Semester VIII														
401007	**Dams and Hydraulics Structure**															
401007.1	Understand types of dams and instrumentation working.	3	1	1	2	2	2	2	1	1	1	1	1	1	1	1
401007.2	Execute stability analysis of Gravity Dam.	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
401007.3	Understand types of spillways & Design of Ogee spillway.	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1
401007.4	Illustrate the failures and analyze stability of earthen dam.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
401007.5	Design Canals and understand the canal structures.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
401007.6	Analysis of the Diversion headwork and Cross Drainage work .	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1
401008	**Quantity Surveying, Contract nd Tenders**															
401008.1	Understand the concept of estimates and prepare approximate estimates for various civil engineering works.	3	3	1	2	2	2	2	1	1	1	1	1	1	1	1
401008.2	Prepare a detailed estimate of various items of work by different methods and calculate the quantity of steel from the bar bending schedule.	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
401008.3	Apply concepts of specification to draft a brief specification, a detailed specification, and a detailed rate analysis report	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1
401008.4	Evaluate the valuation of property on the basis of its present condition, specifications, and market trend.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
401008.5	Describe the tendering process, and prepare tender documents.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
401008.6	Describe construction contracts, and aspects of Arbitration and prepare the bill	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1

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401 009	**Elective III (APC)**																
401 009.1	Students will able to understand the effect of meteorological aspects & parameters,	3	2	-	-	-	1	3	-	-	-	-	1	1	2	1
401 009.2	Students will be aware of different methods of sampling for air pollutants, air pollutants including minimum stack height	3	2	2	-	-	1	3	-	-	-	-	1	1	2	1
401 009.3	Students to understand and identify sources, methods of measurement and control various indoor air pollution	3	2	-	2	-	1	3	-	-	-	-	1	-	2	1
401 009.4	Students to understand how to control air pollution, process modifications.	3	2	-	2	2	1	3	-	-	-	-	1	-	2	1
401 009.5	Students will able to correlate the effect of air pollution on society and measures for mitigation	3	2	-	1	-	1	3	-	-	-	-	1	1	2	1
401 009.6	Students will be aware of different national and international legislation related to air pollution &amp Students will able to read, prepare and understand EIA report.	3	2	2	2	1	1	3	2	-	2	-	1	1	2	1
401010	**Elective-IV CM -2015 PATTERN**																
401010.1	To understand the overview of construction sector.	2	2	-	2	2	1	1	-	2	3	3	1	2	1	2
401010.2	Illustrate construction scheduling, work study and work measurement.	1	-	1	-	1	-	-	1	2	3	3	1	3	2	2
401010.3	Acquaint various labor laws and financial aspects of construction projects.	1	2	1	-	1	2	-	2	1	1	2	1	2	2	1
401010.4	Explain elements of risk management and value engineering.	1	2	-	-	-	1	-	3	1				2	2	1
401010.5	State material and human resource management techniques in construction.	1	-	-	1	2	-	1	1	2	2	3	1	2	2	3
401010.6	To understand basics of artificial intelligence techniques in civil engineering.	1	-	1	-	1	-	-	1	-	-	-	1	2	2	2

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(Approved by AICTE and Govt. of Maharashtra, Affiliated to Savitribai Phule Pune University)
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Founder President: Shri Rambhau Moze

Criteria 2.6.2 CO PO Mapping

Information Technology 2015 pattern

Sr. No.	Course Code	Course Name
		Semester - III
1	214441	Discrete Structures
2	214442	Computer Organization & Architecture
3	214443	Digital Electronics and Logic Design
4	214444	Fundamentals of Data Structures
5	214445	Problem Solving and Object Oriented programming
		Semester - IV
6	207003	Engineering MathematicsIII
7	214450	Computer Graphics
8	214451	Processor Architecture
9	214452	Data Structures & Files
10	214453	Foundations of Communication and Computer Network
		Semester - V
11	314441	Theory of Computation
12	314442	Database Management Systems
13	314443	Software Engineering &Project Management
14	314444	Operating System
15	314445	Human-Computer Interaction
		Semester - VI
16	314450	Computer Network Technology
17	314451	Systems Programming
18	314452	Design and Analysis of Algorithms
19	314453	Cloud Computing
20	314454	Data Science & Big Data Analytics
		Semester - VII
21	414453	Information and Cyber Security
22	414454	Machine Learning and Applications
23	414455	Software Design and Modeling
24	414456E	Elective-I Business Analytics and Intelligence
	414457C	Elective-II Software Testing and Quality Assurance
		Semester - VIII
25	414462	Distributed Computing System
26	414463	Ubiquitous Computing
27	414464C	Elective III Multimedia Techniques
28	414465D	Elective IV Social Media Analytics

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Founder President: Shri Rambhau Moze

Criteria 2.6.2 CO PO Mapping

Information Technology 2019 pattern

Sr. No.	Course Code	Course Name
		Semester - III
1	214441	Discrete Mathematics
2	214442	Computer Organization and Logic Design
3	214443	Data Structures and Algorithms
4	214444	Object Oriented Programming
5	214445	Basics of Computer Network
		Semester - IV
6	207003	Engineering MathematicsIII
7	214451	Processor Architecture
8	214452	Database Management System
9	214453	Computer Graphics
10	214454	Software Engineering
		Semester - V
11	314441	Theory of Computation
12	314442	Operating Systems
13	314443	Machine Learning
14	314444	Human Computer Interaction
15	314445	Elective-I Internet of Things
		Semester - VI
16	314451	Computer Networks& Security
17	314452	Data Science and Big Data Analytics
18	314453	Web Application Development
19	314454	Elective-II Cloud Computing
		Semester - VII
20	414441	Information and Storage Retrieval
21	414442	Software Project Management
22	414443	Deep Learning
23	414444	Elective III Mobile Computing
24	414445	Elective IV Wireless Communications
		Semester - VIII
25	414450	Distributed Systems
26	414451	Elective V Social Computing
27	414452	Elective VI Blockchain Technology

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2.6.2 CO-PO Mapping Matrix

Semester III

Course Code	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
214441	**Discrete Structures**														
214441.1	Formulate, apply formal proof techniques and solve the problems with logical reasoning.	3	2	3	2	2	-	2	-	2	1	-	1	2	-
214441.2	Analyze and evaluate the combinatorial problems by using probability theory.	3	2	2	2	2	-	2	-	2	1	-	1	2	-
214441.3	Apply the concepts of graph theory to devise mathematical models.	3	3	3	2	2	-	2	-	1	1	-	1	2	-
214441.4	Analyze types of relations and functions to provide solution to computational problems.	2	2	2	-	-	-	-	-	1	1	-	1	2	-
214441.5	Identify techniques of number theory and its application.	2	2	1	-	-	-	-	-	-	1	-	1	1	-
214441.6	Identify fundamental algebraic structures.	2	2	3	1	2	-	1	-	2	1	-	1	1	-
214442	**Computer Organization & Architecture**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
214442.1	Solve problems based on computer arithmetic.	3	3	-	-	2	1	-	-	-	-	-	-	1	1
214442.2	Explain processor structure & its functions.	3	3	3	-	1	1	-	-	-	-	-	-	3	1
214442.3	Obtain knowledge about micro-programming of a processor.	3	3	3	-	1	1	-	-	-	-	-	-	3	
214442.4	Understand concepts related to memory & IO organization.	3	2	-	-	2	3	-	-	-	-	-	-	-	1
214442.5	Understand CPU instruction characteristics	3	2	-	-	2	2	-	-	-	-	-	-	-	1
214442.6	Understand enhancement features of CPU	3	2	-	-	2	2	-	-	-	-	-	-	1	1
214443	**Digital Electronics and Logic Design**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
214443.1	Spectacle an awareness and apply knowledge of number systems, codes, Boolean algebra and use necessary A.C, D.C Loading characteristics as well as functioning while designing with logic gates.	3	3	2	3	-	3	-	-	-	-	-	-	1	-
214443.2	Use logic function representation for simplification with K-Maps and analyze as well as design Combinational logic circuits using SSI & MSI chips.	1	3	3	3	-	3	-	-	-	-	-	-	2	-
214443.3	Analyze Sequential circuits like Flip-Flops (Truth Table, Excitation table), their conversion & design the applications.	2	1	2	3	-	3	-	-	-	-	-	-	2	-
214443.4	Design algorithms based on techniques like brute-force,	2	3	3	3	-	3	-	-	-	-	-	-	1	2
214443.5	Use VHDL programming technique	3	3	2	3	-	3	-	-	-	-	-	-	1	1
214443.6	different modeling styles for any digital circuits	1	3	3	3	-	3	-	-	-	-	-	-	1	1

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214444	Fundamentals of Data Structures	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
214444.1	Apply appropriate constructs of C language, coding standards for application development.	2	3	2	3	-	3	-	-	-	-	-	-	2	-
214444.2	Use dynamic memory allocation concepts and file handling in various application developments.	1	2	3	2	-	2	-	-	-	-	-	-	1	-
214444.3	Perform basic analysis of algorithms with respect to time and space complexity	2	1	2	3	-	3	-	-	-	-	-	-	1	-
214444.4	Select appropriate searching and/or sorting techniques in the application development	2	3	3	2	-	3	-	-	-	-	-	-	-	1
214444.5	Select and use appropriate data structures for problem solving and programming	3	3	2	3	-	2	-	-	-	-	-	-	-	1
214444.6	Use algorithmic foundations for solving problems and programming	1	3	2	3	-	3	-	-	-	-	-	-	1	-
214445	Problem Solving and Object Oriented programming	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
214445.1	Develop algorithms for solving problems by using modular programming concepts	3	3	3	2	2	3	3	-	-	2	-	2	1	1
214445.2	Abstract data and entities from the problem domain, build object models and design software solutions using object-oriented principles and strategies	2	3	2	3	2	3	3	1	-	2	-	2	1	1
214445.3	Discover, explore and apply tools and best practices in object-oriented programming.	3	3	3	3	2	3	3	1	-	2	-	2	1	1
214445.4	Develop programs that appropriately utilize key object-oriented concepts	3	2	3	3	2	3	3	1	-	2	-	2	1	1
214445.5	Apply appropriate Virtual Functions and Templates to provide object-oriented solutions	3	3	2	3	2	2	2	-	-	2	-	-	1	1
214445.6	Use of files for persistent data storage for real world	3	3	3	3	2	2	3	-	-	2	-	-	1	1

Semester IV

207003	Engineering Mathematics III	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
207003 .1	Solve higher order linear differential equation using appropriate techniques for modeling and analysing electrical circuits.	1	2	1	2	-	-	-	-	-	-	-	-	1	-
207003 .2	Solve problems related to Fourier Transform, Z-Transform and applications to signal and image processing.	1	1	2	2	-	-	-	-	1	-	-	-	1	-
207003 .3	Apply statistical methods like correlation, regression analysis and probability theory for analysis and prediction of a given data as	2	1	1	2	-	1	-	-	-	-	-	-	2	-

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207003 .4	Perform vector differentiation and integration to ar ze the vector fields and apply to compute line, surface and volume	1	2	2	1	-	-	-	-	-	-	-	-	1	-
207003 .5	contour integration of complex functions required in Image processing, Digital filters and Computer graphics.	1	2	1	2	-	-	-	-	-	-	-	-	2	-
214450	**Computer Graphics**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
214450 .1	Apply mathematics and logic to develop Computer programs for elementary graphic operations	3	3	3	2	2	1	2	1	0	1	2	-	2	-
214450 .2	Explain and employ techniques of geometrical transforms to produce, position and manipulate objects in 2 dimensional and 3-dimensional space respectively.	2	3	3	3	2	2	2	2	2	2	2	-	-	-
214450 .3	Describe mapping from a world coordinates to device coordinates, clipping, and projections in order to produce 3D images on 2D output device.	3	3	3	2	2	2	2	2	2	1	1	-	-	-
214450 .4	design, development and testing of 2D, 3D modeling applications.	2	3	2	2	1	2	2	2	1	1	-	2	-	1
214450 .5	Apply the concepts of rendering, shading, animation	2	3	1	2	1	2	1	2	1	1	-	2	-	-
214450 .6	Apply the concepts of CURVES AND FRACTALS	1	2	2	2	1	1	-	-	-	1	-	2	-	-
214451	**Processor Architecture**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
214451 .1	Learn architectural details of 80386 microprocessor	3	1	2	2	3	2	2	2	-	-	-	2	-	-
214451 .2	Understand memory management and multitasking of 80386 microprocessor	2	2	3	-	2	2	-	-	-	-	-	-	-	-
214451 .3	Understand Privilege protection, interrupts and exceptions.	1	1	3	-	2	0	-	-	-	-	-	-	-	-
214451 .4	Understand architecture and memory organization of 8051 microcontroller	1	1	3	-	2	0	-	-	-	-	-	-	-	-
214451 .5	Explain timers and interrupts of 8051 microcontroller and its interfacing with I/O devices	1	2	2	-	-	-	-	-	-	-	-	-	-	-
214451 .6	Understand minimum system using 8051 microcontroller.	1	2	2	-	-	-	-	-	-	-	-	-	-	-

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214452	Data Structures & Files	PO1	PO2	PO3	PO4	PO5	PO	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
214452 .1	Analyze algorithms and to determine algorithm correctness and	3	3	3	3	-	3	-	-	-	-	-	-	2	-
214452 .2	Understand different advanced abstract data type (ADT) and data structures and their implementations.	2	2	3	3	-	3	-	-	-	-	-	-	-	-
214452 .3	Understand different algorithm design techniques (brute - force, divide and conquer, greedy,	3	1	2	3	-	3	-	-	-	-	-	-	-	2
214452 .4	Apply and implement learned algorithm design techniques and data structures to solve problems.	3	3	3	3	-	3	-	-	-	-	-	-	1	-
214452 .5	Apply and implement concept of trees.	3	3	2	3	-	3	-	-	-	-	-	-	1	-
214452 .6	Apply and implement file organization	2	3	2	3	-	3	-	-	-	-	-	-	1	-
214453	**Foundations of Communication and Computer Network**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
214452 .1	Understand data/signal transmission over communication media	3	2	2	-	1	-	-	-	-	-	-	2	-	-
214452 .2	Recognize usage of various modulation techniques in communication	1	3	2	-	1	1	-	-	-	-	-	1	-	-
214452 .3	Analyze various spread spectrum and multiplexing techniques	1	1	2	-	3	-	1	-	-	-	-	2	1	-
214452 .4	Use concepts of data communication to solve various related problems	1	3	3	-	1	-	-	-	-	-	-	2	-	-
214452 .5	Understand error correction and detection techniques.	1	1	1	-	2	3	-	-	-	-	-	3	-	-
214452 .6	Acquaint with transmission media and their standards	-	-	2	-	1	1	-	2	-	-	-	3	-	-

Semester V

Course Code	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
314441	**Theory of Computation**														
314441.1	To construct finite state machines to solve problems in computing	3	2	2	1	1	-	-	-	-	-	-	-	2	2
314441.2	To write mathematical expressions for the formal languages	2	2	2	2	3	-	-	-	-	-	-	-	2	2
314441.3	To apply well defined rules for syntax verification.	2	3	2	1	3	-	-	-	-	-	-	-	2	1
314441.4	To construct and analyze Push Down, Post and Turing Machine for formal languages.	3	3	3	1	1	-	-	-	-	-	-	-		2
314441.5	To express the understanding of the decidability and decidability problems	3	2	1	1	2	-	-	-	-	-	-	-	2	1
314441.6	To express the understanding of computational complexity.	3	3	3	1	-	-	-	-	-	-	-	1	2	1

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314442	Database Management Systems	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
314442.1	To define basic functions of DBMS & RDBMS	3	2	3	-	1	-	-	1	-	-	-	2	3	1
314442.2	To analyze database models & entity relationship models.	2	1	2	-	2	-	-	1	2	-	-	2	3	2
314442.3	To design and implement a database schema for a given problem-domain	2	-	1	-	-	-	-	1	-	-	-	2	3	-
314442.4	To populate and query a database using SQL DML/DDL commands.	2	-	-	-	-	-	-	1	-	-	-	2	3	-
314442.5	Do Programming in PL/SQL including stored procedures, stored functions, cursors and packages.	2	-	-	-	2	-	-	1	-	-	-	2	3	1
314442.6	To appreciate the impact of analytics and big data on the information industry and the external	3	-	-	-	1	-	-	1	-	-	-	2	3	1
314443	Software Engineering &Project Management	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
314443.1	To identify unique features of various software application domains and classify software applications.	3	3	1	2	2	1	-	-	-	-	-	1	1	1
314443.2	To choose and apply appropriate lifecycle model of software development	3	3	2	1	-	-	-	-	1	2	-	1	-	1
314443.3	To describe principles of agile development, discuss the SCRUM process and distinguish agile process	3	2	3	1	2	1		1	1	1	1	1	-	1
314443.4	To analyze software requirements by applying various modeling techniques.	2	3		1		1	1	2	1	1	-	1	1	-
314443.5	To list and classify CASE tools and discuss recent trends and research in software engineering	2	2	2	1	1	1	1	2	1	1	-	1	-	1
314443.6	To understand IT project management through life cycle of the project and future trends in IT Project Management.	2	1	1	1	2	1	1	1	1	-	-	1	-	-
314444	Operating Systems	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
314444.1	Fundamental understanding of the role of Operating Systems.	3	-	2	-	2	1	-	1	-	-	1	-	1	1
314444.2	To understand the concept of a process and thread.	3	-	3	-	1	-	-	1	-	-	1	-	2	1
314444.3	To apply the cons of process/thread scheduling.	-	3	2	1	-	1	-	1	-	-	1	-	-	-
314444.4	To apply the concept of process synchronization, mutual exclusion and the deadlock	-	3	1	2	-	2	-	2	-	-	1	-	-	-
314444.5	To realize the concept of I/O management and File system.	2	1	2	-	2	2	-	-	-	-	1	-	1	
314444.6	To understand the various memory management techniques.	3	-	-	-	1	-	-	-	-	-	1	-	1	1

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314445	Human Computer Interaction	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
314445.1	To explain importance of HCI study and principles of user-centred design (UCD) approach.	2	2	1	-	-	-	-	-	-	2	-	1	2	2
314445.2	Develop understanding of human factors in HCI design.	3	3	2	2	1	-	-	-	-	2	-	2	1	2
314445.3	Develop understanding of models, paradigms, and context of interactions.	3	3	3	1	1	-	-	-	-	2	-	2	1	1
314445.4	Design effective user-interfacesfollowing a structured and organized UCD process.	3	3	2	2	1	-	-	-	-	2	-	2	1	2
314445.5	Evaluate usability of a user-interface design.	3	3	2	2	1	-	-	-	-	2	-	2	1	2
314445.6	Apply cognitive models for predicting human-computer-	2	2	-	-	-	-	-	-	-	2	-	1	1	1

Semester VI

314450	Computer Networks& Security	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
314450 .1	To know Responsibilities, services offered and protocol used at each layer of network.	3	-	2	1	2	2	-	-	-	-	-	-	1	-
314450 .2	To understand different addressing techniques used in network.	3	2	1	2	2	-	-	-	-	-	-	-	2	-
314450 .3	To know the difference between different types of network.	3	3	2	1	1	-	-	-	-	-	-	-	-	-
314450 .4	To know the different wireless technologies and IEEE standards.	3	3	2	2	2	2	-	-	-	-	-	-	-	-
314450 .5	To use and apply the standards and protocols learned, for application development.	2	1	2	-	2	2	-	-	-	-	-	-	1	-
314450 .6	To understand and explore recent trends in network domain.	3	-	-	-	1	1	-	-	-	-	-	-	1	-
314451	Systems Programming	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
314451.1	creates novel solutions for language processing applications.	3	2	3	-	-	-	-	-	-	-	-	-	1	1
314451.2	To design and implement assemblers and macro processors.	2	1	3	-	2	-	-	-	-	-	-	-	-	2
314451.3	To use tool LEX for generation of Lexical Analyzer.	1	1	3	-	2	-	-	-	-	-	-	-	-	-
314451.4	To use YACC tool for generation of syntax analyzer.	1	1	3	-	2	-	-	-	-	-	-	-	-	-
314451.5	To generate output for all the phases of compiler.	1	2	2	-	-	-	-	-	-	-	-	-	-	-
314451.6	To apply code optimization in the compilation process.	1	2	2	-	-	-	-	-	-	-	-	-	-	-
314452	Design and Analysis of Algorithms	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
314452.1	To calculate computational complexity using asymptotic notations for various algorithms.	3	-	-	-	2	-	-	-	-	-	-	-	1	-
314452.2	To apply Divide & Conquer as well as Greedy approach to design algorithms.	3	-	-	-	3	-	-	-	-	-	-	-	-	2
314452.3	To practice principle of optimality.	3	1	3	2	-	-	-	-	-	-	-	-	1	-

314452.4	To illustrate different problems using Backtracking.	-	-	2	-	3	2	-	-	-	-	-	-	1	-
314452.5	To compare different methods of Branch and Bound strategy.	-	3	2	2	3	-	-	-	-	-	-	-	1	-
314452.6	To explore the concept of P, NP, NP-complete, NP-Hard and parallel algorithms.	-	-	3	-	-	-	-	-	-	-	-	-	-	-
314453	**Cloud Computing**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
314453.1	To understand the need of Cloud based solutions.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
314453.2	To understand Security Mechanisms and issues in various Cloud Applications	3	3	1	-	1	1	1	-	-	-	-	-	1	1
314453.3	To explore effective techniques to program Cloud Systems.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
314453.4	Computing.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
314453.5	To find challenges in cloud computing and delve into it to effective solutions.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
314453.6	To understand emerging trends in cloud computing.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
314454	**Data Science and Big Data Analytics**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
314454.1	Understand Big Data primitives.	3	-	-	-	-	2	1	-	-	-	-	-	-	-
314454.2	Learn and apply different mathematical models for Big Data.	2	-	-	-	-	1	-	-	-	-	-	-	-	-
314454.3	Demonstrate Big Data learning skills by developing industry or research applications.	2	-	-	-	-	2	1	1	-	-	-	-	1	1
314454.4	Analyze and apply each learning model comes from a different algorithmic approach and it will perform differently under different datasets.	-	1	1	-	-	2	2	-	1	-	-	-	2	2
314454.5	Understand, apply and analyze needs, challenges and techniques for big data visualization.	-	1	-	-	1	2	2	-	1	-	-	-	2	1
314454.6	Learn different programming platforms for big data analytics.	-	1	-	-	1	-	1	-	2	1	1	1	2	-

Semester VII

Course Code	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
414453	**Information and Cyber Security**														
414453.1	Students shall be able to understand what are the common threats faced today	3	-	3	-	-	1	-	-	-	-	-	1	-	-
414453.2	What is the foundational theory behind information security	1	3	-	2	-	-	-	-	3	2		1	1	-
414453.3	What are the basic principles and techniques when designing a secure system	2	2	1	-	2	-	-	1	2	1	1	2	-	-
414453.4	How today's attacks and defenses work in practice	-	-	-	-	-	2	1	2	1	1	-	1	1	-
414453.5	How to assess threats for their significance	3	1	2	-	1	2	-	-	1	1	-	1	-	-
414453.6	How to gauge the protections and limitations provided by today's technology	-	1	1	-	2	1	-	-	1	1	1	1	1	-

414454	Machine Learning and Applications	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
414454.1	model the learning primitives	3	1	1	2	2	2	2	1	1	1	1	1	1	1
414454.2	build the learning model.	3	3	3	1	1	1	1	1	1	1	1	1	1	1
414454.3	tackle real world problems in the domain of Data Mining and Big Data Analytics, Information Retrieval, Computer vision, Linguistics and Bioinformatics.	3	3	3	2	1	1	1	1	1	1	1	1	1	1
414454.4	Illustrate the regaration and generalization machine learning algorithms.	3	3	2	1	1	1	2	1	1	1	1	1	1	1
414454.5	Apply fundamental concepts of ANN.	3	3	2	1	1	1	2	1	1	1	1	1	1	1
414454.6	Identify different unsupervised learning algorithms for the related real-world problems.	3	2	2	1	1	1	1	1	1	1	1	1	1	1
414455	**Software Design and Modeling**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
414455.1	Understand object oriented methodologies, basics of Unified Modeling Language (UML)	3	2	3	2	2	-	2	-	2	2	2	-	2	1
414455.2	Understand analysis process, use case modeling, domain/class modeling	3	2	2	2	2	-	2	-	2	2	2	-	-	1
414455.3	Understand interaction and behavior modeling.	3	3	3	2	2	-	2	-	1	-	1	-	-	-
414455.4	Understand design process and business, access and view layer class design	2	2	2	-	-	-	-	-	1	-	-	-	-	2
414455.5	Get started on study of GRASP principles and GoF design patterns.	2	2	1	-	-	-	-	-	-	-	-	-	-	-
414455.6	Get started on study of architectural design principles and guidelines in the various type of application development.	2	2	3	1	2	-	1	-	2	-	2	-	-	-
414456E	**Elective-I Business Analytics and Intelligence**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
414456E.1	Comprehend the Information Systems and development approaches of Intelligent Systems.	3	-	3	-	-	1	-	-	-	-	-	1	-	-
414456E.2	Evaluate and rethink business processes using information systems.	1	3		2	-	-	-	-	3	2		1	1	-
414456E.3	Propose the Framework for business intelligence	2	2	1		2	-	-	1	2	1	1	2	-	-
414456E.4	Get acquainted with the Theories, techniques, and considerations for capturing organizational intelligence.	-	-	-	-	-	2	1	2	1	1	-	1	1	-
414456E.5	Align business intelligence with business strategy.	3	1	2	-	1	2	-	-	1	1	-	1	-	-
414456E.6	Apply the techniques for implementing business intelligence systems.		1	1	-	2	1	-	-	1	-	-	1	1	-

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414457C	Elective-II Software Testing and Quality Assu. ance	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
414457.1	Test the software by applying testing techniques to deliver a product free from bugs.	3		3	3	3	-	-	-	2	-	-	-	3	2
414457.2	Investigate the scenario and to select the proper testing technique.	2	3	2	2	3	-	-	-	-	-	-	-	3	2
414457.3	Explore the test automation concepts and tools and estimation of cost, schedule based on standard metrics.	3		3	3	3	-	-	-	-	-	-	3	2	3
414457.4	Understand how to detect, classify, prevent and remove	2	3	3	3	2	-	-	-	-	2	-	-	2	-
414457.5	Choose appropriate quality assurance models and develop quality.	2	2	3	3	3	-	-	-	-	-	-	-	-	2
414457.6	Ability to conduct formal inspections, record and evaluate results of inspections.	3	2	2	2	2	-	-	-	-	-	-	-	3	-

Semester VIII

414462	Distributed Computing System	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
414462.1	To learn the principles, architectures and programming models used in distributed systems.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
414462.2	To understand the fundamentals and knowledge of the Middleware of distributed systems	3	3	1	-	1	1	1	-	-	-	-	-	1	1
414462.3	To gain knowledge of working components and fault tolerance of distributed systems.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
414462.4	To understand the significance of agreement, fault tolerance and recovery protocols in Distributed Systems.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
414462.5	To make students aware about distributed and multimedia file systems and web systems.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
414462.6	Create an awareness of Emerging trends in distributed computing.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
414463	**Ubiquitous Computing**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
414463.1	Demonstrate the knowledge of design of Ubicomp and its applications	2	2		2	-	-	-	-	-	-	-	-	1	-
414463.2	Explain smart devices and services used Ubicomp.	2	3	2	3	-	-	-	-	-	-	-	-	-	-
414463.3	Describe the significance of actuators and controllers in real time application design.	3	2	3	3	-	-	-	-	-	-	-	-	-	1

414463.4	Use the concept of HCI to understand the design automation applications.	3	2	3	3	-	-	-	-	-	-	-	-	1	-
414463.5	Classify Ubicomp privacy and explain the challenges associated with Ubicomp privacy.	3	3	3	3	-	-	-	-	-	-	-	-	1	-
414463.6	Get the knowledge of ubiquitous and service oriented networks along with Ubicomp management.	1	3		3	-	-	-	-	-	-	-	-	1	-
414464C	**Elective III Multimedia Techniques**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
414464c .1	To create own file formats for specific application.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
414464c .2	To do some projects based on current trends in multimedia.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
414464c .3	To use open sources for authoring tool for animation.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
414464c .4	TUnderstand some research areas of current multimedia techniques.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
414464c .5	To use open sources for authoring tool for presentations	3	3	1	-	1	1	1	-	-	-	-	-	1	1
414464c .6	Become acquainted with some advanced topics in	3	3	1	-	1	1	1	-	-	-	-	-	1	1
414465D	**Elective IV Social Media Analytics**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
414465D .1	Understand the basics of Social Media Analytics	3	3	-	-	3	-	-	-	-	-	-	-	-	-
414465D .2	Explain the significance of Data mining in Social media.	3	3	3	-	-	-	-	-	-	-	-	-	-	-
414465D .3	Demonstrate the algorithms used for text mining.	2	3	1	-	-	-	-	-	-	-	-	-	-	-
414465D .4	Apply network measures for social media data.	2	2	2		-	-	-	-	-	-	-	-	1	-
414465D .5	Explain Behavior Analytics techniques used for social media	2	3	3	2	3	-	-	-	-	-	-	-	-	-
414465D .6	Apply social media analytics for Face book and Twitter kind of applications.	2	2	3	3	3	-	-	1	-	-	-	-	1	-

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2.6.2 CO-PO Mapping Matrix

Semester III

Course Code	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO1	PSO1	PSO2
214441	**Discrete Structures**														
214441.1	Formulate, apply formal proof techniques and solve the problems with logical reasoning.	3	2	3	2	2	-	2	-	2	1	-	1	2	1
214441.2	Analyze and evaluate the combinatorial problems by using probability theory.	3	2	2	2	2	-	2	-	2	1	-	1	-	1
214441.3	Apply the concepts of graph theory to devise mathematical models.	3	3	3	2	2	-	2	-	1	1	-	1	-	-
214441.4	Analyze types of relations and functions to provide solution to computational problems.	2	2	2	-	-	-	-	-	1	1	-	1	-	2
214441.5	Identify techniques of number theory and its application.	2	2	1	-	-	-	-	-		1	-	1	-	-
214441.6	Identify fundamental algebraic structures.	2	2	3	1	2	-	1	-	2	1	-	1	-	-
214442	**Computer Organization & Architecture**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
214442.1	Solve problems based on computer arithmetic.	3	3	-	-	2	1	-	-	-	-	-	-	1	1
214442.2	Explain processor structure & its functions.	3	3	3	-	1	1	-	-	-	-	-	-	3	1
214442.3	Obtain knowledge about micro-programming of a processor.	3	3	3	-	1	1	-	-	-	-	-	-	3	-
214442.4	Understand concepts related to memory & IO organization.	3	2	-	-	2	3	-	-	-	-	-	-	-	1
214442.5	Understand CPU instruction characteristics	3	2	-	-	2	2	-	-	-	-	-	-	-	1
214442.6	Understand enhancement features of CPU	3	2	-	-	2	2	-	-	-	-	-	-	-	1
214443	**Digital Electronics and Logic Design**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
214443.1	Spectacle an awareness and apply knowledge of number systems, codes, Boolean algebra and use necessary A.C, D.C Loading characteristics as well as functioning while designing with logic gates.	3	3	2	3	-	3	-	-	-	-	-	-	2	-
214443.2	Use logic function representation for simplification with K-Maps and analyze as well as design Combinational logic circuits using SSI & MSI chips.	1	3	3	3	-	3	-	-	-	-	-	-	2	-
214443.3	Analyze Sequential circuits like Flip-Flops (Truth Table, Excitation table), their conversion & design the applications.	2	1	2	3	-	3	-	-	-	-	-	-	2	-
214443.4	Design algorithms based on techniques like brute -force, divide and conquer, greedy, etc.	2	3	3	3	-	3	-	-	-	-	-	-	-	2
214443.5	Use VHDL programming technique	3	3	2	3	-	3	-	-	-	-	-	-	-	-
214443.6	different modeling styles for any digital circuits.	1	3	3	3	-	3	-	-	-	-	-	-	-	-
214444	**Fundamentals of Data Structures**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
214444.1	Apply appropriate constructs of C language, coding standards for application development.	2	3	2	3	-	3	-	-	-	-	-	-	1	-
214444.2	Use dynamic memory allocation concepts and file handling in various application development.	1	2	3	2	-	2	-	-	-	-	-	-	1	1

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214444.3	Perform basic analysis of algorithms with respect to time and space complexity	2	1	2	3	-	3	-	-	-	-	-	-	1	1
214444.4	Select appropriate searching and/or sorting techniques in the application development	2	3	3	2	-	3	-	-	-	-	-	-	1	1
214444.5	Select and use appropriate data structures for problem solving and programming	3	3	2	3	-	2	-	-	-	-	-	-	2	-
214444.6	Use algorithmic foundations for solving problems and programming	1	3	2	3	-	3	-	-	-	-	-	-	1	1
214445	**Problem Solving and Object Oriented programming**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
214445.1	Develop algorithms for solving problems by using modular programming concepts	3	3	3	2	2	3	3	-	-	2	-	2	1	1
214445.2	Abstract data and entities from the problem domain, build object models and design software solutions using object-oriented principles and strategies	2	3	2	3	2	3	3	1	-	2	-	2	1	1
214445.3	Discover, explore and apply tools and best practices in object-oriented programming.	3	3	3	3	2	3	3	1	-	2	-	2	1	1
214445.4	Develop programs that appropriately utilize key object-oriented concepts	3	2	3	3	2	3	3	1	-	2	-	2	1	1
214445.5	Apply appropriate Virtual Functions and Templates to provide object-oriented solutions	3	3	2	3	2	2	2	-	-	2	-	-	1	1
214445.6	Use of files for persistent data storage for real world application.	3	3	3	3	2	2	3	-	-	2	-	-	1	1

Semester IV

207003	**Engineering Mathematics III**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
207003 .1	Solve higher order linear differential equation using appropriate techniques for modeling and analyzing electrical circuits.	3	2	1	2	-	2	-	1	-	-	-	-	1	1
207003 .2	Solve problems related to Fourier transform, Z-Transform and applications to Signal and Image processing.	1	2	2	2	-	1	-	-	-	-	-	-	1	1
207003 .3	Apply statistical methods like correlation, regression analysis and probability theory for analysis and prediction of a given data as applied to machine intelligence.	2	1	3	2	-	1	-	-	-	-	-	-	2	1
207003 .4	Perform vector differentiation and integration to analyze the vector fields and apply to compute line, surface and volume integrals.	3	2	2	1	-	2	-	1	-	-	-	-	-	1
207003 .5	Analyze conformal mappings, transformations and perform contour integration of complex functions required in Image processing, Digital filters and Computer graphics.	3	2	1	2	-	1	-	-	-	-	-	-	2	1
214450	**Computer Graphics**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
214450 .1	Apply mathematics and logic to develop Computer programs for elementary graphic operations	3	3	3	2	2	1	2	1	0	1	2	-	2	-
214450 .2	Explain and explore techniques of geometrical transforms to produce, position and manipulate objects in 2-dimensional and 3-dimensional space respectively.	2	3	3	3	2	2	2	2	2	2	2	-	1	1
214450 .3	Describe mapping from a world coordinates to device coordinates, clipping, and projections in order to produce 3D images on 2D output device.	3	3	3	2	2	2	2	2	1	1	1	-	1	-

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214450 .4	design, development and testing of 2D, 3D modeling ap ations.	2	3	2	2	-	2	2	2	1	1	-	2	1	2
214450 .5	Apply the concepts of rendering, shading, animation	2	3	1	2	1	2	1	2	1	1	-	2	1	1
214450 .6	Apply the concepts of CURVES AND FRACTALS	1	2	2	2	1	1	-	-	-	1	-	2	1	-
214451	**Processor Architecture**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
214451 .1	Learn architectural details of 80386 microprocessor	3	1	2	2	3	2	2	2	-	-	-	2	1	1
214451 .2	Understand memory management and multitasking of 80386 microprocessor	2	2	3	-	2	2	-	-	-	-	-	-	1	-
214451 .3	Understand Privilege protection, interrupts and exceptions.	1	1	3	-	2	-	-	-	-	-	-	-	-	-
214451 .4	Understand architecture and memory organization of 8051microcontroller	1	1	3	-	2	-	-	-	-	-	-	-	1	-
214451 .5	Explain timers and interrupts of 8051 microcontroller and its interfacing with I/O devices	1	2	2	-	-	-	-	-	-	-	-	-	-	1
214451 .6	Understand minimum system using 8051 microcontroller.	1	2	2	-	-	-	-	-	-	-	-	-	-	-
214452	**Data Structures & Files**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
214452 .1	Analyze algorithms and to determine algorithm correctness and time efficiency class.	3	3	3	3	-	3	-	-	-	-	-	-	2	-
214452 .2	Understand different advanced abstract data type (ADT) and data structures and their implementations.	2	2	3	3	-	3	-	-	-	-	-	-	-	-
214452 .3	Understand different algorithm design techniques (brute -force, divide and conquer, greedy etc.) and their implementation	3	1	2	3	-	3	-	-	-	-	-	-	-	-
214452 .4	Apply and implement learned algorithm design techniques and data structures to solve	3	3	3	3	-	3	-	-	-	-	-	-	2	-
214452 .5	Apply and implement concept of trees.	3	3	2	3	-	3	-	-	-	-	-	-	2	-
214452 .6	Apply and implement file organization	2	3	2	3	-	3	-	-	-	-	-	-	2	-
214453	**Foundations of Communication and Computer Network**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
214452 .1	Understand data/signal transmission over communication media	3	2	2	-	1	-	-	-	-	-	-	2	-	-
214452 .2	Recognize usage of various modulation techniques in communication	1	3	2	-	1	1	-	-	-	-	-	1	-	-
214452 .3	Analyze various spread spectrum and multiplexing techniques	1	1	2	-	3	-	1	-	-	-	-	2	2	-
214452 .4	Use concepts of data communication to solve various related problems	1	3	3	-	1	-	-	-	-	-	-	2	1	-
214452 .5	Understand error correction and detection techniques.	1	1	1	-	2	3	-	-	-	-	-	3	1	-
214452 .6	Acquaint with transmission media and their standards			2	-	1	1	-	2	-	-	-	3	-	-

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Semester V

Course Code	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO1	PSO1	PSO2
314441	**Theory of Computation**														
314441.1	To construct finite state machines to solve problems in computing	3	2	2	1	1	-	-	-	-	-	-	-	2	2
314441.2	To write mathematical expressions for the formal languages	2	2	2	2	3	-	-	-	-	-	-	-	2	2
314441.3	To apply well defined rules for syntax verification.	2	3	2	1	3	-	-	-	-	-	-	-	2	1
314441.4	To construct and analyze Push Down, Post and Turing Machine for formal languages.	3	3	3	1	1	-	-	-	-	-	-	-		2
314441.5	To express the understanding of the decidability and decidability problems.	3	2	1	1	2	-	-	-	-	-	-	-	2	1
314441.6	To express the understanding of computational complexity.	3	3	3	1	-	-	-	-	-	-	-	1	2	1
314442	**Database Management Systems**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
314442.1	To define basic functions of DBMS & RDBMS	3	2	3	-	1	-	-	1	-	-	-	2	3	1
314442.2	To analyze database models & entity relationship models.	2	1	2	-	2	-	-	1	2	-	-	2	3	2
314442.3	To design and implement a database schema for a given problem-domain	2	-	1	-	-	-	-	1	-	-	-	2	3	-
314442.4	To populate and query a database using SQL DML/DDL commands.	2	-	-	-	-	-	-	1	-	-	-	2	3	-
314442.5	Do Programming in PL/SQL including stored procedures, stored functions, cursors	2	-	-	-	2	-	-	1	-	-	-	2	3	-
314442.6	external ecosystem for analytical and data services.	3	-	-	-	1	-	-	1	-	-	-	2	3	1
314443	**Software Engineering &Project Management**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
314443.1	To identify unique features of various software application domains and classify software applications.	3	3	1	2	2	1	-	-	-	-	-	1	1	1
314443.2	To choose and apply appropriate lifecycle model of software development	3	3	2	1	-	-	-	-	1	2	-	1	-	1
314443.3	To describe principles of agile development, discuss the SCRUM process and distinguish agile process model from other process models.	3	2	3	1	2	1		1	1	1	1	1	-	1
314443.4	To analyze software requirements by applying various modeling techniques.	2	3		1		1	1	2	1	1	-	1	1	-
314443.5	To list and classify CASE tools and discuss recent trends and research in software engineering	2	2	2	1	1	1	1	2	1	1	-	1	-	1
314443.6	To understand IT project management through life cycle of the project and future trends in IT Project Management.	2	1	1	1	2	1	1	1	1	-	-	1	-	-
314444	**Operating Systems**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
314444.1	Fundamental understanding of the role of Operating Systems.	3	-	2	-	2	1	-	1	-	-	1	-	1	1
314444.2	To understand the concept of a process and thread.	3	-	3	-	1	-	-	1	-	-	1	-	2	1
314444.3	To apply the cons of process/thread scheduling.	-	3	2	1	-	1	-	1	-	-	1	-	-	-
314444.4	To apply the concept of process synchronization, mutual exclusion and the deadlock	-	3	1	2	-	2	-	2	-	-	1	-	-	-
314444.5	To realize the concept of I/O management and File system.	2	1	2	-	2	2	-	-	-	-	1	-	1	
314444.6	To understand the various memory management techniques.	3	-	-	-	1	-	-	-	-	-	1	-	1	1
314445	**Human Computer Interaction**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**

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314445.1	To explain importance of HCI study and principles of user-centred design (UCD) approach.	2	2	1	-		-	-	-	-	2	-	1	2	2
314445.2	Develop understanding of human factors in HCI design.	3	3	2	2	1	-	-	-	-	2	-	2	1	2
314445.3	Develop understanding of models, paradigms, and context of interactions.	3	3	3	1	1	-	-	-	-	2	-	2	1	1
314445.4	Design effective user-interfacesfollowing a structured and organized UCD process.	3	3	2	2	1	-	-	-	-	2	-	2	1	2
314445.5	Evaluate usability of a user-interface design.	3	3	2	2	1	-	-	-	-	2	-	2	1	2
314445.6	Apply cognitive models for predicting human-computer-interactions.	2	2	-	-	-	-	-	-	-	2	-	1	1	1

Semester VI

314450	Computer Networks& Security	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
314450 .1	To know Responsibilities, services offered and protocol used at each layer of network.	3	-	2	1	2	2	-	-	-	-	-	-	1	-
314450 .2	To understand different addressing techniques used in network.	3	2	1	2	2	-	-	-	-	-	-	-	2	-
314450 .3	To know the difference between different types of network.	3	3	2	1	1	-	-	-	-	-	-	-	-	-
314450 .4	To know the different wireless technologies and IEEE standards.	3	3	2	2	2	2	-	-	-	-	-	-	-	-
314450 .5	To use and apply the standards and protocols learned, for application development.	2	1	2	-	2	2	-	-	-	-	-	-	1	-
314450 .6	To understand and explore recent trends in network domain.	3	-	-	-	1	1	-	-	-	-	-	-	1	-

314451	Systems Programming	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
314451.1	language processing applications.	3	2	3	-	-	-	-	-	-	-	-	-	1	-
314451.2	To design and implement assemblers and macro processors.	2	1	3	-	2	-	-	-	-	-	-	-	-	2
314451.3	To use tool LEX for generation of Lexical Analyzer.	1	1	3	-	2	-	-	-	-	-	-	-	1	-
314451.4	To use YACC tool for generation of syntax analyzer.	1	1	3	-	2	-	-	-	-	-	-	-	-	1
314451.5	To generate output for all the phases of compiler.	1	2	2	-	-	-	-	-	-	-	-	-	1	-
314451.6	To apply code optimization in the compilation process.	1	2	2	-	-	-	-	-	-	-	-	-	2	-

314452	Design and Analysis of Algorithms	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
314452.1	To calculate computational complexity using asymptotic notations for various algorithms.	3	-	-	-	2	-	-	-	-	-	-	-	1	-
314452.2	To apply Divide & Conquer as well as Greedy approach to design algorithms.	3	-	-	-	3	-	-	-	-	-	-	-	2	-
314452.3	To practice principle of optimality.	3	1	3	2	-	-	-	-	-	-	-	-	-	1
314452.4	To illustrate different problems using Backtracking.	-	-	2	-	3	2	-	-	-	-	-	-	-	-
314452.5	To compare different methods of Branch and Bound strategy.	-	3	2	2	3	-	-	-	-	-	-	-	-	1
314452.6	To explore the concept of P, NP, NP-complete, NP-Hard and parallel algorithms.	-	-	3	-	-	-	-	-	-	-	-	-	-	-

314453	Cloud Computing	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
314453.1	To understand the need of Cloud based solutions.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
314453.2	To understand Security Mechanisms and issues in various Cloud Applications	3	3	1	-	1	1	1	-	-	-	-	-	1	1

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314453.3	To explore effective techniques to program Cloud Systems.	3	3	1	-	-	1	1	-	-	-	-	-	1	1
314453.4	To understand current challenges and trade-offs in Cloud Computing.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
314453.5	To find challenges in cloud computing and delve into it to effective solutions.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
314453.6	To understand emerging trends in cloud computing.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
314454	**Data Science and Big Data Analytics**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
314454.1	Understand Big Data primitives.	3	-	-	-	-	2	1	-	-	-	-	-	-	-
314454.2	Learn and apply different mathematical models for Big Data.	2	-	-	-	-	1	-	-	-	-	-	-	-	-
314454.3	Demonstrate Big Data learning skills by developing industry or research applications.	2	-	-	-	-	2	1	1	-	-	-	-	1	1
314454.4	Analyze and apply each learning model comes from a different algorithmic approach and it will perform differently under different datasets.	-	1	1	-	-	2	2	-	1	-	-	-	2	2
314454.5	Understand, apply and analyze needs, challenges and techniques for big data visualization.	-	1	-	-	1	2	2	-	1	-	-	-	2	1
314454.6	Learn different programming platforms for big data analytics.	-	1	-	-	1	-	1	-	2	1	1	1	2	-

Semester VII

Course Code	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO1	PSO1	PSO2
414453	**Information and Cyber Security**														
414453.1	Students shall be able to understand what are the common threats faced today	3		3	-	-	1	-	-	-	-	-	1	-	-
414453.2	What is the foundational theory behind information security	1	3	-	2	-	-	-	-	3	2	-	1	1	-
414453.3	What are the basic principles and techniques when designing a secure system	2	2	1	-	2	-	-	1	2	1	1	2	-	-
414453.4	How today's attacks and defenses work in practice	-	-	-	-	-	2	1	2	1	1	-	1	1	-
414453.5	How to assess threats for their significance	3	1	2	-	1	2	-	-	1	1	-	1	-	-
414453.6	How to gauge the protections and limitations provided by today's technology	-	1	1	-	2	1	-	-	1	-	-	1	1	-
414454	**Machine Learning and Applications**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO1**	**PSO1**	**PSO2**
414454.1	model the learning primitives	3	1	1	2	2	2	2	1	1	1	1	1	1	1
414454.2	build the learning model.	3	3	3	1	1	1	1	1	1	1	1	1	1	1
414454.3	tackle real world problems in the domain of Data Mining and Big Data Analytics, Information Retrieval, Computer vision, Linguistics and Bioinformatics.	3	3	3	2	1	1	1	1	1	1	1	1	1	1
414454.4	Illustrate the regaration and generalization machine learning algorithms.	3	3	2	1	1	1	2	1	1	1	1	1	1	1
414454.5	Apply fundamental concepts of ANN.	3	3	2	1	1	1	2	1	1	1	1	1	1	1
414454.6	Identify different unsupervised learning algorithms for the related real-world problems.	3	2	2	1	1	1	1	1	1	1	1	1	1	1

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414455	Software Design	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO1	PSO1	PSO2
414455.1	Understand object oriented methodologies, basics of Unified Modeling Language (UML)	3	2	3	2	2	-	2	-	2	2	2	-	2	1
414455.2	Understand analysis process, use case modeling, domain/class modeling	3	2	2	2	2	-	2	-	2	2	2	-	-	1
414455.3	Understand interaction and behavior modeling.	3	3	3	2	2	-	2	-	1	-	1	-	1	-
414455.4	Understand design process and business, access and view layer class design	2	2	2	-	-	-	-	-	1	-	-	-	-	2
414455.5	Get started on study of GRASP principles and GoF design patterns.	2	2	1	-	-	-	-	-	-	-	-	-	1	-
414455.6	Get started on study of architectural design principles and guidelines in the various type of application development.	2	2	3	1	2	-	1	-	2	-	2	-	-	-
414456E	Elective-I Business Analytics and Intelligence	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO1	PSO1	PSO2
414456E.1	Comprehend the Information Systems and development approaches of Intelligent	3	-	3	-	-	1	-	-	-	-	-	1	-	-
414456E.2	Evaluate and rethink business processes using information systems	1	3	-	2	-	-	-	-	3	2	-	1	1	-
414456E.3	Propose the Framework for business intelligence	2	2	1	-	2	-	-	1	2	1	1	2	-	-
414456E.4	Get acquainted with the Theories, techniques, and considerations for capturing	-	-	-	-	-	2	1	2	1	1	-	1	1	-
414456E.5	Align business intelligence with business strategy.	3	1	2	-	1	2	-	-	1	1	-	1	-	-
414456E.6	Apply the techniques for implementing business intelligence systems.	-	1	1	-	2	1	-	-	1	-	-	1	1	-
414457C	Elective-II Software Testing and Quality Assurance	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO1	PSO1	PSO2
414457.1	Test the software by applying testing techniques to deliver a product free from bugs.	3	-	3	3	3	-	-	-	2	-	-	-	3	2
414457.2	Investigate the scenario and to select the proper testing technique.	2	3	2	2	3	-	-	-	-	-	-	-	3	2
414457.3	Explore the test automation concepts and tools and estimation of cost, schedule based on standard metrics.	3	-	3	3	3	-	-	-	-	-	-	3	2	3
414457.4	Understand how to detect, classify, prevent and remove defects.	2	3	3	3	2	-	-	-	-	2	-	-	2	-
414457.5	Choose appropriate quality assurance models and develop quality.	2	2	3	3	3	-	-	-	-	-	-	-	-	2
414457.6	Ability to conduct formal inspections, record and evaluate results of inspections.	3	2	2	2	2	-	-	-	-	-	-	-	3	-

Semester VIII

414462	Distributed Computing System	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO1	PSO1	PSO2
414462.1	To learn the principles, architectures and programming models used in distributed systems.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
414462.2	To understand the fundamentals and knowledge of the Middleware of distributed systems	3	3	1	-	1	1	1	-	-	-	-	-	1	1
414462.3	To gain knowledge of working components and fault tolerance of distributed systems.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
414462.4	To understand the significance of agreement, fault tolerance and recovery protocols in Distributed Systems.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
414462.5	To make students aware about distributed and multimedia file systems and web systems.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
414462.6	Create an awareness of Emerging trends in distributed computing.	3	3	1	-	1	1	1	-	-	-	-	-	1	1

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414463	Ubiquitous Computing	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO1	PSO1	PSO2
414463.1	Demonstrate the knowledge of design of Ubicomp and its applications.	2	2	-	2	-	-	-	-	-	-	-	-	1	-
414463.2	Explain smart devices and services used Ubicomp.	2	3	2	3	-	-	-	-	-	-	-	-	-	-
414463.3	Describe the significance of actuators and controllers in real time application design.	3	2	3	3	-	-	-	-	-	-	-	-	-	1
414463.4	Use the concept of HCI to understand the design of automation applications.	3	2	3	3	-	-	-	-	-	-	-	-	1	-
414463.5	Classify Ubicomp privacy and explain the challenges associated with Ubicomp privacy	3	3	3	3	-	-	-	-	-	-	-	-	1	-
414463.6	Get the knowledge of ubiquitous and service oriented networks along with Ubicomp management.	1	3		3	-	-	-	-	-	-	-	-	1	-
414464AC	Elective III Multimedia Techniques	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO1	PSO1	PSO2
414464c .1	To create own file formats for specific application.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
414464c .2	To do some projects based on current trends in multimedia.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
414464c .3	To use open sources for authoring tool for animation.	3	3	1	-	2	1	1	-	-	-	-	-	2	1
414464c .4	TUnderstand some research areas of current multimedia techniques.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
414464c .5	To use open sources for authoring tool for presentations	3	3	1	-	1	2	1	-	-	-	-	-	1	1
414464c .6	Become acquainted with some advanced topics in multimedia.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
414464D	Elective IV	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO1	PSO1	PSO2
414464D.1	Understand the basics of Social Media Analytics	3	3	-	-	3	-	-	-	-	-	-	-	1	1
414464D.2	Explain the significance of Data mining in Social media.	3	3	3	-	-	-	-	-	-	-	-	-	-	-
414464D.3	Demonstrate the algorithms used for text mining.	2	3	1	-	-	-	-	-	-	-	-	-	-	1
414464D.4	Apply network measures for social media data.	2	2	2	-	-	-	-	-	-	-	-	-	2	-
414464D.5	Explain Behavior Analytics techniques used for social media data	2	3	3	2	3	-	-	-	-	-	-	-	-	1
414464D.6	Apply social media analytics for Face book and Twitter kind of applications.	2	2	3	3	3	-	-	1	-	-	-	-	2	-

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2.6.2 CO-PO Mapping Matrix

Semester III

Course	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
214441	**Discrete Mathematics**																
214441.1	Formulate, apply formal proof techniques and solve the problems with logical reasoning.	3	2	1	1	1	1	-	-	-	1	-	2	1	-	-	-
214441.2	Analyze and evaluate the combinatorial problems by using probability theory.	2	3	1	1	1	1	-	-	-	1	-	2	1	-	-	-
214441.3	Apply the concepts of graph theory to devise mathematical models.	3	3	2	2	1	1	-	-	-	2	-	2	1	-	-	-
214441.4	Analyze types of relations and functions to provide solution to computational problems.	3	2	1	2	1	1	-	-	-	2	-	2	1	-	-	-
214441.5	Identify techniques of number theory and its application.	2	2	2	2	1	2	-	-	-	1	-	2	1	-	-	-
214441.6	Identify fundamental algebraic structures.	2	3	2	1	1	1	-	-	-	1	-	2	1	-	-	-
214442	**Computer Organization and Logic Design**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
214442.1	Perform basic binary arithmetic & simplify logic expressions.	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
214442.2	Grasp the operations of logic ICs and Implement combinational logic functions using ICs.	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-	-
214442.3	functions using ICs.	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-	-
214442.4	Elucidate the functions & organization of various blocks of CPU.	3	-	-	-	2	3	-	-	-	-	-	-	-	-	-	-
214442.5	Understand CPU instruction characteristics, enhancement features of CPU	3	-	-	-	2	2	-	-	-	-	-	-	-	-	-	-
214442.6	Describe an assortment of memory types (with their characteristics) used in computer	3	-	-	-	2	2	-	-	-	-	-	-	-	-	-	-
214443	**Data Structures and Algorithms**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
214443.1	Perform basic analysis of algorithms with respect to time and space complexity.	3	3	2	3	-	3	-	-	-	-	-	-	-	-	-	-
214443.2	Select appropriate searching and/or sorting techniques in the application development.	1	3	3	3	-	3	-	-	-	-	-	-	-	-	-	-
214443.3	Implement abstract data type (ADT) and data structures for given application.	2	1	2	3	-	3	-	-	-	-	-	-	-	-	-	-
214443.4	Design algorithms based on techniques like brute -force, divide and conquer, greedy, etc.	2	3	3	3	-	3	-	-	-	-	-	-	-	-	-	-
214443.5	Apply implement learned algorithm design techniques and data structures to solve	3	3	2	3	-	3	-	-	-	-	-	-	-	-	-	-
214443.6	Design different hashing functions and use files organizations.	1	3	3	3	-	3	-	-	-	-	-	-	-	-	-	-
214444	**Object Oriented Programming**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
214444.1	Differentiate various programming paradigms.	3	3	3	2	2	3	2	-	-	2	-	2	1	1	1	-
214444.2	Destruction to model real-world problems.	3	3	3	3	2	3	3	1	-	2	-	2	1	1	1	-
214444.3	Identify relationship among objects using inheritance and polymorphism principles.	3	3	3	3	2	3	3	1	-	2	-	2	1	1	1	-
214444.4	Handle different types of exceptions and perform generic programming.	3	3	3	3	2	3	3	1	-	2	-	2	1	1	1	-
214444.5	Use of files for persistent data storage for real world application.	3	3	3	3	2	2	2	-	-	2	-	-	1	1	1	-
214444.6	Apply appropriate design patterns to provide object-oriented solutions.	3	3	3	3	2	2	2	-	-	2	-	-	1	1	1	-
214445	**Basics of Computer Network**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
214445.1	Understand and explain the concepts of communication theory and compare functions of OSI	3	2	-	-	-	-	-	-	-	-	-	2	-	-	-	-

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214445.2	Analyze data link layer services, error detection and correction, linear block codes, cyclic codes, framing and flow control protocols.	-	3	-	-	-		-	-	-	-	-	1	-	-	-	-
214445.3	Compare different access techniques, channelization and Ethernet standards.	-	-	-	-	3	-	1	-	-	-	-	2	-	-	-	-
214445.4	Apply the skills of subnetting, supernetting and routing mechanisms.	-	3	3	-	-	-	-	-	-	-	-	2	-	-	-	-
214445.5	Compare IPv4 and IPv6	-	-	-	-	2	3	-	-	-	-	-	3	-	-	-	-
214445.6	Understand services and protocols used at transport layer.	-	-	2	-	-	-	-	2	-	-	-	3	-	-	-	-

Semester IV

207003	**Engineering Mathematics III**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
207003 .1	Solve Linear differential equations, essential in modelling and design of computer-based	3	2	1	1	-	-	-	-	-	-	-	-	-	1	1	1
207003 .2	Apply concept of Fourier transform and Z-transform and its applications to continuous and discrete systems and image processing.	1	3	2	2	-	1	-	-	-	-	-	-	-	1	1	1
207003 .3	Apply Statistical methods like correlation& regression analysis and probability theory for data analysis and predictions in machine learning.	2	1	3	1	-	2	-	-	-	-	-	-	-	1	1	1
207003 .4	Solve Algebraic &Transcendental equations and System of linear equations using numerical	1	2	2	1	-	1	-	-	-	-	-	-	-	1	1	1
207003 .5	Obtain Interpolating polynomials, numerical differentiation and integration,	1	2	2	2	-	1	-	-	-	-	-	-	-	1	1	1
214451	**Processor Architecture**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
214451 .1	Apprehend architecture and memory organization of PIC 18 microcontroller	2	2	2	2	-	-	-	-	-	-	-	2	-	-	-	-
214451 .2	Implement embedded C programming for PIC 18.	2	2	2	2	3	-	-	-	-	-	-	2	-	-	-	-
214451 .3	Use concepts of timers and interrupts of PIC 18.	2	2	2	2	-	-	-	-	-	-	-	-	-	-	-	-
214451 .4	Demonstrate real life applications using PIC 18.	3	3	3	3	3	2	-	-	-	-	-	-	-	-	-	-
214451 .5	Analyze architectural details of ARM processor.	1	1	1	1	-	-	-	-	-	-	-	2	-	-	-	-
214452	**Database Management System**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
214452 .1	Define fundamental elements of database management systems	3	2	3	-	1	-	-	1	-	-	-	2	3	1	-	-
214452 .2	Describe the fundamental elements of relational database management systems and Design ERmodels to represent simple database application scenarios.	2	1	2	-	2	-	-	1	2	-	-	2	3	2	2	-
214452 .3	Populate relational database and formulate SQL queries on data.	2	-	1	-	-	-	-	1	-	-	-	2	3	-	-	-
214452 .4	Improve the database design by normalization & to incorporate query processing.	2	-	-	-	-	-	-	1	-	-	-	2	3	-	-	-
214452 .5	Illustrate ACID properties for transaction management & to describe concurrency control protocols.	2	-	-	-	2	-	-	1	-	-	-	2	3	-	-	-
214452 .6	Understand recent trends in database technology.	3	-	-	-	1	-	-	1	-	-	-	2	3	1	-	-
214453	**Computer Graphics**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
214453 .1	Specify mathematical and logical aspects for developing elementary graphics	3	3	3	2	2	1	2	1	0	1	1	0	-	-	-	-
214453 .2	Explain and employ techniques of geometrical transforms to produce, position and	3	3	3	2	2	2	0	0	2	2	2	0	-	-	-	-
214453 .3	Describe mapping from a world coordinates to device coordinates, clipping, and	3	3	3	2	2	2	0	0	0	0	1	0	-	-	-	-
214453 .4	Apply the concepts of rendering, shading, animation, curves and fractals using	2	3	1	2	1	2	1	2	1	1	0	1	-	-	-	-
214453 .5	Develop the competency to understand the concepts related to Virtual reality	2	3	1	2	1	2	1	2	1	1	0	1	-	-	-	-
214454	**Software Engineering**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
214454 .1	Identify various software application domains and classify software applications.	2	2	1	-	-	1	-	-	-	-	-	1	-	-	-	-
214454 .2	Analyze software requirements by applying various modeling techniques.	2	2	-	1	-	-	-	-	1	2	-	1	-	-	-	-

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214454 .3	Translate the requirement models into design models.	2	2	2	1	2	-	-	1	1	1	1	1	-	-	-	-
214454 .4	Apply planning and estimation to any project.	2	2		1		1	1	2	1	1	-	1	-	-	-	-
214454 .5	Apply quality attributes and testing principles in software development life cycle.	1	1	2	1	1	1	1	2	1	1	-	1	-	-	-	-
214454 .6	Discuss recent trends in Software engineering by using CASE and agile tools.	1	1	1		2	1	1	1	1	-	-	1	-	-	-	-

Semester V

Course	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
314441	**Theory of Computation**														
314441.1	To construct finite state machines to solve problems in computing	3	2	2	1	1	-	-	-	-	-	-	-	2	2
314441.2	To write mathematical expressions for the formal languages	2	2	2	2	3	-	-	-	-	-	-	-	2	2
314441.3	To apply well defined rules for syntax verification.	2	3	2	1	3	-	-	-	-	-	-	-	2	1
314441.4	To construct and analyze Push Down, Post and Turing Machine for formal languages.	3	3	3	1	1	-	-	-	-	-	-	-	-	2
314441.5	To express the understanding of the decidability and decidability problems.	3	2	1	1	2	-	-	-	-	-	-	-	2	1
314441.6	To express the understanding of computational complexity.	3	3	3	1	-	-	-	-	-	-	-	1	2	1
314442	**Database Management Systems**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
314442.1	To define basic functions of DBMS & RDBMS	3	2	3	-	1	-	-	1	-	-	-	2	3	1
314442.2	To analyze database models & entity relationship models.	2	1	2	-	2	-	-	1	2	-	-	2	3	2
314442.3	To design and implement a database schema for a given problem-domain	2	-	1	-	-	-	-	1	-	-	-	2	3	-
314442.4	To populate and query a database using SQL DML/DDL commands.	2	-	-	-	-	-	-	1	-	-	-	2	3	-
314442.5	Do Programming in PL/SQL including stored procedures, stored functions, cursors and packages.	2	-	-	-	2	-	-	1	-	-	-	2	3	-
314442.6	To appreciate the impact of analytics and big data on the information industry and the external ecosystem for analytical and data services.	3	-	-	-	1	-	-	1	-	-	-	2	3	1
314443	**Software Engineering &Project Management**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
314443.1	To identify unique features of various software application domains and classify software applications.	3	3	1	2	2	1	-	-	-	-	-	1	-	-
314443.2	To choose and apply appropriate lifecycle model of software development	3	3	2	1	-	-	-	-	1	2	-	1	-	-
314443.3	To describe principles of agile development, discuss the SCRUM process and distinguish agile process	3	2	3	1	2	1	-	1	1	1	1	1	-	-
314443.4	To analyze software requirements by applying various modeling techniques.	2	3	-	1	-	1	1	2	1	1	-	1	-	-
314443.5	To list and classify CASE tools and discuss recent trends and research in software engineering	2	2	2	1	1	1	1	2	1	1	-	1	-	-
314443.6	To understand IT project management through life cycle of the project and future trends in IT Project	2	1	1	1	2	1	1	1	1	-	-	1	-	-
314444	**Operating Systems**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
314444.1	Fundamental understanding of the role of Operating Systems.	3	-	2		2	1	-	1	-	-	1	-	1	1
314444.2	To understand the concept of a process and thread.	3	-	3		1		-	1	-	-	1	-	2	1
314444.3	To apply the cons of process/thread scheduling.	-	3	2	1		1	-	1	-	-	1	-	-	-
314444.4	To apply the concept of process synchronization, mutual exclusion and the deadlock	-	3	1	2		2	-	2	-	-	1	-	-	-
314444.5	To realize the concept of I/O management and File system.	2	1	2	-	2	2	-	-	-	-	1	-	1	-
314444.6	To understand the various memory management techniques.	3	-	-	-	1	-	-	-	-	-	1	-	1	1

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314445	Human Computer Interaction	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
314445.1	To explain importance of HCI study and principles of user-centred des (UCD) approach.	2	2	1	-	-	-	-	-	-	2	-	1	2	2
314445.2	Develop understanding of human factors in HCI design.	3	3	2	2	1	-	-	-	-	2	-	2	1	2
314445.3	Develop understanding of models, paradigms, and context of interactions.	3	3	3	1	1	-	-	-	-	2	-	2	1	1
314445.4	Design effective user-interfacesfollowing a structured and organized UCD process.	3	3	2	2	1	-	-	-	-	2	-	2	1	2
314445.5	Evaluate usability of a user-interface design.	3	3	2	2	1	-	-	-	-	2	-	2	1	2
314445.6	Apply cognitive models for predicting human-computer-interactions.	2	2	-	-	-	-	-	-	-	2	-	1	1	1

Semester VI

314450	Computer Networks& Security	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
314450 .1	To know Responsibilities, services offered and protocol used at each layer of network.	3		2	1	2	2	-	-	-	-	-	-	1	-
314450 .2	To understand different addressing techniques used in network.	3	2	1	2	2	-	-	-	-	-	-	-	2	-
314450 .3	To know the difference between different types of network.	3	3	2	1	1	-	-	-	-	-	-	-	-	-
314450 .4	To know the different wireless technologies and IEEE standards.	3	3	2	2	2	2	-	-	-	-	-	-	-	-
314450 .5	To use and apply the standards and protocols learned, for application development.	2	1	2		2	2	-	-	-	-	-	-	1	-
314450 .6	To understand and explore recent trends in network domain.	3	-	-	-	1	1	-	-	-	-	-	-	1	-
314451	Systems Programming	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
314451.1	for language processing applications.	3	2	3	-	-	-	-	-	-	-	-	-	-	-
314451.2	To design and implement assemblers and macro processors.	2	1	3	-	2	-	-	-	-	-	-	-	-	-
314451.3	To use tool LEX for generation of Lexical Analyzer.	1	1	3	-	2	-	-	-	-	-	-	-	-	-
314451.4	To use YACC tool for generation of syntax analyzer.	1	1	3	-	2	-	-	-	-	-	-	-	-	-
314451.5	To generate output for all the phases of compiler.	1	2	2	-	-	-	-	-	-	-	-	-	-	-
314451.6	To apply code optimization in the compilation process.	1	2	2	-	-	-	-	-	-	-	-	-	-	-
314452	Design and Analysis of Algorithms	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
314452.1	To calculate computational complexity using asymptotic notations for various algorithms.	3	-	-	-	2	-	-	-	-	-	-	-	-	-
314452.2	To apply Divide & Conquer as well as Greedy approach to design algorithms.	3	-	-	-	3	-	-	-	-	-	-	-	-	-
314452.3	To practice principle of optimality.	3	1	3	2	-	-	-	-	-	-	-	-	-	-
314452.4	To illustrate different problems using Backtracking.	-	-	2		3	-	-	-	-	-	-	-	-	-
314452.5	To compare different methods of Branch and Bound strategy.	-	3	2	2	3	-	-	-	-	-	-	-	-	-
314452.6	To explore the concept of P, NP, NP-complete, NP-Hard and parallel algorithms.	-	-	3	-	-	-	-	-	-	-	-	-	-	-
314453	Cloud Computing	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
314453.1	To understand the need of Cloud based solutions.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
314453.2	To understand Security Mechanisms and issues in various Cloud Applications	3	3	1	-	1	1	1	-	-	-	-	-	1	1
314453.3	To explore effective techniques to program Cloud Systems.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
314453.4	To understand current challenges and trade-offs in Cloud Computing.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
314453.5	To find challenges in cloud computing and delve into it to effective solutions.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
314453.6	To understand emerging trends in cloud computing.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
314454	Data Science and Big Data Analytics	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
314454.1	Understand Big data primitives.	3	-	-	-	-	2	1	-	-	-	-	-	-	-
314454.2	Learn and apply different mathematical models for Big Data.	2	-	-	-	-	1	-	-	-	-	-	-	-	-

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314454.3	Demonstrate Big Data learning skills by developing industry or research	2	-	-	-	-	2	1	-	-	-	-	-	1	1
314454.4	Analyze and apply each learning model comes from a different a ithmic	-	1	1	-	-	2	2	-	1	-	-	-	2	2
314454.5	Understand, apply and analyze needs, challenges and techniques for big data	-	1	-	-	1	2	2	-	1				2	1
314454.6	Learn different programming platforms for big data analytics.	-	1	-	-	1		1	-	2	1	1	1	2	

Semester VII

Course	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
414453	**Information and Cyber Security**														
414453.1	Students shall be able to understand what are the common threats faced today	3	-	3	-	-	1	-	-	-	-	-	1	-	-
414453.2	What is the foundational theory behind information security	1	3	-	2	-	-	-	-	3	2		1	1	-
414453.3	What are the basic principles and techniques when designing a secure system	2	2	1	-	2			1	2	1	1	2	-	-
414453.4	How today's attacks and defenses work in practice	-	-	-	-		2	1	2	1	1	-	1	1	-
414453.5	How to assess threats for their significance	3	1	2	-	1	2	-	-	1	1	-	1	-	-
414453.6	How to gauge the protections and limitations provided by today's technology	-	1	1	-	2	1	-	-	1	-	-	1	1	-
414454	**Machine Learning and Applications**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
414454.1	model the learning primitives	3	1	1	2	2	2	2	1	1	1	1	1	1	1
414454.2	build the learning model.	3	3	3	1	1	1	1	1	1	1	1	1	1	1
414454.3	tackle real world problems in the domain of Data Mining and Big Data Analytics,	3	3	3	2	1	1	1	1	1	1	1	1	1	1
414454.4	Illustrate the regaration and generalization machine learning algorithms.	3	3	2	1	1	1	2	1	1	1	1	1	1	1
414454.5	Apply fundamental concepts of ANN.	3	3	2	1	1	1	2	1	1	1	1	1	1	1
414454.6	Identify different unsupervised learning algorithms for the related real-world	3	2	2	1	1	1	1	1	1	1	1	1	1	1
414455	**Software Design**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
414455.1	Understand object oriented methodologies, basics of Unified Modeling Language	3	2	3	2	2	-	2	-	2	2	2	-	2	1
414455.2	Understand analysis process, use case modeling, domain/class modeling	3	2	2	2	2	-	2	-	2	2	2	-	-	1
414455.3	Understand interaction and behavior modeling.	3	3	3	2	2	-	2	-	1		1	-	-	-
414455.4	Understand design process and business, access and view layer class design	2	2	2	-	-	-	-	-	1	-	-	-	-	2
414455.5	Get started on study of GRASP principles and GoF design patterns.	2	2	1	-	-	-	-	-	-	-	-	-	-	-
414455.6	Get started on study of architectural design principles and guidelines in the various type of application development.	2	2	3	1	2	-	1	-	2	-	2	-	-	-
414456E	**Elective-I Business Analytics and Intelligence**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
414456E.1	Comprehend the Information Systems and development approaches of Intelligent Systems.	3	-	3	-	-	1	-	-	-	-	-	1	-	-
414456E.2	Evaluate and rethink business processes using information systems	1	3		2	-	-	-	-	3	2	-	1	1	-
414456E.3	Propose the Framework for business intelligence	2	2	1	-	2	-	-	1	2	1	1	2	-	-
414456E.4	Get acquainted with the Theories, techniques, and considerations for capturing organizational intelligence.	-	-	-	-	-	2	1	2	1	1	-	1	1	-
414456E.5	Align business intelligence with business strategy.	3	1	2	-	1	2	-	-	1	1	-	1		-
414456E.6	Apply the techniques for implementing business intelligence systems.	-	1	1	-	2	1	-	-	1	-	-	1	1	-
414457C	**Elective-II Software Testing and Quality Assurance**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
414457.1	Test the software by applying testing techniques to deliver a product free from	3		3	3	3	-	-	-	2	-	-	-	3	2
414457.2	Investigate the scenario and to select the proper testing technique.	2	3	2	2	3	-	-	-	-	-	-	-	3	2
414457.3	Explore the test automation concepts and tools and estimation of cost, schedule based on standard metrics.	3		3	3	3	-	-	-	-	-	-	3	2	3
414457.4	Understand how to detect, classify, prevent and remove defects.	2	3	3	3	2	-	-	-			-	-	2	

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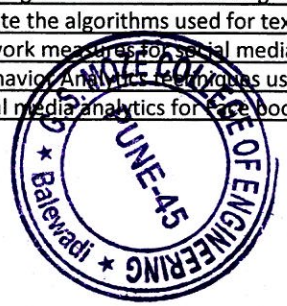
414457.5	Choose appropriate quality assurance models and develop quality	2	2	3	3	3	-	-	-	-	-	-	-	-	2
414457.6	Ability to conduct formal inspections, record and evaluate results or inspections.	3	2	2	2	2	-	-	-	-	-	-	-	3	-

Semester VIII

414462	Distributed Computing System	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
414462.1	To learn the principles, architectures and programming models used in distributed systems.	3	3	1		1	1	1	-	-	-	-	-	1	1
414462.2	To understand the fundamentals and knowledge of the Middleware of distributed systems	3	3	1	-	1	1	1	-	-	-	-	-	1	1
414462.3	To gain knowledge of working components and fault tolerance of distributed systems.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
414462.4	To understand the significance of agreement, fault tolerance and recovery protocols in Distributed Systems.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
414462.5	To make students aware about distributed and multimedia file systems and web systems.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
414462.6	Create an awareness of Emerging trends in distributed computing.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
414463	Ubiquitous Computing	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
414463.1	Demonstrate the knowledge of design of Ubicomp and its applications.	2	2	-	2	-	-	-	-	-	-	-	-	-	-
414463.2	Explain smart devices and services used Ubicomp.	2	3	2	3	-	-	-	-	-	-	-	-	-	-
414463.3	Describe the significance of actuators and controllers in real time application	3	2	3	3	-	-	-	-	-	-	-	-	-	-
414463.4	Use the concept of HCI to understand the design of automation applications. 5	3	2	3	3	-	-	-	-	-	-	-	-	-	-
414463.5	Classify Ubicomp privacy and explain the challenges associated with Ubicomp privacy.	3	3	3	3	-	-	-	-	-	-	-	-	-	-
414463.6	Get the knowledge of ubiquitous and service oriented networks along with Ubicomp management.	1	3	-	3	-	-	-	-	-	-	-	-	-	-
414464AC	Elective III Multimedia Techniques	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
414464c .1	To create own file formats for specific application.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
414464c .2	To do some projects based on current trends in multimedia.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
414464c .3	To use open sources for authoring tool for animation.	3	3	1	-	2	1	1	-	-	-	-	-	2	1
414464c .4	TUnderstand some research areas of current multimedia techniques.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
414464c .5	To use open sources for authoring tool for presentations	3	3	1	-	1	2	1	-	-	-	-	-	1	1
414464c .6	Become acquainted with some advanced topics in multimedia.	3	3	1	-	1	1	1	-	-	-	-	-	1	1
414464D	Elective IV	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
414464D.1	Understand the basics of Social Media Analytics	3	3	-	-	3	-	-	-	-	-	-	-	-	-
414464D.2	Explain the significance of Data mining in Social media.	3	3	3	-	-	-	-	-	-	-	-	-	-	-
414464D.3	Demonstrate the algorithms used for text mining.	2	3	1	-	-	-	-	-	-	-	-	-	-	-
414464D.4	Apply network measures for social media data.	2	2	2	-	-	-	-	-	-	-	-	-	-	-
414464D.5	Explain Behavior Analytics techniques used for social media data	2	3	3	2	3	-	-	-	-	-	-	-	-	-
414464D.6	Apply social media analytics for Face book and Twitter kind of applications.	2	2	3	3	3	-	-	1	-	-	-	-	-	-



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2.6.2 CO-PO Mapping Matrix

Semester III

Course	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
214441	**Discrete Mathematics**																
214441.1	Formulate, apply formal proof techniques and solve the problems with logical reasoning.	3	2	1	1	1	1	-	-	-	1		2	1	-	-	-
214441.2	Analyze and evaluate the combinatorial problems by using probability theory.	2	3	1	1	1	1	-	-	-	1		2	1	-	-	-
214441.3	Apply the concepts of graph theory to devise mathematical models.	3	3	2	2	1	1	-	-	-	2		2	1	-	-	-
214441.4	Analyze types of relations and functions to provide solution to computational problems.	3	2	1	2	1	1	-	-	-	2		2	1	-	-	-
214441.5	Identify techniques of number theory and its application.	2	2	2	2	1	2	-	-	-	1		2	1	-	-	-
214441.6	Identify fundamental algebraic structures.	2	3	2	1	1	1	-	-	-	1		2	1	-	-	-
214442	**Computer Organization and Logic Design**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
214442.1	Perform basic binary arithmetic & simplify logic expressions.	3	3		-	-	-	-	-	-	-	-	-	-	-	-	-
214442.2	functions using ICs.	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-	-
214442.3	sequential logic functions using ICs.	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-	-
214442.4	Elucidate the functions & organization of various blocks of CPU.	3	-	-	-	2	3	-	-	-	-	-	-	-	-	-	-
214442.5	CPU	3	-	-	-	2	2	-	-	-	-	-	-	-	-	-	-
214442.6	Describe an assortment of memory types (with their	3	-	-	-	2	2	-	-	-	-	-	-	-	-	-	-
214443	**Data Structures and Algorithms**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
214443.1	Perform basic analysis of algorithms with respect to time and space complexity.	3	3	2	3	-	3	-	-	-	-	-	-	-	-	-	-
214443.2	Select appropriate searching and/or sorting techniques in the application development.	1	3	3	3	-	3	-	-	-	-	-	-	-	-	-	-
214443.3	Implement abstract data type (ADT) and data structures for given application.	2	1	2	3	-	3	-	-	-	-	-	-	-	-	-	-
214443.4	Design algorithms based on techniques like brute -force, divide and conquer, greedy, etc.	2	3	3	3	-	3	-	-	-	-	-	-	-	-	-	-
214443.5	Apply implement learned algorithm design techniques and data structures to solve	3	3	2	3	-	3	-	-	-	-	-	-	-	-	-	-
214443.6	Design different hashing functions and use files organizations.	1	3	3	3	-	3	-	-	-	-	-	-	-	-	-	-
214444	**Object Oriented Programming**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
214444.1	Different Mode various programming paradigms.	3	3	3	2	2	3	2	-	-	2	-	2	1	1	1	-
214444.2	initialization, and destruction to model real-world problems.	3	3	3	3	2	3	3	1	-	2	-	2	1	1	1	-
214444.3	Identify relationship among objects using inheritance and polymorphism principles.	3	3	3	3	2	3	3	1	-	2	-	2	1	1	1	-
214444.4	Handle different types of exceptions and perform generic	3	3	3	3	2	3	3	-	-	2	-	2	1	1	1	-

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214444.5	Use of files for persistent data storage for real world applica	3	3	3	3	2	2	2	-	-	2	-	-	1	1	1	-
214444.6	Apply appropriate design patterns to provide object-oriented solutions.	3	3	3	3	2	2	2	-	-	2	-	-	1	1	1	-
214445	**Basics of Computer Network**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
214445.1	Understand and explain the concepts of communication theory	3	2	-	-	-	-	-	-	-	-	-	2	-	-	-	-
214445.2	Analyze data link layer services, error detection and correction,	-	3	-	-	-	-	-	-	-	-	-	1	-	-	-	-
214445.3	Compare different access techniques, channelization and	-	-	-	-	3	-	1	-	-	-	-	2	-	-	-	-
214445.4	Apply the skills of subnetting, supernetting and routing	-	3	3	-		-	-	-	-	-	-	2	-	-	-	-
214445.5	: Compare IPv4 and IPv6	-	-	-	-	2	3	-	-	-	-	-	3	-	-	-	-
214445.6	Understand services and protocols used at transport layer.	-	-	2	-		-	-	2	-	-	-	3	-	-	-	-

Semester IV

207003	**Engineering Mathematics III**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
207003 .1	Solve Linear differential equations, essential in modelling and design of computer-based	1	2	1	1	-	-	-	-	-	-	-	-	-	-	-	1
207003 .2	Apply concept of Fourier transform and Z-transform and its applications to continuous and discrete systems and image processing.	1	1	2	1	-	-	-	-	-	-	-	-	-	-	-	1
207003 .3	Apply Statistical methods like correlation& regression analysis and probability theory for data analysis and predictions in machine learning.	2	1	1	1	-	-	-	-	-	-	-	-	-	-	-	1
207003 .4	Solve Algebraic &Transcendental equations and System of linear equations using numerical	1	2	2	1	-	-	-	-	-	-	-	-	-	-	-	1
207003 .5	Obtain Interpolating polynomials, numerical differentiation and integration, numerical	1	2	1	2	-	-	-	-	-	-	-	-	-	-	-	1
214451	**Processor Architecture**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
214451 .1	Apprehend architecture and memory organization of PIC 18	2	2	2	2	-	-	-	-	-	-	-	2	-	-	-	-
214451 .2	Implement embedded C programming for PIC 18.	2	2	2	2	3	-	-	-	-	-	-	2	-	-	-	-
214451 .3	Use concepts of timers and interrupts of PIC 18.	2	2	2	2	-	-	-	-	-	-	-	-	-	-	-	-
214451 .4	Demonstrate real life applications using PIC 18.	3	3	3	3	3	2	-	-	-	-	-	-	-	-	-	-
214451 .5	Analyze architectural details of ARM processor.	1	1	1	1	-	-	-	-	-	-	-	2	-	-	-	-
214452	**Database Management System**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
214452 .1	Define fundamental elements of database management systems	3	2	3	-	1	-	-	1	-	-	-	2	3	1		-
214452 .2	Describe the fundamental elements of relational database management systems and Design ERmodels to represent simple database application scenarios.	2	1	2	-	2	-	-	1	2	-	-	2	3	2	2	-
214452 .3	Populate relational database and formulate SQL queries on data.	2	-	1	-	-	-	-	1	-	-	-	2	3			-

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214452 .4	Improve the database design by normalization & to incorpo query processing.	2	-	-	-	-	-	-	1	-	-	-	2	3			-
214452 .5	Illustrate ACID properties for transaction management & to describe concurrency control protocols.	2	-	-	-	2	-	-	1	-	-	-	2	3			-
214452 .6	Understand recent trends in database technology.	3	-	-	-	1	-	-	1	-	-	-	2	3	1		-
214453	**Computer Graphics**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
214453 .1	Specify mathematical and logical aspects for developing elementary graphics operations like scan conversion of points, lines and circle and apply it for problem solving.	3	3	3	2	2	1	2	1	0	1	1	0	-	-	-	-
214453 .2	Explain and employ techniques of geometrical transforms to produce, position and manipulate objects in 2 dimensional and 3-dimensional space respectively.	3	3	3	2	2	2	0	0	2	2	2	0	-	-	-	-
214453 .3	Describe mapping from a world coordinates to device coordinates, clipping, and projections in order to produce 3D images on 2D output device.	3	3	3	2	2	2	0	0	0	0	1	0	-	-	-	-
214453 .4	Apply the concepts of rendering, shading, animation, curves and fractals using computer graphics tools in design, development and testing of 2D, 3D modeling applications.	2	3	1	2	1	2	1	2	1	1	0	1	-	-	-	-
214453 .5	Develop the competency to understand the concepts related to Virtual reality	2	3	1	2	1	2	1	2	1	1	0	1	-	-	-	-
214454	**Software Engineering**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
214454 .1	Identify various software application domains and classify software applications.	2	2	1	-	-	1	-	-	-	-	-	1	-	-	-	-
214454 .2	Analyze software requirements by applying various modeling techniques.	2	2		1	-	-	-		1	2	-	1	-	-	-	-
214454 .3	Translate the requirement models into design models.	2	2	2	1	2	-	-	1	1	1	1	1	-	-	-	-
214454 .4	Apply planning and estimation to any project.	2	2		1		1	1	2	1	1	-	1	-	-	-	-
214454 .5	Apply quality attributes and testing principles in software development life cycle.	1	1	2	1	1	1	1	2	1	1	-	1	-	-	-	-
214454 .6	Discuss recent trends in Software engineering by using CASE and agile tools.	1	1	1		2	1	1	1	1	-	-	1	-	-	-	-

Semester V

Course	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
314441	**Theory of Computation**																
314441.1	Construct finite automata and its variants to solve computing problems.	3	2	2	-	-	-	-	-	-	-	-	-	2	2	3	-
314441.2	Write regular expressions for the regular languages and finite automata.	-	-	2	2	3	-	-	-	-	-	-	-	2	2	1	-
314441.3	Identify types of grammar, design and simplify Context Free Grammar.	-	3	2	1	3	-	-	-	-	-	-	-	2	1	-	-

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314441.4	Construct Pushdown Automata machine for the Context Fre Language.	3	3	3	-		-	-	-	-	-	-	-		2	-	-
314441.5	Design and analyze Turing machines for formal languages.	3	2	-	-	3	-	-	-	-	-	-	-	2	1	2	-
314441.6	Understand decidable and undecidable problems, analyze complexity classes.	3	3	3	-	-	-	-	-	-	-	-	1	2	1	-	-
314442	**Operating Systems**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
314442.1	Explain the role of Modern Operating Systems.	1	-	-	-	-	-	-	-	-	-	-	2	-	2	-	-
314442.2	Apply the concepts of process and thread scheduling.	1	1	-	-	-	-	-	-	-	-	-	2	-	2	-	-
314442.3	Illustrate the concept of process synchronization, mutual exclusion and the deadlock.	1	1	-	-	-	-	-	-	-	-	-	2	-	2	-	-
314442.4	Implement the concepts of various memory management techniques.	1	1	-	-	-	-	-	-	-	-	-	2	-	2	-	-
314442.5	Make use of concept of I/O management and File system.	1	1	-	-	-	-	-	-	-	-	-	2	-	2	-	-
314442.6	Understand Importance of System software	1	1	-	-	-	-	-	-	-	-	-	2	-	2	-	-
314443	**Machine Learning**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
314443.1	Apply basic concepts of machine learning and different types of machine learning algorithms.	3	1	1	2	2	2	2	1	1	1	1	1	1	1	1	-
314443.2	Differentiate various regression techniques and evaluate their performance.	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1	-
314443.3	Compare different types of classification models and their relevant application.	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1	-
314443.4	Illustrate the tree-based and probabilistic machine learning algorithms.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1	-
314443.5	Identify different unsupervised learning algorithms for the related real-world problems.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1	-
314443.6	Apply fundamental concepts of ANN.	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1	-
314444	**Human Computer Interaction**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
314444.1	Explain importance of HCIstudy and principles of user-centered design (UCD) approach.	2	2	1	-	-	-	-	-	-	2	-	1	2	2	2	-
314444.2	Develop understanding of human factors in HCI design.	3	3	2	2	1	-	-	-	-	2	-	2	1	2	2	-
314444.3	Develop understanding of models, paradigms, and context of interactions.	3	3	3	1	1	-	-	-	-	2	-	2	1	1	1	-
314444.4	Design effective user interfacesfollowing a structured and organized UCD process.	3	3	2	2	1	-	-	-	-	2	-	2	1	2	2	-
314444.5	Evaluate usability of a UI design.	3	3	2	2	1	-	-	-	-	2	-	2	1	2	2	-
314444.6	Apply cognitive models for predicting human-computer-interactions.	2	2				-	-	-	-	2	-	1	1	1	1	-

Semester VI

314445 D	**Elective-I Internet of Things**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
314445 D.1	Discussfundamentals, architecture and framework of IoT.	3	3	1	-	1	1	1					1	1	1	1	1

314445 D.2	Select suitable sensors and actuators for real time scenarios	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
314445 D.3	challenges	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
314445 D.4	applications.	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
314445 D.5	Understand the cloud interfacing technologies.	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
314445 D.6	Design and Implement realtime IoT applications.	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
314451	**Computer Networks& Security**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
314451.1	Explain Responsibilities,services offered and protocol used at	1	3	-	-	1	-	1	1	-	-	-	1	-	-	2	-
314451.2	Apply concepts of wireless network and different	1	1	-	-	1	-	-	1	-	-	-	1	-	-	2	-
314451.3	Recognize the Adhoc Network's MAC layer, routing protocol and	1	2	-	-	1	-	-	1	-	-	-	1	-	-	2	-
314451.4	Implement the principal concepts of network security and	1	3	-	1	-	1	-	3	-	-	-	1	-	-	2	-
314451.5	Apply basic cryptographic techniques in application development.	1	3	-	1	-	1	-	3	-	-	-	1	-	-	2	-
314451.6	Gain a good comprehension of the landscape of cyber security	1	3	-	1	-	1	-	3	-	-	-	1	-	-	2	-
314452	**Data Science and Big Data Analytics**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
314452.1	Understand Big Data primitives.	3	-	-	-	-	2	1	-	-	-	-	-	-	-	2	-
314452.2	Learn and apply different mathematical models for Big Data.	2	-	-	-	-	1	-	-	-	-	-	-	-	-	2	-
314452.3	Demonstrate Big Data learning skills by developing industry or	2	-	-	-	-	2	1	1	-	-	-	-	1	1	2	-
314452.4	Analyze and apply each learning model comes from a different	-	1	1	-		2	2	-	1	-	-	-	2	2	1	-
314452.5	Understand, apply and analyze needs, challenges and techniques	-	1	-	-	1	2	2	-	1	-	-	-	2	1	-	-
314452.6	Learn different programming platforms for big data analytics.	-	1	-	-	1	-	1	-	2	1	1	1	2	-	-	-
314453	**Web Application Development**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
314453.1	Bootstrap.	3	1	1	2	2	2	2	1	1	1	1	1	1	1	1	-
314453.2	Demonstrate the use of web scripting languages.	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1	-
314453.3	Develop web application with Front End & Back End Technologies.	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1	-
314453.4	Develop web application with Front End & Back End	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1	-
314453.5	Deploy web application on cloud using AWS.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1	-
314454 C	**Elective-II Cloud Computing**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
314454C.1	To provide students with the fundamentals and essentials of	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
314454C.2	To learn basics of virtualization and its importance	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
314454C.3	To provide students a sound foundation of the cloud computing	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
314454C.4	To enable students exploring some important cloud computing	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
314454C.5	To understand cloud storage technologies and relevant file	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
314454C.6	To be exposed to Ubiquitous Cloud and Internet of Things	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1

Semester VII

Course	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
414453	**Information and Cyber Security**																
414453.1	Comprehend the Information Systems and development approaches of intelligent systems.	3	-	3	-	-	1	-	-	-	-	-	1	-	-	-	-
414453.2	Evaluate and rethink business processes using information systems.	1	3	-	2	-	-	-	-	3	2	1	1	-	-	-	-
414453.3	Propose the framework for business intelligence	2	2	1	-	2	-	-	1	2	1	1	2	-	-	-	-

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414453.4	Get acquainted with the Theories, techniques, and considera ns for capturing	-	-	-	-	-	2	1	2	1	1	-	1	1	-	-	-
414453.5	Align business intelligence with business strategy.	3	1	2	-	1	2	-	-	1	1	-	1	-	-	-	-
414453.6	Apply the techniques for implementing business intelligence systems.	-	1	1	-	2	1	-	-	1	-	-	1	1	-	-	-
414454	**Machine Learning and Applications**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
414454.1	Apply basic concepts of machine learning and different types of machine learning algorithms.	3	1	1	2	2	2	2	1	1	1	1	1	1	1	1	-
414454.2	Differentiate various regression techniques and evaluate their performance.	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1	-
414454.3	Compare different types of classification models and their relevant application.	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1	-
414454.4	Illustrate the tree-based and probabilistic machine learning algorithms.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1	-
414454.5	Identify different unsupervised learning algorithms for the related real-world problems.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1	-
414454.6	Apply fundamental concepts of ANN.	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1	-
414455	**Software Design**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
414455.1	Understand object oriented methodologies, basics of Unified Modeling Language (UML)	3	2	3	2	2	-	2	-	2	2	2	-	2	1	-	-
414455.2	Understand analysis process, use case modeling, domain/class modeling	3	2	2	2	2	-	2	-	2	2	2	-	-	1	-	-
414455.3	Understand interaction and behavior modeling.	3	3	3	2	2	-	2	-	1	-	1	-	-	-	-	-
414455.4	Understand design process and business, access and view layer class design	2	2	2	-	-	-	-	-	1	-	-	-	-	2	-	-
414455.5	Get started on study of GRASP principles and GoF design patterns.	2	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-
414455.6	Get started on study of architectural design principles and guidelines in the various type of application development.	2	2	3	1	2	-	1	-	2	-	2	-	-	-	-	-
414456E	**Elective-I Business Analytics and Intelligence**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
414456E.1	Comprehend the Information Systems and development approaches of Intelligent	3	-	3	-	-	1	-	-	-	-	-	1	-	-	-	-
414456E.2	Evaluate and rethink business processes using information systems	1	3	-	2	-	-	-	-	3	2	-	1	1	-	-	-
414456E.3	Propose the framework for business intelligence	2	2	1	-	2	-	-	1	2	1	1	2	-	-	-	-
414456E.4	Get acquainted with the Theories, techniques, and considerations for capturing	-	-	-	-	-	2	1	2	1	1	-	1	1	-	-	-
414456E.5	Align business intelligence with business strategy.	3	1	2	-	1	2	-	-	1	1	-	1	-	-	-	-
414456E.6	Apply the techniques for implementing business intelligence systems.	-	1	1	-	2	1	-	-	1	-	-	1	1	-	-	-

414457C	**Elective-II Software Testing and Quality Assurance**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
414457.1	Test the software by applying testing techniques to deliver a product free from bugs.	3		3	3	3	-	-	-	2	-	-	-	3	2	3	-
414457.2	Investigate the scenario and to select the proper testing technique.	2	3	2	2	3	-	-	-	-	-	-	-	3	2	3	-
414457.3	Explore the test automation concepts and tools and estimation of cost, schedule based on standard metrics.	3		3	3	3	-	-	-	-	-	-	3	2	3	3	-
414457.4	Understand how to detect, classify, prevent and remove defects.	2	3	3	3	2	-	-	-	-	2	-	-	2	-	2	-
414457.5	Choose appropriate quality assurance models and develop quality.	2	2	3	3	3	-	-	-	-	-	-	-	-	2	2	-
414457.6	Ability to conduct formal inspections, record and evaluate results of inspections.	3	2	2	2	2	-	-	-	-	-	-	-	3	-	-	-

Semester VIII

414462	**Distributed Computing System**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
414462.1	To learn the principles, architectures and programming models used in distributed systems.	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
414462.2	To understand the fundamentals and knowledge of the Middleware of distributed systems	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
414462.3	To gain knowledge of working components and fault tolerance of distributed systems.	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
414462.4	To understand the significance of agreement, fault tolerance and recovery protocols in Distributed Systems.	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
414462.5	To make students aware about distributed and multimedia file systems and web systems.	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
414462.6	Create an awareness of Emerging trends in distributed computing.	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
414463	**Ubiquitous Computing**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
414463.1	Demonstrate the knowledge of design of Ubicomp and its applications.	2	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-
414463.2	Explain smart devices and services used Ubicomp.	2	3	2	3	-	-	-	-	-	-	-	-	-	-	-	-
414463.3	Describe the significance of actuators and controllers in real time application design.	3	2	3	3	-	-	-	-	-	-	-	-	-	-	-	-
414463.4	Use the concept of HCI to understand the design of automation applications.	3	2	3	3	-	-	-	-	-	-	-	-	-	-	-	-
414463.5	Classify Ubicomp privacy and explain the challenges associated with Ubicomp privacy.	3	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-
414463.6	Get the knowledge of ubiquitous and service oriented networks along with Ubicomp management.	1	3	-	3	-	-	-	-	-	-	-	-	-	-	-	-

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414464A	Elective III Internet of Things (IoT)	PO1	PO2	PO3	PO4	PO5	PO6	PO	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
414464A .1	To Explain what is internet of things.	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
414464A .2	To Explain architecture and design of IoT	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
414464A .3	To Describe the objects connected in IoT.	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
414464A .4	To Understand the underlying Technologies.	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
414464A .5	To Understand the platforms in IoT.	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
414464A .6	To Understand cloud interface to IoT.	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1

414464D	Elective IV	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
414464D.1	Understand the basics of Social Media Analytics	3	3	-	-	3	-	-	-	-	-	-	-	-	-	-	-
414464D.2	Explain the significance of Data mining in Social media.	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
414464D.3	Demonstrate the algorithms used for text mining.	2	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-
414464D.4	Apply network measures for social media data.	2	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
414464D.5	Explain Behavior Analytics techniques used for social media data	2	3	3	2	3	-	-	-	-	-	-	-	-	-	-	-
414464D.6	Apply social media analytics for Face book and Twitter kind of applications.	2	2	3	3	3	-	-	1	-	-	-	-	-	-	-	-

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2.6.2 CO-PO Mapping Matrix

Semester III

Course	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
214441	**Discrete Mathematics**																
214441.1	Formulate, apply formal proof techniques and solve the problems with logical reasoning.	3	2	1	1	1	1	-	-	-	1	-	2	1	-	-	-
214441.2	Analyze and evaluate the combinatorial problems by using probability theory.	2	3	1	1	1	1	-	-	-	1	-	2	1	-	-	-
214441.3	Apply the concepts of graph theory to devise mathematical models.	3	3	2	2	1	1	-	-	-	2	-	2	1	-	-	-
214441.4	Analyze types of relations and functions to provide solution to computational problems.	3	2	1	2	1	1	-	-	-	2	-	2	1	-	-	-
214441.5	Identify techniques of number theory and its application.	2	2	2	2	1	2	-	-	-	1	-	2	1	-	-	-
214441.6	Identify fundamental algebraic structures.	2	3	2	1	1	1	-	-	-	1	-	2	1	-	-	-
214442	**Computer Organization and Logic Design**																
214442.1	Perform basic binary arithmetic & simplify logic expressions.	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
214442.2	Grasp the operations of logic ICs and Implement combinational logic functions using ICs.	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-	-
214442.3	sequential logic functions using ICs.	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-	-
214442.4	Elucidate the functions & organization of various blocks of CPU.	3	-	-	-	2	3	-	-	-	-	-	-	-	-	-	-
214442.5	Understand CPU instruction characteristics, enhancement features of CPU	3	-	-	-	2	2	-	-	-	-	-	-	-	-	-	-
214442.6	Describe an assortment of memory types (with their characteristics) used in computer systems and basic principle of interfacing input, output devices.	3	-	-	-	2	2	-	-	-	-	-	-	-	-	-	-
214443	**Data Structures and Algorithms**																
214443.1	Perform basic analysis of algorithms with respect to time and space complexity.	3	3	2	3	-	3	-	-	-	-	-	-	-	-	-	-
214443.2	Select appropriate searching and/or sorting techniques in the application development.	1	3	3	3	-	3	-	-	-	-	-	-	-	-	-	-
214443.3	Implement abstract data type (ADT) and data structures for given application.	2	1	2	3	-	3	-	-	-	-	-	-	-	-	-	-
214443.4	Design algorithms based on techniques like brute -force, divide and conquer, greedy, etc.	2	3	3	3	-	3	-	-	-	-	-	-	-	-	-	-
214443.5	Apply implement learned algorithm design techniques and data structures to solve problems.	3	3	2	3	-	3	-	-	-	-	-	-	-	-	-	-
214443.6	Design different hashing functions and use file organizations.	1	3	3	3	-	3	-	-	-	-	-	-	-	-	-	-
214444	**Object Oriented Programming**																
214444.1	Differentiate various programming paradigms	3	3	3	2	2	3	2	-	-	2	-	2	1	1	1	-
214444.2	and Destruction to model real-world problems	3	3	3	3	2	3	3	1	-	2	-	2	1	1	1	-

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214444.3	Identify relationship among objects using inheritance and polymorphism principles.	3	3	3	3	2	3	3	1	-	2	-	2	1	1	1	-	
214444.4	Handle different types of exceptions and perform generic programming.	3	3	3	3	2	3	3	1	-	2	-	2	1	1	1	-	
214444.5	Use of files for persistent data storage for real world application.	3	3	3	3	2	2	2	-	-	2	-	-	1	1	1	-	
214444.6	Apply appropriate design patterns to provide object-oriented solutions.	3	3	3	3	2	2	2	-	-	2	-	-	1	1	1	-	
214445	**Basics of Computer Network**																	
214445.1	Understand and explain the concepts of communication theory and compare functions of OSI and TCP/IP model.	3	2	-	-	-	-	-	-	-	-	-	2	-	-	-	-	
214445.2	Analyze data link layer services, error detection and correction, linear block codes, cyclic codes, framing and flow control protocols.	-	3	-	-	-	-	-	-	-	-	-	1	-	-	-	-	
214445.3	Compare different access techniques, channelization and Ethernet standards.	-	-	-	-	3	-	1	-	-	-	-	2	-	-	-	-	
214445.4	Apply the skills of subnetting, supernetting and routing mechanisms.	-	3	3	-	-	-	-	-	-	-	-	2	-	-	-	-	
214445.5	Compare IPv4 and IPv6	-	-	-	-	2	3	-	-	-	-	-	3	-	-	-	-	
214445.6	Understand services and protocols used at transport layer.	-	-	2	-	-	-	-	2	-	-	-	3	-	-	-	-	

Semester IV

207003	**Engineering Mathematics III**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	
207003 .1	Solve Linear differential equations, essential in modelling and design of computer-based systems.	1	2	1	1	-	-	-	-	-	-	-	-	-	-	-	1
207003 .2	Apply concept of Fourier transform and Z-transform and its applications to continuous and discrete systems and image processing.	1	1	2	1	-	-	-	-	-	-	-	-	-	-	-	1
207003 .3	Apply Statistical methods like correlation& regression analysis and probability theory for data analysis and predictions in machine learning.	2	1	1	1	-	-	-	-	-	-	-	-	-	-	-	1
207003 .4	Solve Algebraic &Transcendental equations and System of linear equations using numerical	1	2	2	1	-	-	-	-	-	-	-	-	-	-	-	1
207003 .5	Obtain Interpolating polynomials, numerical differentiation and integration, numerical	1	2	1	2	-	-	-	-	-	-	-	-	-	-	-	1
214451	**Processor Architecture**																
214451 .1	Apprehend architecture and memory organization of PIC 18	2	2	2	2	-	-	-	-	-	-	-	2	-	-	-	-
214451 .2	Implement embedded C programming for PIC 18.	2	2	2	2	3	-	-	-	-	-	-	2	-	-	-	-
214451 .3	Use concepts of timers and interrupts of PIC 18.	2	2	2	2	-	-	-	-	-	-	-	-	-	-	-	-
214451 .4	Demonstrate real life applications using PIC 18.	3	3	3	3	3	2	-	-	-	-	-	-	-	-	-	-
214451 .5	Analyze architectural details of ARM processor.	1	1	1	1	-	-	-	-	-	-	-	2	-	-	-	-
214452	**Database Management System**																
214452 .1	Define fundamental elements of database management systems	3	2	3	-	1	-	-	1	-	-	-	2	3	1	-	-
214452 .2	Describe the fundamental elements of relational database management	2	1	2	-	2	-	-	1	2	-	-	2	3	2	2	-
214452 .3	Populate relational database and formulate SQL queries on data.	2	-	1	-	-	-	-	1	-	-	-	2	3	-	-	-

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214452 .4	Improve the database design by normalization & to incor ate query processing.	2	-	-	-	-	-		1	-	-	-	2	3	-	-	-		
214452 .5	Illustrate ACID properties for transaction management & to describe concurrency control protocols.	2	-	-	-	2	-	-	1	-	-	-	2	3	-	-	-		
214452 .6	Understand recent trends in database technology.	3	-	-	-	1	-	-	1	-	-	-	2	3	1	-	-		
214453	**Computer Graphics**																		
214453 .1	Specify mathematical and logical aspects for developing elementary	3	3	3	2	2	1	2	1	-	1	1	-	-	-	-	-		
214453 .2	Explain and employ techniques of geometrical transforms to produce, position and manipulate objects in 2 dimensional and 3-dimensional space respectively.	3	3	3	2	2	2	-	-	2	2	2	-	-	-	-	-		
214453 .3	Describe mapping from a world coordinates to device coordinates, clipping, and projections in order to produce 3D images on 2D output device.	3	3	3	2	2	2	-	-	-	-	1	-	-	-	-	-		
214453 .4	Apply the concepts of rendering, shading, animation, curves and fractals using computer graphics tools in design, development and testing of 2D, 3D modeling applications.	2	3	1	2	1	2	1	2	1	1	-	1	-	-	-	-		
214453 .5	Develop the competency to understand the concepts related to Virtual reality	2	3	1	2	1	2	1	2	1	1	-	1	-	-	-	-		
214454	**Software Engineering**																		
214454 .1	Identify various software application domains and classify software applications.	2	2	1	-	-	1	-	-	-	-	-	1	-	-	-	-		
214454 .2	Analyze software requirements by applying various modeling techniques.	2	2		1	-	-	-	-	1	2		1	-	-	-	-		
214454 .3	Translate the requirement models into design models.	2	2	2	1	2	-	-	1	1	1	1	1	-	-	-	-		
214454 .4	Apply planning and estimation to any project.	2	2		1	-	1	1	2	1	1	-	1	-	-	-	-		
214454 .5	Apply quality attributes and testing principles in software development	1	1	2	1	1	1	1	2	1	1	-	1	-	-	-	-		
214454 .6	Discuss recent trends in Software engineering by using CASE and agile tools.	1	1	1	-	2	1	1	1	1	-	-	1	-	-	-	-		

Semester V

Course	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
314441	**Theory of Computation**																-
314441.1	Construct finite automata and its variants to solve computing problems.	3	2	2	-	-	-	-	-	-	-	-	-	2	2	3	-
314441.2	Write regular expressions for the regular languages and finite automata.	-	-	2	2	3	-	-	-	-	-	-	-	2	2	1	-
314441.3	Identify types of grammar, design and simplify Context Free Grammar.	-	3	2	1	3	-	-	-	-	-	-	-	2	1	-	-
314441.4	Construct Pushdown Automata machine for the Context Free Language.	3	3	3			-	-	-	-	-	-	-	2	-	-	

314441.5	Design and analyze Turing machines for formal languages.	3	2	-	-	3	-	-	-	-	-	-	-	2	1	2	-
314441.6	Understand decidable and undecidable problems, analyze complexity classes.	3	3	3	-	-	-	-	-	-	-	-	1	2	1	-	-
314442	**Operating Systems**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
314442.1	Explain the role of Modern Operating Systems.	1	-	-	-	-	-	-	-	-	-	-	2	-	2	-	-
314442.2	Apply the concepts of process and thread scheduling.	1	1	-	-	-	-	-	-	-	-	-	2	-	2	-	-
314442.3	Illustrate the concept of process synchronization, mutual exclusion and the deadlock.	1	1	-	-	-	-	-	-	-	-	-	2	-	2	-	-
314442.4	Implement the concepts of various memory management techniques.	1	1	-	-	-	-	-	-	-	-	-	2	-	2	-	-
314442.5	Make use of concept of I/O management and File system.	1	1	-	-	-	-	-	-	-	-	-	2	-	2	-	-
314442.6	Understand Importance of System software	1	1	-	-	-	-	-	-	-	-	-	2	-	2	-	-
314443	**Machine Learning**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
314443.1	Apply basic concepts of machine learning and different types of machine learning algorithms.	3	1	1	2	2	2	2	1	1	1	1	1	1	1	1	-
314443.2	Differentiate various regression techniques and evaluate their	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1	-
314443.3	Compare different types of classification models and their relevant application.	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1	-
314443.4	Illustrate the tree-based and probabilistic machine learning algorithms.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1	-
314443.5	Identify different unsupervised learning algorithms for the related real-world problems.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1	-
314443.6	Apply fundamental concepts of ANN.	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1	-
314444	**Human Computer Interaction**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
314444.1	Explain importance of HCIstudy and principles of user-centered design (UCD) approach.	2	2	1	-	-	-	-	-	-	2	-	1	2	2	2	-
314444.2	Develop understanding of human factors in HCI design.	3	3	2	2	1	-	-	-	-	2	-	2	1	2	2	-
314444.3	Develop understanding of models, paradigms, and context of interactions.	3	3	3	1	1	-	-	-	-	2	-	2	1	1	1	-
314444.4	Design effective user-interfacesfollowing a structured and organized UCD process.	3	3	2	2	1	-	-	-	-	2	-	2	1	2	2	-
314444.5	Evaluate usability of a user-interface design.	3	3	2	2	1	-	-	-	-	2	-	2	1	2	2	-
314444.6	Apply cognitive models for predicting human-computer-interactions.	2	2	-	-	-	-	-	-	-	2	-	1	1	1	1	-

Semester VI

314445 D	**Elective-4 Internet of Things**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
314445 D.1	Discussfundamentals, architecture and framework of IoT.	3	3	1	-	1	1	1			-	-	-	1	1	1	1
314445 D.2	Select suitable sensors and actuators for real time scenarios	3	3	1	-	1	1	1			-	-	-	1	1	1	1

314445 D.3	Justify the significance of protocol for wireless communication a oT challenges	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
314445 D.4	Understand the Python programming for development of IoT applications.	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
314445 D.5	Understand the cloud interfacing technologies.	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
314445 D.6	Design and Implement realtime IoT applications.	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
314451	**Computer Networks& Security**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
314451.1	Explain Responsibilities,services offered and protocol used at	1	3	-	-	1	-	1	1	-	-	-	1	-	-	2	-
314451.2	Apply concepts of wireless network and different wirelessstandards.	1	1	-	-	1	-	-	1	-	-	-	1	-	-	2	-
314451.3	Recognize the Adhoc Network's MAC layer, routing protocol and Sensor	1	2	-	-	1	-	-	1	-	-	-	1	-	-	2	-
314451.4	Implement the principal concepts of network security and Understand network security threats, security services, and counter measures	1	3	-	1	-	1	-	3	-	-	-	1	-	-	2	-
314451.5	Apply basic cryptographic techniques in application development.	1	3	-	1	-	1	-	3	-	-	-	1	-	-	2	-
314451.6	Gain a good comprehension of the landscape of cyber security	1	3	-	1	-	1	-	3	-	-	-	1	-	-	2	-
314452	**Data Science and Big Data Analytics**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
314452.1	Understand Big Data primitives.	3	-	-	-	-	2	1	-	-	-	-	-	-	-	2	-
314452.2	Learn and apply different mathematical models for Big Data.	2	-	-	-	-	1	-	-	-	-	-	-	-	-	2	-
314452.3	Demonstrate Big Data learning skills by developing industry or research	2	-	-	-	-	2	1	1	-	-	-	-	1	1	2	-
314452.4	Analyze and apply each learning model comes from a different algorithmic approach and it will perform differently under different datasets.	-	1	1	-	-	2	2	-	1	-	-	-	2	2	1	-
314452.5	Understand, apply and analyze needs, challenges and techniques for big	-	1	-	-	1	2	2	-	1	-	-	-	2	1	-	-
314452.6	Learn different programming platforms for big data analytics.	-	1	-	-	1	-	1	-	2	1	1	1	2	-	-	-
314453	**Web Application Development**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
314453.1	Develop Static and Dynamic website using technologies like HTML, CSS, Bootstrap.	3	1	1	2	2	2	2	1	1	1	1	1	1	1	1	-
314453.2	Demonstrate the use of web scripting languages.	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1	-
314453.3	Develop web application with Front End & Back End Technologies.	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1	-
314453.4	Develop web application with Front End & Back End Technologies.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1	-
314453.5	Deploy web application on cloud using AWS.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1	-
314454 C	**Elective I Cloud Computing**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
314454C.1	To provide students with the fundamentals and essentials of cloud	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
314454C.2	To learn basics of virtualization and its importance	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
314454C.3	To provide students a sound foundation of the cloud computing so that they are able to start using and adopting cloud computing services and tools in their real life scenarios	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1

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314454C.4	To enable students exploring some important cloud comp ng driven commercial systems and applications	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
314454C.5	To understand cloud storage technologies and relevant file systems	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
314454C.6	To be exposed to Ubiquitous Cloud and Internet of Things	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1

Semester VII

Course	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
414441	**Information and Storage Retrieval**																
414441.1	Understand the concept of Information retrieval and to apply clustering in information retrieval.	2	-	3	-	1	-	-	-	-	-	-	2	2	2	-	-
414441.2	Use an indexing approach for retrieval of text and multimedia data.	3	3	3	1	1	-	-	-	-	-	1	2	3	3	-	-
414441.3	Evaluate performance of information retrieval systems.	2	3	2	-		-	-	-	-	-	-	-	2	-	-	-
414441.4	Apply the concepts of multimedia and distributed information retrieval.	2	3	2	-	1	-	-	-	-	-	-	2	3	3	-	-
414441.5	Use appropriate tools in analyzing the web information.	2	3	2	-		-	-	-	-	-	-	-	2	3	-	-
414441.6	Simulate the working of a search engine and recommender system.	2	3	2	-	1	-	-	-	-	-	-	2	3	2	-	-
414442	**Software Project Management**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
414442.1	Apply the practices and methods for successful Software Project Management	-	2	-	-	-	-	-	-	-	2	2	2	2	-	-	-
414442.2	Create Design and Evaluate Project	-	2	-	-	-	-	-	-	-	2	2	2	2	-	-	-
414442.3	Analyze Project Schedule and calculate Risk Management with help of tools.	-	2	-	-	2	-	-	-	-	2	2	2	2	-	-	-
414442.4	Demonstrate different tools used for Project Tracking, Monitoring & Control.	-	2	-	-	2	-	-	-	-	2	2	2	2	-	-	-
414442.5	Identify Staff Selection Process and the issues related to Staff Management.	-	1	-	-		-	-	-	-	1	1	1	1	-	-	-
414442.6	Discuss and use modern tools for Software Project Management.	-	1	-	-	2	-	-	-	-	1	1	1	1	-	-	-

414443	**Deep Learning**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
414443.1	Understanding of dam its safety and behavioral aspects with instruments	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
414443.2	Analysis and design of Gravity Dam with different stability conditions.	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
414443.3	Undertake design and detailing of Ogee Spillway.	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
414443.4	Students are gained the knowledge of failure aspects of earthen dam and study of diversion headwork	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
414443.5	Design Canal structures for satisfying irrigation in nearby area.	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
414443.6	Suggest types of cross drainage work for available site conditions.	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
414444	**Elective II: Mobile Computing**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
414444.1	Apply basic concepts of machine learning and different types of machine learning algorithms.	3	1	1	2	2	2	2	1	1	1	1	1	1	1	1	-

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414444.2	Differentiate various regression techniques and evaluate t performance.	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1	-
414444.3	Compare different types of classification models and their relevant application.	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1	-
414444.4	Illustrate the tree-based and probabilistic machine learning algorithms.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1	-
414444.5	Identify different unsupervised learning algorithms for the related real-world problems.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1	-
414444.6	Apply fundamental concepts of ANN.	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1	-
414445	**Elective IV Wireless Communications**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
414445.1	Articulate the fundamental concept of cellular system.	3	2	-	-	-	-	-	-	-	-	-	-	1	-	-	-
414445.2	Analyse the fundamentals of cellular systems.	2	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
414445.3	Illustrate multiple access technique for effective utilization of spectrum.	2	2	-	-	-	-	-	-	-	1	-	-	1	-	-	-
414445.4	Design and analyse the WAP Programming Model in networking environment.	3	2	3	-	2	-	-	-	-	2	-	-	1	-	-	-
414445.5	Learn and understand security issues, challenges and tools in wireless communication.	3	2	2	-	2	-	-	3	-	3	-	-	1	-	-	-
414445.6	Explore the emerging trends and applications in wireless	3	3	2	-	2	-	-	1	-	3	-	-	1	-	-	-

Semester VIII

414450	**Distributed Systems**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
414450.1	To learn the principles, architectures and programming models used in distributed systems.	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
414450.2	To understand the fundamentals and knowledge of the Middleware of distributed systems	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
414450.3	To gain knowledge of working components and fault tolerance of distributed systems.	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
414450.4	To understand the significance of agreement, fault tolerance and recovery protocols in Distributed Systems.	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
414450.5	To make students aware about distributed and multimedia file systems and web systems.	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
414450.6	Create an awareness of Emerging trends in distributed computing.	3	3	1	-	1	1	1	-	-	-	-	-	1	1	1	1
414451	**Elective V Social Computing**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
414451.1	Understand basics of Social Media Analytics	3	2	2	3	-	-	-	-	-	-	-	2	2	-	-	-
414451.2	Correlate Network Measures for Social Media Data	3	3	3	2	-	-	-	-	-	-	-	1	2	-	-	-
414451.3	Visualize mining in social media data	3	2	3	3	1	-	-	-	-	1	-	2	1	1	-	-
414451.4	Discuss the Social Similarities	3	3	2	2	1	-	-	-	-	-	-	2	2	2	-	-
414451.5	Interpret social media behavior	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
414451.6	Apply Social Media Computations for Google+	3	3	3	2	2	-	-	-	-	1	-	2	2	2	-	-

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414452	Elective VI Blockchain Technology	PO1	PO2	PO3	PO4	PO5	PO6	O7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
414452.1	Understand the concept of cryptography and decentralization.	3	1	-	-	2	-	-	-	-	-	-	-	-	-	-	-
414452.2	Acquire fundamental knowledge of blockchain with issues associated with it.	3	1	-	-	-	-	-	-	-	3	-	-	-	-	-	-
414452.3	Acquire knowledge of Ethereum blockchain platform.	3	1	-	2	2	-	-	-	-	3	2	-	-	-	-	-
414452.4	Understand hyper ledger fabric platform.	3	1	3	2	2	1	1	2	-	3	2	1	-	-	-	-
414452.5	Acquire the knowledge regarding working of tokenization.	3	1	-	2	2		1	2	-	3	2	1	-	-	-	-
414452.6	Describe the applications and risk involved	1	-	1	-	1	1	1	-	1	1	-	1	-	-	-	-

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Sr. No.	Course Code	Course Name
Semester - I		
1	310901	Discrete Mathematics and Statistics
2	310902	Data Structures and Algorithms
3	310903	Object Oriented Programming
4	310904	Software Engineering & Project Management
5	310905	Information Systems and Engineering Economics
Semester - II		
1	310912	Database Management System
2	310913	Computer Network
3	310914	Java Programming
4	310915	Operating Systems
5	310916	Elective-I

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Course Code	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
310901	**Discrete Mathematics and Statistics**															
310901.1	Solve real world problems logically by using set and induction approaches.	3	3	2	3	2	1	1	-	1	-	-	1	1	1	2
310901.2	Describe and implement relations and functions.	3	3	3	3	2	1	2	1	2	2	3	1	1	1	1
310901.3	Apply logical reasoning to solve a variety of problems	3	3	2	2	2	-	1	2	1	1	-	-	2	-	3
310901.4	Apply statistical concepts to solve basic problems.	3	3	3	3	3	2	1	-	-	1	1	1	3	1	2
310901.5	Solve the problems of Discrete Distributions and Continuous Distributions.	3	3	3	3	2	-	2	2	3	2	1	2	2	2	2
310901.6	Explain various Descriptive Statistical concepts	3	3	3	3	3	2	2	2	2	2	1	-	-	-	-
310902	**Data structure and Algorithm**															
310902.1	Explain the Complexity of Algorithms & fundamentals of Data Structures.	3	2	1	2	1	1	1	2	1	1	1	2	3	2	3
310902.2	Describe representation & application of Linked List	3	3	2	2	2	1	-	1	1	1	1	1	1	2	3
310902.3	Write programs that uses stacks, queues.	3	3	3	2	2	2	1	1	-	-	1	1	1	2	3
310902.4	Apply nonlinear data structure trees to solve mathematical problems.	3	3	2	2	1	1	1	1	-	1	1	1	3	2	1
310902.5	Explain representations & the applications of graphs.	2	3	2	1	1	-	-	1	1	1	1	1	1	3	2
310902.6	Implement different searching and sorting algorithms.	3	3	2	3	1	1	1	1	1	-	1	1	2	1	3
310903	**Object Oriented Programming**															
310903.1	Explore the basics of Oop	3	2	3	2	2	2	-	2	2	1	-	-	3	3	2
310903.2	Analyze the strengths of object oriented programming	3	2	2	2	2	-	-	1	1	-	-	-	3	2	2
310903.3	Design and apply OOP principles for effective programming	3	2	2	2	2	-	-	-	2	1	-	-	2	2	1
310903.4	Develop programming application using object oriented programming language C++	3	2	2	2	2	2	1	1	1	-	1	-	3	3	2
310903.5	Achieve applicability of OOP	3	2	2	2	2	-	1	1	1	-	-	-	2	2	1
310903.6	Percept the utility of OOP for advanced programming	2	3	2	1	1	-	-	1	1	1	1	1	1	3	2

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310904	Software Engineering & Project Management																
310904.1	Choose and apply appropriate lifecycle model of software development.	3	3	2	2	1	1	1	-	1	2	1	1	3	3	-
310904.2	Analyze software requirements by applying various modelling techniques	3	2	3	2	2	1	1	1	1	2	-	1	3	3	2
310904.3	Describe principles of agile development, discuss the SCRUM process and distinguish Agile process model from other process models	3	2	2	2	2	-	-	-	2	1	-	-	2	2	1
310904.4	Describe project schedule and cost estimation	2	2	1	2	1	1	2	2	1	2	-	-	2	1	1
310904.5	Understand IT project management through life cycle of the project and future trends in IT Project Management.	3	2	1	2	2	2	1	1	-	-	1	1	1	2	3
310904.6	Define ethics and understand its importance in project leadership.	2	2	1	1	1	2	1	-	-	1	1	1	3	1	2
310905	Information Systems and Engineering Economics																
310905.1	Understand the need, usage and importance Management Functions, Organisational structure and Information Systems.	2	2	1	2	2	2	2	2	2	1	2	1	2	1	1
310905.2	Understand the Information Systems, Project Management, Managing Data resources, Knowledge Management, Business Process Integration and Enterprise Systems.	2	3	3	1	2	1	2	2	1	1	2	2	1	-	2
310905.3	Understand the Management Information Systems Applications using in an Organization.	2	3	3	2	2	1	2	2	1	1	2	1	-	1	1
310905.4	Elaborate Managerial Decision Making Models and applying to Business Intelligence.	2	3	2	1	2	1	2	2	1	1	2	2	-	1	2
310905.5	Implement the basic Accounting concepts in the banking and financial applications	3	3	2	1	2	1	2	2	1	1	1	2	1	2	1
310905.6	Apply the basic concepts of cost accounting in real world problem	3	2	2	1	1	1	1	2	1	2	1	1	3	1	3

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310912	**Database Management System**															
310912.1	Design E-R Model for given requirements and convert the same into database tables.	3	2	2	3	2	1	1	-	1	1	2	1	2	2	2
310912.2	Use database techniques such as SQL & PL/SQL.	3	2	3	3	1	1	2	1	2	2	3	1	1	1	1
310912.3	Use modern database techniques such as NOSQL.	2	3	2	2	2	-	1	2	1	1	-	2	2	1	3
310912.4	Explain transaction Management in relational database System.	3	3	3	3	3	2	1	-	-	1	1	1	3	1	2
310912.5	Describe different database architecture and analyses the use of appropriate architecture in real time environment.	3	3	2	3	2	-	2	2	3	2	1	2	2	2	2
310912.6	Students will be able to use advanced database Programming concepts Big Data – HADOOP	3	2	3	3	2	2	2	2	2	2	-	-	3	2	2
310913	**Computer Network**															
310913.1	Analyze the requirements for a given organizational structure to select the most appropriate networking architecture, topologies, transmission mediums, and technologies.	3	2	1	2	3	3	2	2	2	1	2	1	2	1	1
310913.2	Demonstrate design issues, flow control and error control.	3	3	3	1	2	1	2	2	1	1	2	2	1	2	2
310913.3	Analyze data flow between TCP/IP model using Application, Transport and Network Layer protocols.	3	2	2	2	1	-	1	2	1	1	2	1	1	1	1
310913.4	Illustrate applications of Computer Network capabilities, selection and usage for various sectors of user community.	3	2	2	1	1	1	2	2	1	1	2	2	1	-	2
310913.5	Illustrate Client-Server architectures and prototypes by the means of correct standards and technology.	3	3	2	2	2	2	2	2	1	1	1	2	1	2	1
310913.6	Demonstrate different routing and switching algorithms.	3	2	2	1	1	-	1	2	1	2	1	1	3	1	3
310914	**Java Programming**															
310914.1	Describe the core concept of Java programming	3	2	2	3	2	1	1	-	1	-	-	1	2	2	2
310914.2	Discover the need for working with the multithreading and file handling	3	2	3	3	1	1	2	1	2	2	3	1	1	1	1
310914.3	Illustrate the purpose of applet and AWT in Java programming	2	3	2	2	2	-	1	2	1	1	-	-	2	-	3
310914.4	Indicate the use of database connectivity using Java Programming	3	3	3	3	3	2	1	-	-	1	1	1	3	1	2
310914.5	Articulate the networking concepts in Java	3	3	2	3	2	-	2	2	3	2	1	2	2	2	2
310914.6	Implement Java Servlet and JSP concept in Java	3	2	3	3	2	2	2	2	2	2	1	-	3	2	2

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310915	**Operating System**																
310915.1	Fundamental understanding of the role of Operating Systems.	3	3	2	2	3	2	2	2	2	1	1	1	2	1	1	
310915.2	To understand the concept of a process and thread.	3	3	3	1	2	1	2	2	1	1	2	2	1	1	2	
310915.3	To apply the concept of process scheduling.	2	3	3	2	-	1	2	2	1	1	2	1	2	1	1	
310915.4	To apply the concept of process synchronization, mutual exclusion and the deadlock	2	3	2	2	2	1	2	3	1	1	3	2	-	1	2	
310915.5	To realize the concept of disk scheduling and File system	2	2	2	1	2	1	2	2	1	1	1	2	1	2	1	
310915.6	To understand the various memory management techniques.	3	2	2	-	1	1	1	2	1	2	1	1	3	1	3	
310916	**Elective-I Block Chain**																
310916.1	Understand the structure of a block chain and why/when it is better than a simple distributed database.	3	2	2	3	2	1	1	-	1	-	1	1	2	2	2	
310916.2	Analyze the incentive structure in a block chain based system and critically assess its functions, benefits and vulnerabilities	2	3	3	3	1	-	2	1	2	2	3	1	1	1	1	
310916.3	Explain Nakamoto consensus. Describe differences between proof-of-work and proof-of-stake consensus.	3	2	2	3	3	1	1	-	1	1	1	1	2	3	3	
310916.4	Understand what constitutes a "smart" contract, what are its legal implications and what it can and cannot do, now and in the near future	3	3	3	2	3	2	1	2	1	1	1	1	2	1	2	
310916.5	Attain awareness of the new challenges that exist in monetizing businesses around block chains and smart contracts,	3	3	2	3	1	-	2	2	3	2	1	2	2	2	2	
310916.6	State-of-the-art, open research challenges, and future directions.	3	2	3	3	1	2	2	2	2	2	1	1	2	2	2	

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"EMPOWERMENT THROUGH TECHNOLOGICAL EXCELLENCE"

GENBA SOPANRAO MOZE COLLEGE OF ENGINEERING

S. No. 25/1/3, Balewadi, Pune – 411 045

(Approved by AICTE and Govt. of Maharashtra, Affiliated to Savitribai Phule Pune University)

DTE Code - EN6144 University Affiliation ID - PU/PN/ENGG/138/1999

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Founder President: Shri Rambhau Moze

Criteria 2.6.2. CO PO Mapping FE 2019 Pattern

Sr. No.	Course Code	Course Name
	Semester - I	
1	107009	Eng. Chemistry
2	107002	Eng. Physics
3	110005	PPS
4	102003	SME
5	104010	BXE
6	107001	EM-I
7	103004	BEE
8	101011	Eng.Mechanics
	Semester - II	
1	107009	Eng. Chemistry
2	107002	Eng. Physics
3	110005	PPS
4	102012	EG
5	104010	BXE
6	107008	EM-II
7	103004	BEE
8	101011	Eng.Mechanics

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GENBA SOPANRAO MOZE COLLEGE OF ENGINEERING

Department of First Year Engineering

Academic Year:2018-2019

Subject	Course	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Eng. Chemistry	107009													
	107009.1	Understand water quality parameters and advanced water purification techniques	3	3	1	0	1	2	1	0	0	0	0	1
	107009.2	Understand basics of instrumental methods of chemical analysis and their applications	2	3	0	0	1	1	2	0	0	0	0	0
	107009.3	Understand the synthesis and applications of advanced materials	2	2	1	0	1	2	2	0	0	0	0	1
	107009.4	Understand qualities of good fuel such as calorific value and its determination	2	2	0	1	2	2	2	0	0	0	0	1
	107009.5	Understand the concept of nano structure of carbon and complexity of hydrogen as future fuel	3	2	1	0	2	1	1	0	0	0	0	1
	107009.6	Understand basic chemistry behind corrosion of metals and various corrosion prevention methods	3	2	0	1	2	1	2	0	0	0	0	1
Eng Physics	107002		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
	107002.1	To Provide the basic concepts to resolve many engineering and technological problems.	3	2	2	0	2	3	1	0	0	0	0	3
	107002.2	Students will be able to appreciate and use the methodologies to analyze and design a wide range of engineering systems.	3	1	3	0	3	3	2	0	0	0	0	3
	107002.3	To use various techniues for measurement, calculation, control and analysis of engineering problems based on the principles of optics, Ultrasonic acoustics, Quantum Physics, Superconductivity, laser, Physics of nanoparticlesand Semiconductor Physics.	3	3	2	0	1	1	2	0	0	0	0	3
	107002.4	To understand the recent trends and advances in technology, this requires precise control over dynamics of macroscopic engineering systems.	3	3	3	0	2	1	2	0	0	0	0	3
	107002.5	Basic sciences like Physicsalso invoke manipulation of processess over micro and even nano-scale level as there is a growing demand of solid understanding of principles of basic sciences.	3	3	3	0	2	2	2	0	0	0	0	3

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	107002.6	Physics provides the basic ideas and give the solutions for developing mathematical and analytical abilities with higher precision.	3	2	3	0	2	1	3	0	0	0	0	3
FPL-I	**110003**													
	110003.1	Introduction to Machine-level, Assembly level, HLL, LISP, Simulation Platforms, MATLAB, Open Source Programming	3	2	2	1	1	2	2	1	1	2	2	1
	110003.2	Algorithms, avoiding infinite loops, FLowchart, Pasudo code, planning a program, flow charts, structure charts, indentation	3	3	2	1	2	1	1	1	3	1	1	1
	110003.3	C Programing - Constants, Variables, Keywords, COmments, Operators, I/O Operations, Preprocessor, Pointers, Arrays, Structure & Union	3	2	2	1	2	2	3	2	1	1	1	1
	110003.4	C Programming - branching, if, switch, break for loop, while loop, sub-programs, do-while loops, using functions paramter by value or reference	3	1	3	2	2	3	1	1	1	2	1	1

BME	**102013**		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
	102013.1	Explain basic laws of thermodynamics, heat transfer and their applications	3	3	0	0	0	0	0	0	0	0	0	1
	102013.2	Explain basic laws of thermodynamics, heat transfer and their applications	3	3	0	0	0	0	0	0	0	0	0	1
	102013.3	List down the types of road vehicles and their specifications	1	1	0	0	0	0	0	0	3	3	0	1
	102013.4	Illustrate various basic parts and transmission system of a road vehicle	1	1	0	0	0	0	0	0	0	3	3	1
	102013.5	Discuss several manufacturing processes and identify the suitable process	3	3	0	0	0	0	0	0	0	0	0	1
	102013.6	Explain various types of mechanism and its application	3	3	0	0	0	0	0	0	0	0	0	1

	104012		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
	104012.1	To give knowledge of some basic electronic components and circuits.	3	2	2	1	1	2	2	1	1	2	2	1
	104012.2	To introduce basics of diode and transistor circuits.	3	3	2	1	2	1	1	1	3	1	1	1
	104012.3	To understand working of some IC based circuits.	3	3	2	1	2	2	3	2	1	1	1	1

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BXE	104012.4	To study logic gates and their usage in digital circuits.	3	1	3	2	2	3	1	1	1	2	1	1
	104012.5	To expose the students to working of some power electronics devices, transdicers and application of transducers.	2	1	3	2	2	2	2	3	2	1	2	2
	104012.6	To introduce basic aspect of electronic communication systems.	2	1	2	2	2	2	2	2	1	3	1	1
	104012.7	The associated Laboratory Practical course is designed to understand working of various Electronic sirsuits. The student will understand how to use the basic test and measuring instruments to test the circuits.	3	2	2	1	1	3	2	2	1	1	1	1

	107001		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
EM-I	107001.1	System of Linear Equations arising in all engineering fields, using matrix methods,stability of engineering sytems where knowledge of Eigen Values and eigen vectors are essential	3	2	-	-	-	-	-	-	-	-	-	1
	107001.2	Algebraic and Transcendental equations	3	2	-	-	-	-	-	-	-	-	-	1
	107001.3	Eroor analysis and approximations	3	2	-	-	-	-	-	-	-	-	-	1
	107001.4	Ordinary & Partial Differential Equations	3	2	-	-	-	-	-	-	-	-	-	1
	107001.5	Engineering applications such as vibrations theory , heat transfer,electrical circuits etc	3	2	-	-	-	-	-	-	-	-	-	1
	107001.6	Stationary Values of functions (Maxima & Minima) arising in optimizatopn problems	3	2	-	-	-	-	-	-	-	-	-	1

	103004		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
BEE	103004.1	Understand and solve problems on basic terminologies of electrical engineering.	3	0	0	3	0	0	0	0	0	0	0	3
	103004.2	Understand and solve the problems on basic concepts of electromagnetism	3	2	3	3	0	2	0	1	0	0	0	3
	103004.3	Understand the fundamentals of electrostatics and Single Phase transformer.	2	0	3	0	0	0	0	0	0	0	0	2
	103004.4	Understand and solve the problems on AC fundamentals.	2	0	0	0	0	1	0	1	0	0	0	2
	103004.5	Understand the fundamentals of AC single phase circuits and polyphase circuits.	3	2	1	0	0	0	0	0	0	0	0	2
	103004.6	Define various DC circuits laws, theorems and apply them to obtain solutions.			0	0	0	1	0	0	0	0	0	2

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Eng Mathematics-II	107708	**Eng. Mathematics-II**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
	107708.1	Modelling Of various Physical Systems such as Newton's Law of Cooling, LCR Circuits, Rectilinear Motion, mass Spring Systems heat Transfer	3	2	-	-	-	-	-	-	-	-	-	1
	107708.2	Design and analysis of continuous and discrete system, where knowledge of Fourier series and harmonic analysis is required	3	2	-	-	-	-	-	-	-	-	-	1
	107708.3	Advanced Techniques to evaluate integrals.	3	2	-	-	-	-	-	-	-	-	-	1
	107708.4	Measurements of arc lengths of various integrals	3	2	-	-	-	-	-	-	-	-	-	1
	107708.5	Sphere , cone and cylindert taht arise in vector calculus, electro magnetic field theory, cad-cam, computer graphics etc.	3	2	-	-	-	-	-	-	-	-	-	1
	107708.6	Multiple integrals which are used in calculating areas, volume, mean and RMS values , mass,moment of inertia and centre of gravity.	3	2	-	-	-	-	-	-	-	-	-	1

EG-I	102006		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
	102006.1	To identify reference, principal, auxiliary planes and utilize fundamentals of engineering Drawing to draw and interpret projection of lines.	3	2	-	-	-	-	-	-	-	-	-	1
	102006.2	To apply concept of reference and auxiliary plane method for projection of different Shapes of planes	3	2	-	-	-	-	-	-	-	-	-	1
	102006.3	To draw and explain projection of solids resting on HP	3	2	-	-	-	-	-	-	-	-	-	1
	102006.4	To draw various types of engineering curves and development of lateral surfaces of Solids	3	2	-	-	-	-	-	-	-	-	-	1
	102006.5	To draw orthographic views of given pictorial view	3	2	-	-	-	-	-	-	-	-	-	1
	102006.6	To perceive two dimensional engineering drawings for imagining and constructing three Dimensional engineering drawing	3	2	-	-	-	-	-	-	-	-	-	1

FPL-II	**110010**													
	110010.1	Open source and C++ programing, BOSS GNU Linux	3	3	1	0	1	2	1	0	0	0	0	1
	110010.2	Algorithm, Loops, Pseudocdoe, Logic writing,	2	3	0	0	1	1	2	0	0	0	0	0
	110010.3	C Programing, constants, variablesm pointers,	2	2	1	0	1	2	2	0	0	0	0	1
	110010.4	C Programming, Conditional and unconditional	2	2	0	1	2	2	2	0	0	0	0	1

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			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
EG-II	102014													
	102014.1	To identify reference, principal, auxiliary planes and utilize fundamentals of engineering Drawing to draw and interpret projection of lines.	3	2	-	-	-	-	-	-	-	-	-	-
	102014.2	To apply concept of reference and auxiliary plane method for projection of different Shapes of planes	3	2	-	-	-	-	-	-	-	-	-	-
	102014.3	To draw and explain projection of solids resting on HP	3	2	-	-	-	-	-	-	-	-	-	-
	102014.4	To draw various types of engineering curves and development of lateral surfaces of Solids	3	2	-	-	-	-	-	-	-	-	-	-
	102014.5	To draw orthographic views of given pictorial view	3	2	-	-	-	-	-	-	-	-	-	-
	102014.6	To perceive two dimensional engineering drawings for imagining and constructing three Dimensional engineering drawing	3	2	-	-	-	-	-	-	-	-	-	-

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Department of First Year Engineering
Academic Year:2019-2020

Course Code	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
107009	**Eng. Chemistry**												
107009.1	Illustrate the technolgy involved in analysis and quality of water as comidity and its implimentation.	3	3	1	2	2	2	1	0	0	0	0	1
107009.2	Demonstrate electro analytical techniquesthat faciliate the rapid and precise description of material.	3	1	0	2	1	1	1	1	0	0	0	0
107009.3	Describe the structures properties and applications of speciality polymers and nanomaterials.	3	1	1	2	1	2	1	2	1	0	0	1
107009.4	Illustrate conventional and alternative fuel with respect to their properties and applications.	3	2	0	2	2	2	1	1	0	0	0	1
107009.5	Describe spectroscopic techniques for chemical analysis.	3	2	0	2	2	1	1	1	1	0	0	1
107009.6	Explain corrosion mechanism and methods preventative methods for corrosion control.	3	2	0	2	2	1	1	1	0	0	0	1

107002	Eng. Physics	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
107002.1	Develop understanding of interference, diffraction and polarization; connect it to few engineering applications.	3	3	3	0	3	3	1	0	0	0	0	3
107002.2	Learn basics of lasers and optical fibers and their use in some applications.	3	1	3	0	3	3	2	0	0	0	0	3
107002.3	understand principle and concept in quantum mechanics. Relate them to some applications	3	3	2	0	1	1	2	0	0	0	0	3
107002.4	Understand theory of semiconductors and their applications in some semiconductor devices.	3	3	3	0	2	1	2	0	0	0	0	3

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107002.5	Summarize basics of magnetism and superconductivity. Explore few of their technological applications.	3	2	2	0	2	2	2	0	0	0	0	3
107002.6	Comprehend use of concepts of physics for Non Destructive Testing. Learn some properties of nanomaterials and their applications	3	2	3	0	2	1	3	0	0	0	0	3

110005	PPS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
110005.1	Inculcate and apply various skills in problem solving.	3	3	1	0	2	2	1	0	0	0	0	1
110005.2	Choose most appropriate programming constructs and features to solve the problems in diversified domains.	3	1	0	0	1	1	1	0	0	0	0	0
110005.3	Exhibit the programming skills for the problems those require the writing of well-documented programs including use of the logical constructs of language Python	3	1	1	0	1	2	1	0	0	0	0	0
110005.4	Demonstrate significant experience with the Python program development environment.	3	2	0	0	2	2	1	0	0	0	0	1

102003	SME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
102003.1	Explain basic laws of thermodynamics, heat transfer and their applications	3	3	0	0	0	0	0	0	0	0	0	1
102003.2	Explain basic laws of thermodynamics, heat transfer and their applications	3	3	0	0	0	0	0	0	0	0	0	1
102003.3	List down the types of road vehicles and their specifications	1	1	0	0	0	0	0	0	3	3	0	1
102003.4	Illustrate various basic parts and transmission system of a road vehicle	1	1	0	0	0	0	0	0	0	3	3	1
102003.5	Discuss several manufacturing processes and identify the suitable process	3	3	0	0	0	0	0	0	0	0	0	1
102003.6	Explain various types of mechanism and its application	3	3	0	0	0	0	0	0	0	0	0	1

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104010	BXE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
104010.1	Explain the working of P-N junction diode and its circuit	3	2	2	1	1	2	2	1	1	2	2	1
104010.2	Identify types of Diodes and plot their characteristics and also can compare BJT with MOSFET.	3	2	2	1	2	1	1	1	1	1	1	1
104010.3	Build and test analog circuit using OPAMP and digital circuits using basic/univarsal gates and Flip-flops.	3	2	2	1	2	1	1	1	1	1	1	1
104010.4	Use different electronics measuring instruments to measure various electrical parameters.	3	1	1	1	2	1	1	1	1	1	1	1
104010.5	Select sensors for specific applications	2	1	3	2	2	2	2	1	2	1	2	2
104010.6	Describe basic principles of communication systems.	2	1	2	2	2	2	1	2	1	3	1	1
107001	EM-I	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
107001.1	Mean Value theorems and its generalizations leading to taylor's and Maclaurin's series useful in the analysis of analysis of engineecring problems	3	2	0	0	0	0	0	0	0	0	0	1
107001.2	The Fourier series representation and harmonic analysis for design and analysis of periodic continuous and discrete systems.	3	2	0	0	0	0	0	0	0	0	0	1
107001.3	To deal with derivative of functions of several variables that are essential in various branches of engineering.	3	2	0	0	0	0	0	0	0	0	0	1
107001.4	To aplly the concept of Jacobian to find partial derivative of implicit function and functional dependence. Use of partial derivatives in estimating error and approximation and finding extrema values of the	3	2	0	0	0	0	0	0	0	0	0	1
107001.5	The essential tour of matrices and linear algebra in a comprehensive manner fpr analysis of system of linear equations.	3	2	0	0	0	0	0	0	0	0	0	1

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103004	BEE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
103004.1	Differentiate between electrical and magnetic circuits and derive mathematical relation for self and mutual inductance along with coupling effect.	2	0	0	3	0	0	0	0	0	0	0	3
103004.2	Calculate series, parallel and composite capacitor as well as characteristics parameters of alternating quantity and phasor arithmetic.	2	1	3	3	0	2	0	1	0	0	0	3
103004.3	Derive expression for impedance, current, power in series and parallel RLC circuit with AC supply along with phasor diagram.	2	0	3	0	0	0	0	0	0	0	0	2
103004.4	Relate phase and line electrical quantities in polyphase networks, demonstrate the operation of single phase transformer and calculate efficiency and regulation at different loading conditions	2	0	0	0	0	1	0	1	0	0	0	2
103004.5	Apply and analyze the resistive circuits using star-delta conversion KVL, KCL and different Network theorems under DC supply.	3	2	1	0	0	0	0	0	0	0	0	2
103004.6	Evaluate work, power and energy relations and suggest various batteries for different applications, concept of charging and discharging and depth of charge	3	2	0	0	0	1	0	0	0	0	0	2

102012	Engineering Graphics	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
102012.1	Draw the fundamental engineering objects using basic rules and able to construct the simple geometries	3	3	2	0	0	0	0	0	0	0	0	1
102012.2	Construct the various engineering curves using the drawing instruments	2	3	3	0	3	0	0	0	0	0	0	1
102012.3	Apply the concept of orthographic projection of an object to draw several 2D views and its sectional views for visualizing the physical state of the object	2	1	3	1	0	0	0	0	0	0	0	1
102012.4	Apply the visualization skill to draw a simple isometric projection from given orthographic views precisely using drawing equipment	2	3	3	0	1	0	0	0	0	0	0	1
102012.5	Draw the development of lateral surfaces for cut section of geometrical solids	3	3	3	0	1	0	0	0	0	0	0	1
102012.6	Draw fully-dimensioned 2D, 3D drawings using computer aided drafting tools	3	3	3	1	1	0	0	0	0	0	0	1

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107008	Engineering Mathematics-II	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
107008.1	The effective mathematical tools for solutions of first order differential equations that model physical processes such as Newton's law of cooling, electrical circuit, rectilinear motion, mass spring systems, heat transfer etc.	3	2	0	0	0	0	0	0	0	0	0	1
107008.2	Advanced integration techniques such as Reduction formulae, Beta functions, Gamma functions, Differentiation under integral sign and Error functions needed in evaluating multiple integrals and their applications.	3	2	0	0	0	0	0	0	0	0	0	1
107008.3	To trace the curve for a given equation and measure are length of various curves.	3	2	0	0	0	0	0	0	0	0	0	1
107008.4	The concepts of solid geometry using equations of sphere, cone and cylinder in a comprehensive manner.	3	2	0	0	0	0	0	0	0	0	0	1
107008.5	Evaluation of multiple integrals and its application to find area bounded by curves, volume bounded by surfaces, Centre of gravity and Moment of inertia.	3	2	0	0	0	0	0	0	0	0	0	1

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Department of First Year Engineering

Academic Year: 2020-2021

Course Code	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
107009	**Eng. Chemistry**												
107009.1	Illustrate the technolgy involved in analysis and quality of water as comidity and its implimentation.	3	3	1	0	2	2	1	0	0	0	0	1
107009.2	Demonstrate electro analytical techniquesthat faciliate the rapid and precise description of material.	3	1	0	0	1	1	1	0	0	0	0	0
107009.3	Describe the structures properties and applications of speciality polymers and nanomaterials.	3	1	1	0	1	2	1	0	0	0	0	0
107009.4	Illustrate conventional and alternative fuel with respect to their properties and applications.	3	2	0	0	2	2	1	0	0	0	0	1
107009.5	Describe spectroscopic techniques for chemical analysis.	3	2	0	0	2	1	1	0	0	0	0	0
107009.6	Explain corrosion mechanism and methods preventative methods for corrosion control.	3	2	0	0	2	1	1	0	0	0	0	1

107002	**Eng. Physics**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
107002.1	Develop understanding of interference, diffraction and polarization; connect it to few engineering applications.	3	3	3	0	3	3	1	0	0	0	0	3
107002.2	Learn basics of lasers and optical fibers and their use in some applications.	3	1	3	0	3	3	2	0	0	0	0	3
107002.3	understand principle and concept in quantum mechanics. Relate them to some applications	3	3	2	0	1	1	2	0	0	0	0	3

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107002.4	Understand theory of semiconductors and their applications in some semiconductor devices.	3	3	3	0	2	1	2	0	0	0	0	3
107002.5	Summarize basics of magnetism and superconductivity. Explore few of their technological applications.	3	2	2	0	2	2	2	0	0	0	0	3
107002.6	Comprehend use of concepts of physics for Non Destructive Testing. Learn some properties of nanomaterials and their applications	3	2	3	0	2	1	3	0	0	0	0	3

110005	PPS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
110005.1	Inculcate and apply various skills in problem solving.	3	3	1	0	2	2	1	0	0	0	0	1
110005.2	Choose most appropriate programming constructs and features to solve the problems in diversified domains.	3	1	0	0	1	1	1	0	0	0	0	0
110005.3	Exhibit the programming skills for the problems those require the writing of well-documented programs including use of the logical constructs of language, Python.	3	1	1	0	1	2	1	0	0	0	0	0
110005.4	Demonstrate significant experience with the Python program development environment.	3	2	0	0	2	2	1	0	0	0	0	1

102003	SME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
102003.1	Explain basic laws of thermodynamics, heat transfer and their applications	3	3	0	0	0	0	0	0	0	0	0	1
102003.2	Explain basic laws of thermodynamics, heat transfer and their applications	3	3	0	0	0	0	0	0	0	0	0	1
102003.3	List down the types of road vehicles and their specifications	1	1	0	0	0	0	0	0	3	3	0	1
102003.4	Illustrate various basic parts and transmission system of a road vehicle	1	1	0	0	0	0	0	0	0	3	3	1

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102003.5	Discuss several manufacturing processes and identify the suitable process	3	3	0	0	0	0	0	0	0	0	0	1
102003.6	Explain various types of mechanism and its application	3	3	0	0	0	0	0	0	0	0	0	1
104010	**BXE**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
104010.1	Explain the working of P-N junction diode and its circuit	3	2	2	1	1	2	2	1	1	2	2	1
104010.2	Identify types of Diodes and plot their characteristics and also can compare BJT with MOSFET.	3	2	2	1	2	1	1	1	1	1	1	1
104010.3	Build and test analog circuit using OPAMP and digital circuits using basic/univarsal gates and Flip-flops.	3	2	2	1	2	1	1	1	1	1	1	1
104010.4	Use different electronics measuring instruments to measure various electrical parameters.	3	1	1	1	2	1	1	1	1	1	1	1
104010.5	Select sensors for specific applications	2	1	3	2	2	2	2	1	2	1	2	2
104010.6	Describe basic principles of communication systems.	2	1	2	2	2	2	1	2	1	3	1	1
107001	**EM-I**												
107001.1	Mean Value theorems and its generalizations leading to taylor's and Maclaurin's series useful in the analysis of analysis of engineeering problems.	3	2	0	0	0	0	0	0	0	0	0	1
107001.2	The Fourier series representation and harmonic analysis for design and analysis of periodic continuous and discrete systems.	3	2	0	0	0	0	0	0	0	0	0	1
107001.3	To deal with derivative of functions of several variables that are essential in various branches of engineering.	3	2	0	0	0	0	0	0	0	0	0	1

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107001.4	To aplly the concept of Jacobian to find partial derivative of implicit function and functional dependence. Use of partial derivatives in estimating error and approximation and finding extreme values of the function.	3	2	0	0	0	0	0	0	0	0	0	1
107001.5	The essential tour of matrices and linear algebra in a comprehensive manner fpr analysis of system of linear equations,	3	2	0	0	0	0	0	0	0	0	0	1

103004	BEE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
103004.1	Differentiate between electrical and magnetic circuits and derive mathematical relation for self and mutual inductance along with coupling effect.	2	0	0	3	0	0	0	0	0	0	0	3
103004.2	Calculate series, parallel and composite capacitor as well as characteristics parameters of alternating quantity and phasor arithmetic.	2	1	3	3	0	2	0	1	0	0	0	3
103004.3	Derive expression for impedance, current, power in series and parallel RLC circuit with AC supply along with phasor diagram.	2	0	3	0	0	0	0	0	0	0	0	2
103004.4	Relate phase and line electrical quantities in polyphase networks, demonstrate the operation of single phase transformer and calculate efficiency and regulation at different loading conditions	2	0	0	0	0	1	0	1	0	0	0	2
103004.5	Apply and analyze the resistive circuits using star-delta conversion KVL, KCL and different Network theorems under DC supply	3	2	1	0	0	0	0	0	0	0	0	2
103004.6	Evaluate work, power and energy relations and suggest various batteries for different applications, concept of charging and discharging and depth of charge.	3	2	0	0	0	1	0	0	0	0	0	2

102012	Engineering Graphics	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
102012.1	Draw the fundamental engineering objects using basic rules and able to construct the simple geometries	3	3	2	0	0	0	0	0	0	0	0	1
102012.2	Construct the various engineering curves using the drawing instruments	2	3	3	0	3	0	0	0	0	0	0	1
102012.3	Apply the concept of orthographic projection of an object to draw several 2D views and its sectional views for visualizing the physical state of the object	2	1	3	1	0	0	0	0	0	0	0	1

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102012.4	Apply the visualization skill to draw a simple isometric projection from given orthographic views precisely using drawing equipment	2	3	3	0	1	0	0	0	0	0	0	1
102012.5	Draw the development of lateral surfaces for cut section of geometrical solids	3	3	3	0	1	0	0	0	0	0	0	1
102012.6	Draw fully-dimensioned 2D, 3D drawings using computer aided drafting tools	3	3	3	1	1	0	0	0	0	0	0	1
107008	**Engineering Mathematics-II**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
107008.1	The effective mathematical tools for solutions of first order differential equations that model physical processes such as Newton's law of cooling, electrical circuit,	3	2	0	0	0	0	0	0	0	0	0	1
107008.2	Advanced integration techniques such as Reduction formulae, Beta functions, Gamma functions, Differentiation under integral sign and Error functions needed in evaluating multiple integrals and their applications.	3	2	0	0	0	0	0	0	0	0	0	1
107008.3	To trace the curve for a given equation and measure are length of various curves.	3	2	0	0	0	0	0	0	0	0	0	1
107008.4	The concepts of solid geometry using equations of sphere, cone and cylinder in a comprehensive manner.	3	2	0	0	0	0	0	0	0	0	0	1
107008.5	Evaluation of multiple integrals and its application to find area bounded by curves, volume bounded by surfaces, Centre of gravity and Moment of inertia.	3	2	0	0	0	0	0	0	0	0	0	1

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Department of First Year Engineering

Academic Year 2021-22

Course Code	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
107009	**Eng. Chemistry**												
107009.1	Illustrate the technolgy involved in analysis and quality of water as comidity and its implimentation.	3	3	1	0	2	2	1	0	0	0	0	1
107009.2	Demonstrate electro analytical techniquesthat faciliate the rapid and precise description of material.	3	1	0	0	1	1	1	0	0	0	0	0
107009.3	Describe the structures properties and applications of speciality polymers and nanomaterials.	3	1	1	0	1	2	1	0	0	0	0	0
107009.4	Illustrate conventional and alternative fuel with respect to their properties and applications.	3	2	0	0	2	2	1	0	0	0	0	1
107009.5	Describe spectroscopic techniques for chemical analysis.	3	2	0	0	2	1	1	0	0	0	0	0
107009.6	Explain corrosion mechanism and methods preventative methods for corrosion control.	3	2	0	0	2	1	1	0	0	0	0	1

107002	**Eng. Physics**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
107002.1	Develop understanding of interference, diffraction and polarization; connect it to few engineering applications.	3	3	3	0	3	3	1	0	0	0	0	3

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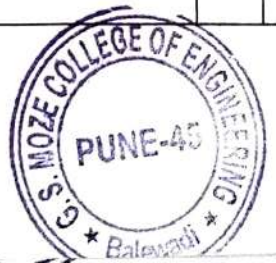
107002.2	Learn basics of lasers and optical fibers and their use in some applications.	3	1	3	0	3	3	2	0	0	0	0	3	
107002.3	understand principle and concept in quantum mechanics. Relate them to some applications	3	3	2	0	1	1	2	0	0	0	0	3	
107002.4	Understand theory of semiconductors and their applications in some semiconductor devices.	3	3	3	0	2	1	2	0	0	0	0	3	
107002.5	Summarize basics of magnetism and superconductivity. Explore few of their technological applications.	3	2	2	0	2	2	2	0	0	0	0	3	
107002.6	Comprehend use of concepts of physics for Non Destructive Testing. Learn some properties of nanomaterials and their applications	3	2	3	0	2	1	3	0	0	0	0	3	
110005	**PPS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	
110005.1	Inculcate and apply various skills in problem solving.	3	3	1	0	2	2	1	0	0	0	0	1	
110005.2	Choose most appropriate programming constructs and features to solve the problems in diversified domains.	3	1	0	0	1	1	1	0	0	0	0	0	
110005.3	Exhibit the programming skills for the problems those require the writing of well-documented programs including use of the logical constructs of language, Python.	3	1	1	0	1	2	1	0	0	0	0	0	
110005.4	Demonstrate significant experience with the Python program development environment.	3	2	0	0	2	2	1	0	0	0	0	1	
102003	**SME**													



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102003.1	Explain basic laws of thermodynamics, heat transfer and their applications	3	3	0	0	0	0	0	0	0	0	0	1	
102003.2	Explain basic laws of thermodynamics, heat transfer and their applications	3	3	0	0	0	0	0	0	0	0	0	1	
102003.3	List down the types of road vehicles and their specifications	1	1	0	0	0	0	0	0	3	3	0	1	
102003.4	Illustrate various basic parts and transmission system of a road vehicle	1	1	0	0	0	0	0	0	0	3	3	1	
102003.5	Discuss several manufacturing processes and identify the suitable process	3	3	0	0	0	0	0	0	0	0	0	1	
102003.6	Explain various types of mechanism and its application	3	3	0	0	0	0	0	0	0	0	0	1	
104010	**BXE**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	
104010.1	Explain the working of P-N junction diode and its circuit	3	2	2	1	1	2	2	1	1	2	2	1	
104010.2	Identify types of Diodes and plot their characteristics and also can compare BJT with MOSFET.	3	2	2	1	2	1	1	1	1	1	1	1	
104010.3	Build and test analog circuit using OPAMP and digital circuits using basic/univarsal gates and Flip-flops.	3	2	2	1	2	1	1	1	1	1	1	1	
104010.4	Use different electronics measuring instruments to measure various electrical parameters.	3	1	1	1	2	1	1	1	1	1	1	1	
104010.5	Select sensors for specific applications	2	1	3	2	2	2	2	1	2	1	2	2	

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104010.6	Describe basic principles of communication systems.	2	1	2	2	2	2	1	2	1	3	1	1

107001	EM-I	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
107001.1	Mean Value theorems and its generalizations leading to taylor's and Maclaurin's series useful in the analysis of analysis of engineeering problems.	3	2	0	0	0	0	0	0	0	0	0	1
107001.2	The Fourier series representation and harmonic analysis for design and analysis of periodic continuous and discrete systems.	3	2	0	0	0	0	0	0	0	0	0	1
107001.3	To deal with derivative of functions of several variables that are essential in various branches of engineering.	3	2	0	0	0	0	0	0	0	0	0	1
107001.4	To aplly the concept of Jacobian to find partial derivative of implicit function and functional dependence. Use of partial derivatives in estimating error and approximation and finding extreme values of the function.	3	2	0	0	0	0	0	0	0	0	0	1
107001.5	The essential tour of matrices and linear algebra in a comprehensive manner fpr analysis of system of linear equations,	3	2	0	0	0	0	0	0	0	0	0	1

103004	BEE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
103004.1	Differentiate between electrical and magnetic circuits and derive mathematical relation for self and mutual inductance along with coupling effect.	2	0	0	3	0	0	0	0	0	0	0	3
103004.2	Calculate series, parallel and composite capacitor as well as characteristics parameters of alternating quantity and phasor arithmetic.	2	1	3	3	0	2	0	1	0	0	0	3
103004.3	Derive expression for impedance, current, power in series and parallel RLC circuit with AC supply along with phasor diagram.	2	0	3	0	0	0	0	0	0	0	0	2

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103004.4	Relate phase and line electrical quantities in polyphase networks, demonstrate the operation of single phase transformer and calculate efficiency and regulation at different loading conditions.	2	0	0	0	0	1	0	1	0	0	0	2	
103004.5	Apply and analyze the resistive circuits using star-delta conversion KVL, KCL and different Network theorems under DC supply.	3	2	1	0	0	0	0	0	0	0	0	2	
103004.6	Evaluate work, power and energy relations and suggest various batteries for different applications, concept of charging and discharging and depth of charge.	3	2	0	0	0	1	0	0	0	0	0	2	
102012	**Engineering Graphics**													
102012.1	Draw the fundamental engineering objects using basic rules and able to construct the simple geometries	3	3	2	0	0	0	0	0	0	0	0	1	
102012.2	Construct the various engineering curves using the drawing instruments	2	3	3	0	3	0	0	0	0	0	0	1	
102012.3	Apply the concept of orthographic projection of an object to draw several 2D views and its sectional views for visualizing the physical state of the object	2	1	3	1	0	0	0	0	0	0	0	1	
102012.4	Apply the visualization skill to draw a simple isometric projection from given orthographic views precisely using drawing equipment	2	3	3	0	1	0	0	0	0	0	0	1	
102012.5	Draw the development of lateral surfaces for cut section of geometrical solids	3	3	3	0	1	0	0	0	0	0	0	1	
102012.6	Draw fully-dimensioned 2D, 3D drawings using computer aided drafting tools	3	3	3	1	1	0	0	0	0	0	0	1	
107008	**Engineering Mathematics-II**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	

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107008.1	The effective mathematical tools for solutions of first order differential equations that model physical processes such as Newton's law of cooling, electrical circuit, rectilinear motion, mass spring systems, heat transfer etc.	3	2	0	0	0	0	0	0	0	0	0	1			
107008.2	Advanced integration techniques such as Reduction formulae, Beta functions, Gamma functions, Differentiation under integral sign and Error functions needed in evaluating multiple integrals and their applications.	3	2	0	0	0	0	0	0	0	0	0	1			
107008.3	To trace the curve for a given equation and measure are length of various curves.	3	2	0	0	0	0	0	0	0	0	0	1			
107008.4	The concepts of solid geometry using equations of sphere, cone and cylinder in a comprehensive manner.	3	2	0	0	0	0	0	0	0	0	0	1			
107008.5	Evaluation of multiple integrals and its application to find area bounded by curves, volume bounded by surfaces, Centre of gravity and Moment of inertia.	3	2	0	0	0	0	0	0	0	0	0	1			

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GENBA SOPANRAO MOZE COLLEGE OF ENGINEERING

Department Of First Year Engineering

Academic Year: 2022-2023

Course Code	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
107009	Eng. Chemistry												
107009.1	Illustrate the technolgy involved in analysis and quality of water as comidity and its implimentation.	3	3	1	0	2	2	1	0	0	0	0	1
107009.2	Demonstrate electro analytical techniquesthat faciliate the rapid and precise description of material.	3	1	0	0	1	1	1	0	0	0	0	0
107009.3	Describe the structures properties and applications of speciality polymers and nanomaterials.	3	1	1	0	1	2	1	0	0	0	0	0
107009.4	Illustrate conventional and alternative fuel with respect to their properties and applications.	3	2	0	0	2	2	1	0	0	0	0	1
107009.5	Describe spectroscopic techniques for chemical analysis.	3	2	0	0	2	1	1	0	0	0	0	0
107009.6	Explain corrosion mechanism and methods preventative methods for corrosion control.	3	2	0	0	2	1	1	0	0	0	0	1

107002	Eng. Physics	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
107002.1	Develop understanding of interference, diffraction and polarization; connect it to few engineering applications.	3	3	3	0	3	3	1	0	0	0	0	3
107002.2	Learn basics of lasers and optical fibers and their use in some applications.	3	1	3	0	3	3	2	0	0	0	0	3
107002.3	understand principle and concept in quantum mechanics. Relate them to some applications	3	3	2	0	1	1	2	0	0	0	0	3

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107002.4	Understand theory of semiconductors and their applications in some semiconductor devices.	3	3	3	0	2	1	2	0	0	0	0	3
107002.5	Summarize basics of magnetism and superconductivity. Explore few of their technological applications	3	2	2	0	2	2	2	0	0	0	0	3
107002.6	Comprehend use of concepts of physics for Non Destructive Testing. Learn some properties of nanomaterials and their applications	3	2	3	0	2	1	3	0	0	0	0	3

110005	**PPS**												
110005.1	Inculcate and apply various skills in problem solving.	3	3	1	0	2	2	1	0	0	0	0	1
110005.2	Choose most appropriate programming constructs and features to solve the problems in diversified domains.	3	1	0	0	1	1	1	0	0	0	0	0
110005.3	Exhibit the programming skills for the problems those require the writing of well-documented programs including use of the logical constructs of language Python	3	1	1	0	1	2	1	0	0	0	0	0
110005.4	Demonstrate significant experience with the Python program development environment.	3	2	0	0	2	2	1	0	0	0	0	1

102003	**SME**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
102003.1	Explain basic laws of thermodynamics, heat transfer and their applications	3	3	0	0	0	0	0	0	0	0	0	1
102003.2	Explain basic laws of thermodynamics, heat transfer and their applications	3	3	0	0	0	0	0	0	0	0	0	1
102003.3	List down the types of road vehicles and their specifications	1	1	0	0	0	0	0	0	3	3	0	1
102003.4	Illustrate various basic parts and transmission system of a road vehicle	1	1	0	0	0	0	0	0	0	3	3	1

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102003.5	Discuss several manufacturing processes and identify the suitable process	3	3	0	0	0	0	0	0	0	0	0	1
102003.6	Explain various types of mechanism and its application	3	3	0	0	0	0	0	0	0	0	0	1

104010	**BXE**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
104010.1	Explain the working of P-N junction diode and its circuit	3	3	1	2	1	2	2	1	2	2	2	1
104010.2	Identify types of Diodes and plot their characteristics and also can compare BJT with MOSFET.	3	2	2	1	1	2	2	1	2	2	2	1
104010.3	Build and test analog circuit using OPAMP and digital circuits using basic/univarsal gates and Flip-flops.	3	2	2	2	1	2	2	1	2	1	2	1
104010.4	Use different electronics measuring instruments to measure various electrical parameters.	3	2	1	2	1	2	1	1	2	1	1	1
104010.5	Select sensors for specific applications	3	1	3	1	1	2	2	1	2	3	2	2
104010.6	Describe basic principles of communication systems.	3	2	2	2	1	2	2	1	2	3	2	1

107001	**EM-I**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
107001.1	Mean Value theorems and its generalizations leading to taylor's and Maclaurin's series useful in the analysis of analysis of engineeering problems.	3	2	0	0	0	0	0	0	0	0	0	1
107001.2	The Fourier series representation and harmonic analysis for design and analysis of periodic continuous and discrete systems.	3	2	0	0	0	0	0	0	0	0	0	1
107001.3	To deal with derivative of functions of several variables that are essential in various branches of engineering.	3	2	0	0	0	0	0	0	0	0	0	1

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107001.4	To aplly the concept of Jacobian to find partial derivative of implicit function and functional dependence. Use of partial derivatives in estimating error and approximation and finding extreme values of the function.	3	2	0	0	0	0	0	0	0	0	0	1
107001.5	The essential tour of matrices and linear algebra in a comprehensive manner fpr analysis of system of linear equations,	3	2	0	0	0	0	0	0	0	0	0	1

103004	BEE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
103004.1	Differentiate between electrical and magnetic circuits and derive mathematical relation for self and mutual inductance along with coupling effect.	2	0	0	3	0	0	0	0	0	0	0	3
103004.2	Calculate series, parallel and composite capacitor as well as characteristics parameters of alternating quantity and phasor arithmetic.	2	1	3	3	0	2	0	1	0	0	0	3
103004.3	Derive expression for impedance, current, power in series and parallel RLC circuit with AC supply along with phasor diagram.	2	0	3	0	0	0	0	0	0	0	0	2
103004.4	Relate phase and line electrical quantities in polyphase networks, demonstrate the operation of single phase transformer and calculate efficiency and regulation at different loading conditions	2	0	0	0	0	1	0	1	0	0	0	2
103004.5	Apply and analyze the resistive circuits using star-delta conversion KVL, KCL and different Network theorems under DC supply	3	2	1	0	0	0	0	0	0	0	0	2
103004.6	Evaluate work, power and energy relations and suggest various batteries for different applications, concept of charging and discharging and depth of charge	3	2	0	0	0	1	0	0	0	0	0	2

102012	Engineering Graphics	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	
102012.1	Draw the fundamental engineering objects using basic rules and able to construct the simple geometries	3	3	2	0	0	0	0	0	0	0	0	1	0
102012.2	Construct the various engineering curves using the drawing instruments	2	3	3	0	3	0	0	0	0	0	0	1	0

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102012.3	Apply the concept of orthographic projection of an object to draw several 2D views and its sectional views for visualizing the physical	2	1	3	1	0	0	0	0	0	0	0	1	0
102012.4	Apply the visualization skill to draw a simple isometric projection from given orthographic views precisely using drawing equipment	2	3	3	0	1	0	0	0	0	0	0	1	0
102012.5	Draw the development of lateral surfaces for cut section of geometrical solids	3	3	3	0	1	0	0	0	0	0	0	1	0
102012.6	Draw fully-dimensioned 2D, 3D drawings using computer aided drafting tools	3	3	3	1	1	0	0	0	0	0	0	1	0

107008	Engineering Mathematics-II	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
107008.1	The effective mathematical tools for solutions of first order differential equations that model physical processes such as Newton's law of cooling, electrical circuit, rectilinear motion, mass spring systems, heat transfer etc.	3	2	0	0	0	0	0	0	0	0	0	1
107008.2	Advanced integration techniques such as Reduction formulae, Beta functions, Gamma functions, Differentiation under integral sign and Error functions needed in evaluating multiple integrals and their applications.	3	2	0	0	0	0	0	0	0	0	0	1
107008.3	To trace the curve for a given equation and measure are length of various curves.	3	2	0	0	0	0	0	0	0	0	0	1
107008.4	The concepts of solid geometry using equations of sphere, cone and cylinder in a comprehensive manner.	3	2	0	0	0	0	0	0	0	0	0	1
107008.5	Evaluation of multiple integrals and its application to find area bounded by curves, volume bounded by surfaces, Centre of gravity and Moment of inertia.	3	2	0	0	0	0	0	0	0	0	0	1

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GENBA SOPANRAO MOZE COLLEGE OF ENGINEERING

Balewadi, Pune - 411045.

Mechanical Engineering Department

Criteria 2.6.2 CO PO Mapping
2019 Pattern

Sr. No.	Course Code	Course Name
	Semester - III	
1	202041	Solid Mechanics
2	202042	Solid Modeling and Drafting
3	202043	Engineering Thermodynamics
4	202044	Engineering Materials and Metallurgy
5	203156	Electrical and Electronics Engineering
	Semester - IV	
6	207002	Engineering Mathematics - III
7	202047	Kinematics of Machinery
8	202048	Applied Thermodynamics
9	202049	Fluid Mechanics
10	202050	Manufacturing Processes
	Semester - V	
11	302041	Numerical & Statistical Methods
12	302042	Heat & Mass Transfer
13	302043	Design of Machine Elements
14	302044	Mechatronics
15	302045	Elective I
	Semester - VI	
17	302049	Artificial Intelligence &Machine Learning
18	302050	Computer Aided Engineering
19	302051	Design of Transmission Systems
20	302052	Elective II
	Semester - VII	
21	402041	Heating Ventilation Air-Conditioning and Refrigeration
22	402042	Dynamics of Machinery
23	402043	Turbomachinery
24	402044	Elective – III
25	402045	Elective – IV - Product Design and Development
	Semester - VIII	
25	402048	Computer Integrated Manufacturing
26	402049	Energy Engineering
27	402050	Elective - V
28	402051	Elective - VI - Industrial Psychology and Organizational Behavior

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Mechanical Engineering Department

Criteria 2.6.2 CO PO Mapping
2015 Pattern

Sr. No.	Course Code	Course Name
	Semester - III (2015)	
1	207002	Engineering Mathematics – III
2	202041	Manufacturing Process-I
3	202042	Computer Aided Machine Drawing
4	202043	Thermodynamics
	202044	Material Science
5	203156	Strength of Materials
	Semester - IV (2015)	
6	202045	Fluid Mechanics
7	202048	Theory of Machines – I
8	202049	Engineering Metallurgy
9	202050	Applied Thermodynamics
10	203152	Electrical and Electronics Engineering
	Semester - V (2015)	
11	302041	Design of Machine Elements-I
12	302042	Heat Transfer
13	302043	Theory of Machines-II$
14	302044	Turbo Machines
15	302045	Metrology and Quality Control
	Semester - VI (2015)	
17	302047	Numerical Methods and Optimization*
18	302048	Design of Machine Elements-II
19	302049	Refrigeration and Air Conditioning
20	302050	Mechatronics
	302051	Manufacturing -Process-II$
	Semester - VII (2015)	
21	402041	Hydraulics and Pneumatics
22	402042	CAD CAM Automation
23	402043	Dynamics of Machinery
24	402044	Elective – I
25	402045	Elective – II
	Semester - VIII (2015)	
25	402047	Energy Engineering
26	402048	Mechanical System Design
27	402049	Elective - III
28	402050	Elective - IV - Product Design and Development

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Mechanical Engineering Department

AY 2022-23

Course Code	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
202041	Solid Mechanics															
202041.1	CO1. DEFINE various types of stresses and strain developed on determinate and indeterminate members.	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
202041.2	CO2. DRAW Shear force and bending moment diagram for various types of transverse loading and support.	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
202041.3	CO3. COMPUTE the slope & deflection, bending stresses and shear stresses on a beam.	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
202041.4	CO4. CALCULATE torsional shear stress in shaft and buckling on the column.	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1
202041.5	CO5. APPLY the concept of principal stresses and theories of failure to determine stresses on a 2-D element.	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
202041.6	CO6. UTILIZE the concepts of SFD & BMD, torsion and principal stresses to solve combined loading applicati	1	3	3	2	2	2	2	1	1	1	1	1	1	1	1
202042	Solid Modeling and Drafting															
202042.1	CO1. UNDERSTAND basic concepts of CAD system, need and scope in Product Lifecycle Management	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
202042.2	CO2. UTILIZE knowledge of curves and surfacing features and methods to create complex solid geometry	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
202042.3	CO3. CONSTRUCT solid models, assemblies using various modeling techniques & PERFORM mass property analysi	1	3	3	2	2	2	2	1	1	1	1	1	1	1	1
202042.4	CO4. APPLY geometric transformations to simple 2D geometries	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
202042.5	CO5. USE CAD model data for various CAD based engineering applications viz. production drawings, 3D printing, FI	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1
202042.6	CO6. USE PMI & MBD approach for communication	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
202043	Engineering Thermodynamics															
202043.1	CO1. DESCRIBE the basics of thermodynamics with heat and work interactions.	1	3	3	2	2	2	2	1	1	1	1	1	1	1	1
202043.2	non available energy for an Open and Closed System,	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
202043.3	CO3. APPLY entropy, available and non available energy for an Open and Closed System	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
202043.4	CO4. DETERMINE the properties of steam and their effect on performance of vapour power cycle.	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
202043.5	CO5. ANALYSE the fuel combustion process and products of combustion.	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1
202043.6	CO6. SELECT various instrumentations required for safe and efficient operation of steam generator.	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
202044	Engineering Materials and Metallurgy															
202044.1	CO1. COMPARE crystal structures and ASSESS different lattice parameters.	1	2	3	2	3	1	1	1	1	1	1	1	1	1	1
202044.2	CO2. CORRELATE crystal structures and imperfections in crystals with mechanical behaviour of materials.	1	1	2	2	3	1	1	1	1	1	1	1	1	1	1
202044.3	CO3. DIFFERENTIATE and DETERMINE mechanical properties using destructive and non-destructive testing of ma	1	1	2	2	3	1	1	1	1	1	1	1	1	1	1
202044.4	CO4. IDENTIFY & ESTIMATE different parameters of the system viz., phases, variables, component, grains, grain b	3	2	2	2	2	1	2	1	1	1	1	1	1	1	1
202044.5	CO5. ANALYSE effect of alloying element & heat treatment on properties of ferrous & nonferrous alloy.	1	1	3	2	3	2	2	1	1	2	1	2	1	1	1
202044.6	CO6. SELECT appropriate materials for various applications.	1	1	3	2	3	2	2	1	1	1	2	1	1	1	1
203156	**Electrical and Electronics Engineering**															
203156.1	APPLY programming concepts to UNDERSTAND role of Microprocessor and Microcontroller in embedded systems	1	1	3	2	3	1	1	1	1	1	1	1	1	1	1
203156.2	DEVELOP interfacing of different types of sensors and other hardware devices with Atmega328 based Arduino Board	1	1	2	2	3	1	1	1	1	1	1	1	1	1	1
203156.3	UNDERSTAND the operation of DC motor, its speed control methods and braking	3	2	2	2	2	1	2	1	1	1	1	1	1	1	1
203156.4	DISTINGUISH between types of three phase induction motor and its characteristic features	3	2	1	1	2	2	2	1	1	1	1	1	1	1	1
203156.5	EXPLAIN about emerging technology of Electric Vehicle (EV) and its modular subsystems	1	1	3	2	3	1	3	1	1	2	1	1	1	1	1
203156.6	CHOOSE energy storage devices and electrical drives for EVs	1	1	3	2	3	2	3	1	1	1	2	1	1	1	1

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207002	**Engineering Mathematics III**																
207001.1	Solve higher order linear differential equation using appropriate techniques for modellinganalyzing of electrical circuits	1	3	1	2	2	2	2	1	1	1	1	1	1	1	1	1
207001.2	Solve system of linear equations using direct and iterative numerical technichs and develop solutions for ordinary diffe	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1	1
207001.3	Apply Statistical methods like correlation,regression and probability theory in data analysis and predictions in civil eng	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1
207001.4	Perform vector differentiation & integration, analyze the vector fields and apply to fluid flow problems.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1	1
207001.5	Solve Partial differential equations such that as wave equations , one and two dimensional heat flow equations	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1	1
202047	**Kinematics of Machinery**																
202047.1	1. To make the students conversant with kinematic analysis of mechanisms applied to real life and industrial applicatio	1	3	3	2	2	2	2	1	1	1	1	1	1	1	1	1
202047.2	2. To develop the competency to analyze the velocity and acceleration in mechanisms using analytical and graphical ap	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1	1
202047.3	3. To develop the skill to propose and synthesize the mechanisms using graphical and analytical technique.	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1
202047.4	4. To develop the competency to understand & apply the principles of gear theory to design various applications.	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1	1
202047.5	5. To develop the competency to design a cam profile for various follower motions.	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
202048	Applied Thermodynamics																
202048.1	CO1. DETERMINE COP of refrigeration system and ANALYZE psychrometric processes.	1	1	2	2	3	1	1	1	1	1	1	1	1	1	1	1
202048.2	CO2. DISCUSS basics of engine terminology,air standard, fuel air and actual cycles.	3	2	2	2	2	1	2	1	1	1	1	2	1	1	1	1
202048.3	CO3. IDENTIFY factors affecting the combustion performance of SI and CI engines.	1	1	2	2	3	1	1	1	1	1	1	1	1	1	1	1
202048.4	CO4. DETERMINE performance parameters of IC Engines and emission control.	1	1	2	2	3	1	1	1	1	1	1	1	1	1	1	1
202048.5	CO5. EXPLAIN working of various IC Engine systems and use of alternative fuels.	1	1	2	2	3	1	1	1	1	1	1	1	1	1	1	1
202048.6	CO6. CALCULATE performance of single and multi stage reciprocating compressors and DISCUSS rotary positive displ	3	2	2	2	2	1	2	1	1	1	1	2	1	1	1	1
202049	Fluid Mechanics																
202049.1	**CO1. DETERMINE various properties of fluid**	1	1	2	2	3	1	1	1	1	1	1	1	1	1	1	1
202049.2	**CO2. APPLY the laws of fluid statics and concepts of buoyancy**	3	2	2	2	2	1	2	1	1	1	1	2	1	1	1	1
202049.3	CO3. IDENTIFY types of fluid flow and terms associated in fluid kinematics	1	1	2	2	3	1	1	1	1	1	1	1	1	1	1	1
202049.4	CO4. APPLY principles of fluid dynamics to laminar flow	3	2	2	2	2	1	2	1	1	1	1	2	1	1	1	1
202049.5	CO5. ESTIMATE friction and minor losses in internal flows and DETERMINE boundary layer formation over an exte	1	1	2	2	3	1	1	1	1	1	1	1	1	1	1	1
202049.6	CO6. CONSTRUCT mathematical correlation considering dimensionless parameters, also ABLE to predict the perfor	3	2	2	2	2	1	2	1	1	1	1	2	1	1	1	1
202050	Manufacturing Processes																
202050.1	CO1. SELECT appropriate moulding, core making and melting practice and estimate pouring time, solidification rate a	3	2	2	2	2	1	2	1	1	1	1	2	1	1	1	1
202050.2	CO2. UNDERSTAND mechanism of metal forming techniques and CALCULATE load required for flat rolling	1	1	2	2	3	1	1	1	1	1	1	1	1	1	1	1
202050.3	CO3. DEMONSTRATE press working operations and APPLY the basic principles to DESIGN dies and tools for form	3	2	2	2	2	1	2	1	1	1	1	2	1	1	1	1
202050.4	CO4. CLASSIFY and EXPLAIN different welding processes and EVALUATE welding characteristics	3	2	2	2	2	1	2	1	1	1	1	2	1	1	1	1
202050.5	CO5. DIFFERENTIATE thermoplastics and thermosetting and EXPLAIN polymer processing techniques	1	1	2	2	3	1	1	1	1	1	1	1	1	1	1	1
202050.6	CO6. UNDERSTAND the principle of manufacturing of fibre-reinforce composites and metal matrix composites	3	2	2	2	2	1	2	1	1	1	1	2	1	1	1	1

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302041	Numerical & Statistical Methods															
302041.1	1. UNDERSTAND applications of systems of equations and solve mechanical engineering applications.	1	3	1	2	1	2	1	1	1	1	1	1	1	1	1
302041.2	2. APPLY differential equations to solve the applications in the domain of fluid mechanics, structural, etc.	3	3	3	1	2	1	2	1	1	1	1	1	1	1	1
302041.3	3. LEARN numerical integration techniques for engineering applications.	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
302041.4	4. COMPARE the system's behavior for the experimental data.	3	2	3	1	1	1	2	1	1	1	1	1	1	1	1
302041.5	5. INTERPRET Statistical measures for quantitative data.	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
302041.6	6. ANALYZE datasets using probability theory and linear algebra.	3	2	3	1	1	1	1	1	1	1	1	1	1	1	1

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302042	**Heat and Mass Transfer**																
202042.1	IDENTIFY the laws for different modes of heat transfer.	3	3	1	2	2	2	2	1	1	1	1	1	1	1	1	1
202042.2	UNDERSTAND the properties and economics of thermal insulation and ANALYZE heat transfer through fins and ther	2	3	3	1	1	1	1	1	1	1	1	1	1	1	1	1
202042.3	ANALYZE the natural and forced convective mode of heat transfer in various geometric configurations.	3	2	3	1	2	1	1	1	1	1	1	1	1	1	1	1
202042.4	UNDERSTAND AND REALIZE various laws with their interrelations and analyzeRadiation heat transfer in black and	3	3	2	2	1	1	2	1	1	1	1	1	1	1	1	1
202042.5	UNDERSTAND the fundamentals and laws of mass transfer and its applications.	2	2	3	2	1	1	2	1	1	1	1	1	1	1	1	1
202042.6	ANALYZE various performance parameters for existing heat exchanger and DEVELOPmethodologies for designing a	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1	1
302043	**Design of Machine Elements**																
302043.1	DESIGN AND ANALYZE the cotter and knuckle Joints, levers and components subjected to eccentric loading.	1	3	1	2	2	2	2	1	1	1	1	1	1	1	1	1
302043.2	DESIGN shafts, keys and couplings under static loading conditions.	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1	1
302043.3	ANALYZE different stresses in power screws and APPLY those in the procedure to design screw jack.	2	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1
302043.4	EVALUATE dimensions of machine components under fluctuating loads.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1	1
302043.5	EVALUATE & INTERPRET the stress developed on the different type of welded and threaded joints.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1	1
302043.6	APPLY the design and development procedure for different types of springs.	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
302044	**Mechatronics**																
302044.1	DEFINE key elements of mechatronics, principle of sensor and its characteristics	3	1	2	1	2	2	2	2	1	2	1	2	1	1	1	
302044.2	UTILIZE concept of signal processing and MAKE use of interfacing systems such as ADC, DAC, Digital I/O.	2	1	2	1	3	2	1	1	2	2	1	1	1	1	1	
302044.3	DETERMINE the transfer function by using block diagram reduction technique	3	1	1	1	1	2	2	1	1	1	1	1	1	1	1	
302044.4	EVALUATE Poles and Zero, frequency domain parameter for mathematical modeling for mechanical system	2	2	1	2	2	1	3	1	2	2	2	2	1	1	1	
302044.5	APPLY the concept of different controller modes to an industrial application	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	
302044.6	DEVELOP the ladder programming for industrial application	3	2	1	1	2	1	1	1	1	1	1	1	1	1	1	
302045	**Advance forming And joining Process**																
302045.1	ANALYSE the effect of friction in metal forming deep drawing and IDENTIFICATION of surface defects and their re	1	2	2	1	2	2	2	1	1	1	1	1	1	1	1	
302045.2	ASSESS the parameters for special forming operation and SELECT appropriate special forming operation for particula	3	3	2	1	2	1	1	1	1	1	1	1	1	1	1	
302045.3	ANALYSE the effect of HAZ on microstructure and mechanical properties of materials	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	
302045.4	CLASSIFY various solid state welding process and SELECT suitable welding processes for particular applications	3	3	3	2	2	3	3	1	1	1	1	1	1	1	1	
302045.5	CLASSIFY various advanced welding process and SELECT suitable welding processes for particular applications.	3	2	3	1	2	1	2	1	1	1	1	1	1	1	1	
302045.6	INTERPRET the principles of sustainable manufacturing and its role in manufacturing industry.	3	2	2	2	1	1	1	1	1	1	1	1	1	1	1	
302049	Artificial Intelligence &Machine Learning																
302049.1	**CO1. DEMONSTRATE fundamentals of artificial intelligence and machine learning.**	1	3	1	2	2	2	2	1	1	1	1	1	1	1	1	
302049.2	**CO2. APPLY feature extraction and selection techniques.**	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1	
302049.3	CO3. APPLY machine learning algorithms for classification and regression problems.	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1	
302049.4	CO4. DEVISE AND DEVELOP a machine learning model using various steps.	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1	
302049.5	CO5. EXPLAIN concepts of reinforced and deep learning.	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1	
302049.6	CO6. SIMULATE machine learning model in mechanical engineering problems.	3	2	3	1	1	1	1	1	1	1	1	1	1	1	1	
302050	**Computer Aided Engineering**																
302050.1	UNDERSTAND the basic concepts of Computer Aided Engineering (CAE) and CHARACTERISTICS of various elements required	1	2	1	2	2	2	2	1	1	1	1	1	1	1		
302050.2	NURTURE students about the discretization process and criteria for quality mesh.	3	3	2	1	1	1	1	1	1	1	1	1	1	1		
302050.3	UNDERSTAND the approaches of Finite Element Method (FEM) and to find displacement and stresses over the body.	2	3	3	2	1	1	1	1	1	1	1	1	1	1		
302050.4	DEVELOP the knowledge and skills needed to effectively evaluate the results using Finite Element Analysis (FEA).	2	2	2	1	1	1	2	1	1	1	1	1	1	1		
302050.5	APPLY computational technique to solve complex solid mechanics problems and its loading states.	2	3	1	1	1	1	2	1	1	1	1	1	1	1		
302050.6	STUDY the applications of CAE in the various domains of the Mechanical Engineering.	3	2	3	1	1	1	1	1	1	1	1	1	1	1		

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302051	**Design of Transmission Systems**																
302051.1	1. APPLY fundamentals for the design and/or selection of elements in transmission systems.	1	3	1	2	2	2	2	1	1	1	1	1	1	1	1	1
302051.2	2. UNDERSTAND the philosophy that real engineering design problems are open-ended and challenging.	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1	1
302051.3	3. DEMONSTRATE design skills for the problems in real life industrial applications.	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1
302051.4	4. DEVELOP an attitude of team work, critical thinking, communication, planning and scheduling through design proje	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1	1
302051.5	5. PERCEIVE about safety, ethical, legal, and other societal constraints in execution of their design projects.	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1	1
302051.6	6. BUILD a holistic design approach to find out pragmatic solutions to realistic domestic and industrial problems	3	2	3	1	1	1	1	1	1	1	1	1	1	1	1	1
302052	**302052-A: Composite Materials**																
302052.1	**CO1. DEFINE & COMPARE composites with traditional materials.**	1	3	1	2	2	2	2	1	1	1	1	1	1	1	1	1
302052.2	CO2. IDENTIFY & ESTIMATE different parameters of the Polymer Matrix Composite	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1	1
302052.3	CO3. CATEGORISE and APPLY Metal Matrix Process from possessions landscape.	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1
302052.4	CO4. DETERMINE volume/weight fraction and strength of Composites.	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1	1
302052.5	CO5. SELECT appropriate testing and inspection method for composite materials. CO6. SELECT composites material	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1	1
302052.6	CO6. SELECT composites materials for various applications.	3	2	3	1	1	1	1	1	1	1	1	1	1	1	1	1

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402041	Heating Ventilation Air-Conditioning and Refrigeration															
402041.1	CO1. SELECT appropriate moulding, core making and melting practice and estimate pouring time, solidification rate a	1	2	1	2	2	2	2	1	1	1	1	1	1	1	1
402041.2	CO2. UNDERSTAND mechanism of metal forming techniques and CALCULATE load required for flat rolling	2	2	3	1	1	1	1	1	1	1	1	1	1	1	1
402041.3	CO3. DEMONSTRATE press working operations and APPLY the basic principles to DESIGN dies and tools for form	2	2	3	2	1	1	1	1	1	1	1	1	1	1	1
402041.4	CO4. ESTIMATE cooling load for air conditioning systems used with concern of design conditions and indoor quality	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
402041.5	CO5. DESIGN air distribution system along with consideration of ventilation and infiltration.	2	2	3	2	2	2	2	1	1	1	1	1	1	1	1
402041.6	CO6. EXPLAIN the working of types of desiccants, evaporative, thermal storage, radiant cooling, clean room and heat	3	2	3	2	2	2	2	1	1	1	1	1	1	1	1
402042	Dynamics of Machinery															
402042.1	To conversant with balancing problems of machines.	1	2	1	2	2	2	2	1	1	1	1	1	1	1	1
402042.2	To understand mechanisms for system control – Gyroscope.	2	2	3	1	1	1	1	1	1	1	1	1	1	1	1
402042.3	To understand fundamentals of free and forced vibrations.	2	2	3	2	1	1	1	1	1	1	1	1	1	1	1
402042.4	To develop competency in understanding of vibration in Industry.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
402042.5	To develop analytical competency in solving vibration problems.	2	2	3	2	2	2	2	1	1	1	1	1	1	1	1
402042.6	To understand the various techniques of measurement and control of vibration and noise.	3	2	3	2	2	2	2	1	1	1	1	1	1	1	1
402043	Turbomachinery															
402043.1	"VALIDATE impulse moment principle using flat, inclined and curved surfaces andINVESTIGATE performance chara	1	3	1	2	2	2	2	1	1	1	1	1	1	1	1
402043.2	DETERMINE performance parameters of impulse and reaction steam turbine along with discussion of nozzles, govern	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
402043.3	MEASURE performance parameters of single & multistage centrifugal pumps along with discussion of cavitation and s	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1
402043.4	EXPLAIN performance parameters of centrifugal compressor along with discussion of theoretical aspects of axial com	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
		3	3	3	2	2	2	2	1	1	1	1	1	1	1	1
402044D	Industrial Engineering															
402044D.1	EVALUATE the productivity and IMPLEMENT various productivity improvement techniques.	1	2	2	2	2	2	2	1	1	1	1	1	1	1	1
402044D.2	APPLY work study techniques and UNDERSTANDS its importance for better productivity.	2	2	1	2	2	2	2	1	1	1	1	1	1	1	1
402044D.3	DEMONSTRATE the ability to SELECT plant location, appropriate layout and material handling equipment.	2	2	3	2	1	1	1	1	1	1	1	1	1	1	1
402044D.4	USE of Production planning and control tools for effective planning, scheduling and managing the shop floor control.	3	3	1	1	1	1	2	1	1	1	1	1	1	1	1
402044D.5	PLAN inventory requirements and EXERCISE effective control on manufacturing requirements.	3	2	3	1	1	1	1	1	1	1	1	1	1	1	1
402044D.6	APPLY Ergonomics and legislations for human comfort at work place and UNDERSTANDS the role of value engineering in impro	3	2	3	2	2	2	2	1	1	1	1	1	1	1	1

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402044C	Modern Machining Processes																
402044C.1	UNDERSTAND and ANALYZE the mechanism, process parameters of mechanical assisted modern machining processes.	3	1	2	3	2	2	2	1	1	1	1	1	1	1	1	1
402044C.2	UNDERSTAND the mechanism, construction and working of laser, plasma and electron beam assisted machining.	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1
402044C.3	CLASSIFY and ANALYZE the mechanism, process parameters of the chemical and electrochemical machining.	2	2	3	2	1	1	1	1	1	1	1	1	1	1	1	1
402044C.4	RELATE and ANALYZE the mechanism and select process parameters Electrical Discharge Machining for an application.	3	3	1	1	1	1	2	1	1	1	1	1	1	1	1	1
402044C.5	ILLUSTRATE the application of micromachining processes.	2	2	1	2	2	2	2	1	1	1	1	1	1	1	1	1
402044C.6	SUGGEST appropriate nanomachining process for the specific application.	3	2	3	2	2	2	2	1	1	1	1	1	1	1	1	1
402045	Product Design and Development																
402045A.1	Understand Product design and Product development processes	2	3	1	2	2	2	2	1	1	1	1	1	1	1	1	1
402045A.2	Understand Processes, tools and techniques for Market Survey & Product Specification Finalization	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1	1
402045A.3	Understand Processes, tools and techniques for Concept Inception, Verification and selection	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1
402045A.4	Understand Processes, tools and techniques for Concept Exploration & Development	2	2	2	1	1	1	2	1	1	1	1	1	1	1	1	1
402045A.5	Understand Processes, tools and techniques for Design Verification and Validation	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1	1
402045A.6	Understand Processes, tools and techniques for Robust Design and Development	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
402048	Computer Integrated Manufacturing																
402048.1	CO1. EXPLAIN CIM and factory automation.	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1
402048.2	CO2. UNDERSTAND the integration of hardware and software elements for CIM	2	2	2	1	1	1	2	1	1	1	1	1	1	1	1	1
402048.3	CO3. APPLY CNC program for appropriate manufacturing techniques.	2	3	1	2	2	2	2	1	1	1	1	1	1	1	1	1
402048.4	CO4. ANALYZE processes planning, quality and MRP integrated with computers.	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1	1
402048.5	CO5. INTERPRET flexible, cellular manufacturing and group technology.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1	1
402048.6	CO6. ANALYZE the effect of IOT, Industry-4.0 and cloud base manufacturing.	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
402049	Energy Engineering																
402049.1	EXPLAIN the power generation scenario, the layout components of thermal power plant and ANALYZE the improved P	1	3	1	2	2	2	2	1	1	1	1	1	1	1	1	1
402049.2	ANALYZE the performance of steam condensers, cooling tower system; RECOGNIZE an environmental impact of ener	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1	1
402049.3	EXPLAIN the layout, component details of diesel engine plant, hydel and nuclear energy systems.	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1
402049.4	ANALYZE gas and improved power cycles	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1	1
402049.5	EXPLAIN the fundamentals of renewable energy systems.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1	1
402049.6	"EXPLAIN basic principles of energy management, storage and economics of power generation."	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1
402050C	Manufacturing System and Simulation																
402050C.1	To help mechanical engineers understand broadly the functioning of manufacturing systems.	1	2	1	2	2	2	2	1	1	1	1	1	1	1	1	1
402050C.2	To describe the role of facilities and support systems.	2	3	3	1	1	1	1	1	1	1	1	1	1	1	1	1
402050C.3	To enable students understand various types of simulations used in manufacturing environment.	2	2	3	2	1	1	1	1	1	1	1	1	1	1	1	1
402050C.4	To acquaint with the methodology of manufacturing simulation using computer software and the repercussions of changes & varia	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1	1
402050C.5	To showcase the areas of simulation applications in manufacturing and allied field.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1	1

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402051	Industrial Psychology and Organizational Behavior																
402051D.1	To develop an understanding of the nature, functioning and design of organization as social collectivities.	3	2	1	2	2	2	2	1	1	1	1	1	1	1	1	1
402051D.2	To orient the students to the application of principles of psychology in an industrial and organizational workplace	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1	1
402051D.3	To demonstrate the understanding of job requirement and related fatigue, boredom and ways to handle it.	3	2	3	2	1	1	1	1	1	1	1	1	1	1	1	1
402051D.4	To develop the insights into performance management and understanding related improvement strategies.	2	2	3	2	1	1	2	1	1	1	1	1	1	1	1	1
402051D.5	To have an understanding of human behavior in groups and develop knowledge and skills in leadership, power, commu	3	3	2	2	1	1	2	1	1	1	1	1	1	1	1	1
402051D.6	To develop the acumen to understand the organizational culture, change management and organizational development.	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1

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GENBA SOPANRAO MOZE COLLEGE OF ENGINEERING

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Mechanical Engineering Department

AY 2021-22

Course Code	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
202041	Solid Mechanics															
202041.1	CO1. DEFINE various types of stresses and strain developed on determinate and indeterminate members.	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
202041.2	CO2. DRAW Shear force and bending moment diagram for various types of transverse loading and support.	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
202041.3	CO3. COMPUTE the slope & deflection, bending stresses and shear stresses on a beam.	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
202041.4	CO4. CALCULATE torsional shear stress in shaft and buckling on the column.	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1
202041.5	CO5. APPLY the concept of principal stresses and theories of failure to determine stresses on a 2-D element.	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
202041.6	CO6. UTILIZE the concepts of SFD & BMD, torsion and principal stresses to solve combined loading applicati	1	3	3	2	2	2	2	1	1	1	1	1	1	1	1
202042	Solid Modeling and Drafting															
202042.1	CO1. UNDERSTAND basic concepts of CAD system, need and scope in Product Lifecycle Management	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1
202042.2	CO2. UTILIZE knowledge of curves and surfacing features and methods to create complex solid geometry	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
202042.3	CO3. CONSTRUCT solid models, assemblies using various modeling techniques & PERFORM mass property analys	1	3	3	2	2	2	2	1	1	1	1	1	1	1	1
202042.4	CO4. APPLY geometric transformations to simple 2D geometries	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
202042.5	CO5. USE CAD model data for various CAD based engineering applications viz. production drawings, 3D printing, F	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
202042.6	CO6. USE PMI & MBD approach for communication	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
202043	Engineering Thermodynamics															
202043.1	CO1. DESCRIBE the basics of thermodynamics with heat and work interactions.	1	3	3	2	2	2	2	1	1	1	1	1	1	1	1
202043.2	non available energy for an Open and Closed System,	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
202043.3	CO3. APPLY entropy, available and non available energy for an Open and Closed System	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
202043.4	CO4. DETERMINE the properties of steam and their effect on performance of vapour power cycle.	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
202043.5	CO5. ANALYSE the fuel combustion process and products of combustion.	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1
202043.6	CO6. SELECT various instrumentations required for safe and efficient operation of steam generator.	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
202044	Engineering Materials and Metallurgy															
202044.1	CO1. COMPARE crystal structures and ASSESS different lattice parameters.	1	2	3	2	3	1	1	1	1	1	1	1	1	1	1
202044.2	CO2. CORRELATE crystal structures and imperfections in crystals with mechanical behaviour of materials.	1	1	2	2	3	1	1	1	1	1	1	1	1	1	1
202044.3	CO3. DIFFERENTIATE and DETERMINE mechanical properties using destructive and non-destructive testing of ma	1	1	2	2	3	1	1	1	1	1	1	1	1	1	1
202044.4	CO4. IDENTIFY & ESTIMATE different parameters of the system viz., phases, variables, component, grains, grain b	3	2	2	2	2	1	2	1	1	1	1	2	1	1	1
202044.5	CO5. ANALYSE effect of alloying element & heat treatment on properties of ferrous & nonferrous alloy.	1	1	3	2	3	2	2	1	1	2	1	2	1	1	1
202044.6	CO6. SELECT appropriate materials for various applications.	1	1	3	2	3	2	2	1	1	1	2	1	1	1	1
203156	**Electrical and Electronics Engineering**															
203156.1	CO1.APPLY programming concepts to UNDERSTAND role of Microprocessor and Microcontroller in embedded systems	1	1	3	2	3	1	1	1	1	1	1	1	1	1	1
203156.2	CO2.DEVELOP interfacing of different types of sensors and other hardware devices with Atmega328 based Arduino Board	1	1	2	2	3	1	1	1	1	1	1	1	1	1	1
203156.3	CO3.UNDERSTAND the operation of DC motor, its speed control methods and braking	3	2	2	2	2	1	2	1	1	1	1	1	1	1	1
203156.4	CO4.DISTINGUISH between types of three phase induction motor and its characteristic features	3	2	1	1	2	2	2	1	1	1	1	1	1	1	1
203156.5	CO5.EXPLAIN about emerging technology of Electric Vehicle (EV) and its modular subsystems	1	1	3	2	3	1	3	1	1	2	1	1	1	1	1
203156.6	CO6.CHOOSE energy storage devices and electrical drives for EVs	1	1	3	2	3	2	3	1	1	1	2	1	1	1	1

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207002	**Engineering Mathematics III**																
207001.1	Solve higher order linear differential equation using appropriate techniques for modellinganalyzing of electrical circuits	1	3	1	2	2	2	2	1	1	1	1	1	1	1	1	
207001.2	Solve system of linear equations using direct and iterative numerical technichs and develop solutions for ordinary diffe	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1	
207001.3	Apply Statistical methods like correlation,regression and probability theory in data analysis and predictions in civil eng	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1	
207001.4	Perform vector differentiation & integration, analyze the vector fields and apply to fluid flow problems.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1	
207001.5	Solve Partial differential equations such that as wave equations , one and two dimensional heat flow equations	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1	
202047	**Kinematics of Machinery**																
202047.1	1. To make the students conversant with kinematic analysis of mechanisms applied to real life and industrial applicatio	1	3	3	2	2	2	2	1	1	1	1	1	1	1	1	
202047.2	2. To develop the competency to analyze the velocity and acceleration in mechanisms using analytical and graphical ap	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1	
202047.3	3. To develop the skill to propose and synthesize the mechanisms using graphical and analytical technique.	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1	
202047.4	4. To develop the competency to understand & apply the principles of gear theory to design various applications.	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1	
202047.5	5. To develop the competency to design a cam profile for various follower motions.	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1	
202048	Applied Thermodynamics																
202048.1	CO1. DETERMINE COP of refrigeration system and ANALYZE psychrometric processes.	1	1	2	2	3	1	1	1	1	1	1	1	1	1	1	
202048.2	CO2. DISCUSS basics of engine terminology,air standard, fuel air and actual cycles.	3	2	2	2	2	1	2	1	1	1	1	2	1	1	1	
202048.3	CO3. IDENTIFY factors affecting the combustion performance of SI and CI engines.	1	1	2	2	3	1	1	1	1	1	1	1	1	1	1	
202048.4	CO4. DETERMINE performance parameters of IC Engines and emission control.	1	1	2	2	3	1	1	1	1	1	1	1	1	1	1	
202048.5	CO5. EXPLAIN working of various IC Engine systems and use of alternative fuels.	1	1	2	2	3	1	1	1	1	1	1	1	1	1	1	
202048.6	CO6. CALCULATE performance of single and multi stage reciprocating compressors and DISCUSS rotary positive displ	3	2	2	2	2	1	2	1	1	1	1	2	1	1	1	
202049	Fluid Mechanics																
202049.1	**CO1. DETERMINE various properties of fluid**	1	1	2	2	3	1	1	1	1	1	1	1	1	1	1	
202049.2	**CO2. APPLY the laws of fluid statics and concepts of buoyancy**	3	2	2	2	2	1	2	1	1	1	1	2	1	1	1	
202049.3	CO3. IDENTIFY types of fluid flow and terms associated in fluid kinematics	1	1	2	2	3	1	1	1	1	1	1	1	1	1	1	
202049.4	CO4. APPLY principles of fluid dynamics to laminar flow	3	2	2	2	2	1	2	1	1	1	1	2	1	1	1	
202049.5	CO5. ESTIMATE friction and minor losses in internal flows and DETERMINE boundary layer formation over an exte	1	1	2	2	3	1	1	1	1	1	1	1	1	1	1	
202049.6	CO6. CONSTRUCT mathematical correlation considering dimensionless parameters, also ABLE to predict the perfor	3	2	2	2	2	1	2	1	1	1	1	2	1	1	1	
202050	Manufacturing Processes																
202050.1	CO1. SELECT appropriate moulding, core making and melting practice and estimate pouring time, solidification rate a	3	2	2	2	2	1	2	1	1	1	1	2	1	1	1	
202050.2	CO2. UNDERSTAND mechanism of metal forming techniques and CALCULATE load required for flat rolling	1	1	2	2	3	1	1	1	1	1	1	1	1	1	1	
202050.3	CO3. DEMONSTRATE press working operations and APPLY the basic principles to DESIGN dies and tools for form	3	2	2	2	2	1	2	1	1	1	1	2	1	1	1	
202050.4	CO4. CLASSIFY and EXPLAIN different welding processes and EVALUATE welding characteristics	3	2	2	2	2	1	2	1	1	1	1	2	1	1	1	
202050.5	CO5. DIFFERENTIATE thermoplastics and thermosetting and EXPLAIN polymer processing techniques	1	1	2	2	3	1	1	1	1	1	1	1	1	1	1	
202050.6	CO6. UNDERSTAND the principle of manufacturing of fibre-reinforce composites and metal matrix composites	3	2	2	2	2	1	2	1	1	1	1	2	1	1	1	

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302041	Numerical & Statistical Methods															
302041.1	1. UNDERSTAND applications of systems of equations and solve mechanical engineering applications.	1	3	1	2	1	2	1	1	1	1	1	1	1	1	1
302041.2	2. APPLY differential equations to solve the applications in the domain of fluid mechanics, structural, etc.	3	3	3	1	2	1	2	1	1	1	1	1	1	1	1
302041.3	3. LEARN numerical integration techniques for engineering applications.	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
302041.4	4. COMPARE the system's behavior for the experimental data.	3	2	3	1	1	1	2	1	1	1	1	1	1	1	1
302041.5	5. INTERPRET Statistical measures for quantitative data.	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
302041.6	6. ANALYZE datasets using probability theory and linear algebra.	3	2	3	1	1	1	1	1	1	1	1	1	1	1	1
302042	**Heat and Mass Transfer**															
202042.1	IDENTIFY the laws for different modes of heat transfer.	3	3	1	2	2	2	2	1	1	1	1	1	1	1	1
202042.2	UNDERSTAND the properties and economics of thermal insulation and ANALYZE heat transfer through fins and ther	2	3	3	1	1	1	1	1	1	1	1	1	1	1	1
202042.3	ANALYZE the natural and forced convective mode of heat transfer in various geometric configurations.	3	2	3	1	2	1	1	1	1	1	1	1	1	1	1
202042.4	UNDERSTAND AND REALIZE various laws with their interrelations and analyzeRadiation heat transfer in black and	3	3	2	2	1	1	2	1	1	1	1	1	1	1	1
202042.5	UNDERSTAND the fundamentals and laws of mass transfer and its applications.	2	2	3	2	1	1	2	1	1	1	1	1	1	1	1
202042.6	ANALYZE various performance parameters for existing heat exchanger and DEVELOPmethodologies for designing a	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
302043	**Design of Machine Elements**															
302043.1	DESIGN AND ANALYZE the cotter and knuckle Joints, levers and components subjected to eccentric loading.	1	3	1	2	2	2	2	1	1	1	1	1	1	1	1
302043.2	DESIGN shafts, keys and couplings under static loading conditions.	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
302043.3	ANALYZE different stresses in power screws and APPLY those in the procedure to design screw jack.	2	3	3	2	1	1	1	1	1	1	1	1	1	1	1
302043.4	EVALUATE dimensions of machine components under fluctuating loads.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
302043.5	EVALUATE & INTERPRET the stress developed on the different type of welded and threaded joints.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
302043.6	APPLY the design and development procedure for different types of springs.	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1
302044	**Mechatronics**															
302044.1	DEFINE key elements of mechatronics, principle of sensor and its characteristics	3	1	2	1	2	2	2	2	1	2	1	2	1	1	1
302044.2	UTILIZE concept of signal processing and MAKE use of interfacing systems such as ADC, DAC, Digital I/O.	2	1	2	1	3	2	1	1	2	2	1	1	1	1	1
302044.3	DETERMINE the transfer function by using block diagram reduction technique	3	1	1	1	1	2	2	1	1	1	1	1	1	1	1
302044.4	EVALUATE Poles and Zero, frequency domain parameter for mathematical modeling for mechanical system	2	2	1	2	2	1	3	1	2	2	2	2	1	1	1
302044.5	APPLY the concept of different controller modes to an industrial application	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1
302044.6	DEVELOP the ladder programming for industrial application	3	2	1	1	2	1	1	1	1	1	1	1	1	1	1
302045	**Advance forming And joining Process**															
302045.1	ANALYSE the effect of friction in metal forming deep drawing and IDENTIFICATION of surface defects and their re	1	2	2	1	2	2	2	1	1	1	1	1	1	1	1
302045.2	ASSESS the parameters for special forming operation and SELECT appropriate special forming operation for particula	3	3	2	1	2	1	1	1	1	1	1	1	1	1	1
302045.3	ANALYSE the effect of HAZ on microstructure and mechanical properties of materials	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
302045.4	CLASSIFY various solid state welding process and SELECT suitable welding processes for particular applications	3	3	3	2	2	3	3	1	1	1	1	1	1	1	1
302045.5	CLASSIFY various advanced welding process and SELECT suitable welding processes for particular applications.	3	2	3	1	2	1	2	1	1	1	1	1	1	1	1
302045.6	INTERPRET the principles of sustainable manufacturing and its role in manufacturing industry.	3	2	2	2	1	1	1	1	1	1	1	1	1	1	1

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302049	Artificial Intelligence &Machine Learning															
302049.1	**CO1. DEMONSTRATE fundamentals of artificial intelligence and machine learning.**	1	3	1	2	2	2	2	1	1	1	1	1	1	1	1
302049.2	**CO2. APPLY feature extraction and selection techniques.**	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
302049.3	CO3. APPLY machine learning algorithms for classification and regression problems.	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1
302049.4	CO4. DEVISE AND DEVELOP a machine learning model using various steps.	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
302049.5	CO5. EXPLAIN concepts of reinforced and deep learning.	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
302049.6	CO6. SIMULATE machine learning model in mechanical engineering problems.	3	2	3	1	1	1	1	1	1	1	1	1	1	1	1
302050	**Computer Aided Engineering**															
302050.1	UNDERSTAND the basic concepts of Computer Aided Engineering (CAE) and CHARACTERISTICS of various elements required	1	2	1	2	2	2	2	1	1	1	1	1	1	1	
302050.2	NURTURE students about the discretization process and criteria for quality mesh.	3	3	2	1	1	1	1	1	1	1	1	1	1	1	
302050.3	UNDERSTAND the approaches of Finite Element Method (FEM) and to find displacement and stresses over the body.	2	3	3	2	1	1	1	1	1	1	1	1	1	1	
302050.4	DEVELOP the knowledge and skills needed to effectively evaluate the results using Finite Element Analysis (FEA).	2	2	2	1	1	1	2	1	1	1	1	1	1	1	
302050.5	APPLY computational technique to solve complex solid mechanics problems and its loading states.	2	3	1	1	1	1	2	1	1	1	1	1	1	1	
302050.6	STUDY the applications of CAE in the various domains of the Mechanical Engineering.	3	2	3	1	1	1	1	1	1	1	1	1	1	1	
302051	**Design of Transmission Systems**															
302051.1	1. APPLY fundamentals for the design and/or selection of elements in transmission systems.	1	3	1	2	2	2	2	1	1	1	1	1	1	1	1
302051.2	2. UNDERSTAND the philosophy that real engineering design problems are open-ended and challenging.	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
302051.3	3. DEMONSTRATE design skills for the problems in real life industrial applications.	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1
302051.4	4. DEVELOP an attitude of team work, critical thinking, communication, planning and scheduling through design proje	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
302051.5	5. PERCEIVE about safety, ethical, legal, and other societal constraints in execution of their design projects.	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
302051.6	6. BUILD a holistic design approach to find out pragmatic solutions to realistic domestic and industrial problems	3	2	3	1	1	1	1	1	1	1	1	1	1	1	1
302052	**302052-A: Composite Materials**															
302052.1	**CO1. DEFINE & COMPARE composites with traditional materials.**	1	3	1	2	2	2	2	1	1	1	1	1	1	1	1
302052.2	CO2. IDENTIFY & ESTIMATE different parameters of the Polymer Matrix Composite	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
302052.3	CO3. CATEGORISE and APPLY Metal Matrix Process from possessions landscape.	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1
302052.4	CO4. DETERMINE volume/weight fraction and strength of Composites.	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
302052.5	CO5. SELECT appropriate testing and inspection method for composite materials. CO6. SELECT composites materia	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
302052.6	CO6. SELECT composites materials for various applications.	3	2	3	1	1	1	1	1	1	1	1	1	1	1	1

Course Code	Name of Course (2015 Pattern)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
402041	Hydraulics and Pneumatics															
402041.1	□ Understand working principle of components used in hydraulic & pneumatic systems	2	2	3	1	1	1	1	1	1	1	1	1	1	1	1
402041.2	□ Identify various applications of hydraulic & pneumatic systems	2	2	3	2	1	1	1	1	1	1	1	1	1	1	1
402041.3	□ Selection of appropriate components required for hydraulic and pneumatic systems	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
402041.4	□ Analyse hydraulic and pneumatic systems for industrial/mobile applications	2	2	3	2	2	2	2	1	1	1	1	1	1	1	1
402041.5	□ Design a system according to the requirements	3	2	3	2	2	2	2	1	1	1	1	1	1	1	1
402041.6	□ Develop and apply knowledge to various applications	1	2	1	2	2	2	2	1	1	1	1	1	1	1	1

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402042	**CAD CAM Automation**																
402042.1	□ Apply homogeneous transformation matrix for geometrical transformations of 2D CAD entities for basic geometric t	1	2	1	2	2	2	2	1	1	1	1	1	1	1	1	1
402042.2	□ Use analytical and synthetic curves and surfaces in part modeling.	2	2	3	1	1	1	1	1	1	1	1	1	1	1	1	1
402042.3	□ Do real times analysis of simple mechanical elements like beams, trusses, etc. and comment on safety of engineering	2	2	3	2	1	1	1	1	1	1	1	1	1	1	1	1
402042.4	□ Generate CNC program for Turning / Milling and generate tool path using CAM software.	2	2	3	1	1	1	1	1	1	1	1	1	1	1	1	1
402042.5	□ Demonstrate understanding of various rapid manufacturing techniques and develop competency in designing and dev	2	2	3	2	1	1	1	1	1	1	1	1	1	1	1	1
402042.6	□ Understand the robot systems and their applications in manufacturing industries.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1	1
402043	**Dynamics of Machinery**																
402043.1	To conversant with balancing problems of machines.	1	2	1	2	2	2	2	1	1	1	1	1	1	1	1	1
402043.2	To understand mechanisms for system control – Gyroscope.	2	2	3	1	1	1	1	1	1	1	1	1	1	1	1	1
402043.3	To understand fundamentals of free and forced vibrations.	2	2	3	2	1	1	1	1	1	1	1	1	1	1	1	1
402043.4	To develop competency in understanding of vibration in Industry.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1	1
402043.5	To develop analytical competency in solving vibration problems.	2	2	3	2	2	2	2	1	1	1	1	1	1	1	1	1
402043.6	To understand the various techniques of measurement and control of vibration and noise.	3	2	3	2	2	2	2	1	1	1	1	1	1	1	1	1
402044	Elective – I																
402044A.1	□ Understand the different techniques used to solve mechanical engineering problems.	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1	1
402044A.2	□ Derive and use 1-D and 2-D element stiffness matrices and load vectors from various methods to solve for displacem	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1
402044A.3	□ Apply mechanics of materials and machine design topics to provide preliminary results used for testing the reasonab	2	2	2	1	1	1	2	1	1	1	1	1	1	1	1	1
402044A.4	□ Explain the inner workings of a finite element code for linear stress, displacement, temperature and modal analysis.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1	1
402044A.5	□ Use commercial finite element analysis software to solve complex problems in solid mechanics and heat transfer.	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
402044A.6	□ Interpret the results of finite element analyses and make an assessment of the results in terms of modeling (physics a	2	3	1	2	2	2	2	1	1	1	1	1	1	1	1	1
402045	Elective – II																
402045A.1	Understand Product design and Product development processes	2	3	1	2	2	2	2	1	1	1	1	1	1	1	1	1
402045A.2	Understand Processes, tools and techniques for Market Survey & Product Specification Finalization	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1	1
402045A.3	Understand Processes, tools and techniques for Concept Inception, Verification and selection	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1
402045A.4	Understand Processes, tools and techniques for Concept Exploration & Development	2	2	2	1	1	1	2	1	1	1	1	1	1	1	1	1
402045A.5	Understand Processes, tools and techniques for Design Verification and Validation	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1	1
402045A.6	Understand Processes, tools and techniques for Robust Design and Development	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
402047	**Energy Engineering**																
402047.1	Describe the power generation scenario, the layout components of thermal power plant and analyze the improved R	1	3	1	2	2	2	2	1	1	1	1	1	1	1	1	1
402047.2	Analyze the steam condensers, recognize the an environmental impacts of thermal power plant and method to contr	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1	1
402047.3	Recognize the layout, component details of hydroelectric power plant and nuclear power plant	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1
402047.4	Realize the details of diesel power plant, gas power plant and analyze gas turbine power cycle	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1	1
402047.5	Emphasize the fundaments of non-conventional power plants	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1	1
402047.6	Describe the different power plant electrical instruments and basic principles of economics of power generation.	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1

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402048	Mechanical System Design																
402050C.1	To help mechanical engineers understand broadly the functioning of manufacturing systems.	1	2	1	2	2	2	2	1	1	1	1	1	1	1	1	1
402050C.2	To describe the role of facilities and support systems.	2	3	3	1	1	1	1	1	1	1	1	1	1	1	1	1
402050C.3	To enable students understand various types of simulations used in manufacturing environment.	2	2	3	2	1	1	1	1	1	1	1	1	1	1	1	1
402050C.4	To acquaint with the methodology of manufacturing simulation using computer software and the repercussions of changes & varia	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1	1
402050C.5	To showcase the areas of simulation applications in manufacturing and allied field.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1	1
402049	Elective - III																
402051D.1	To develop an understanding of the nature, functioning and design of organization as social collectivities.	3	2	1	2	2	2	2	1	1	1	1	1	1	1	1	1
402051D.2	To orient the students to the application of principles of psychology in an industrial and organizational workplace	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1	1
402051D.3	To demonstrate the understanding of job requirement and related fatigue, boredom and ways to handle it.	3	2	3	2	1	1	1	1	1	1	1	1	1	1	1	1
402051D.4	To develop the insights into performance management and understanding related improvement strategies.	2	2	3	2	1	1	2	1	1	1	1	1	1	1	1	1
402051D.5	To have an understanding of human behavior in groups and develop knowledge and skills in leadership, power, commu	3	3	2	2	1	1	2	1	1	1	1	1	1	1	1	1
402051D.6	To develop the acumen to understand the organizational culture, change management and organizational development.	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1
402050	Elective - IV																
402050C.1	To understand essential factors for product design	2	3	2	2	2	2	2	1	1	1	1	1	1	1	1	1
402050C.2	To design product as per customer needs and satisfaction	2	2	3	1	1	1	1	1	1	1	1	1	1	1	1	1
402050C.3	To understand Processes and concepts during product development	3	2	3	2	2	1	1	1	1	1	1	1	1	1	1	1
402050C.4	To understand methods and processes of Forward and Reverse engineering	3	3	2	3	1	1	2	1	1	1	1	1	1	1	1	1
402050C.5	To carry various design processes as DFA, DFMEA, design for safety	3	3	3	3	1	1	2	1	1	1	1	1	1	1	1	1
402050C.6	To understand the product life cycle and product data management	2	2	3	1	1	1	1	1	1	1	1	1	1	1	1	1

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Mechanical Engineering Department

AY 2020-21

Course Code	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
202041	Solid Mechanics															
202041.1	CO1. DEFINE various types of stresses and strain developed on determinate and indeterminate members.	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
202041.2	CO2. DRAW Shear force and bending moment diagram for various types of transverse loading and support.	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
202041.3	CO3. COMPUTE the slope & deflection, bending stresses and shear stresses on a beam.	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
202041.4	CO4. CALCULATE torsional shear stress in shaft and buckling on the column.	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1
202041.5	CO5. APPLY the concept of principal stresses and theories of failure to determine stresses on a 2-D element.	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
202041.6	CO6. UTILIZE the concepts of SFD & BMD, torsion and principal stresses to solve combined loading applicati	1	3	3	2	2	2	2	1	1	1	1	1	1	1	1
202042	Solid Modeling and Drafting															
202042.1	CO1. UNDERSTAND basic concepts of CAD system, need and scope in Product Lifecycle Management	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
202042.2	CO2. UTILIZE knowledge of curves and surfacing features and methods to create complex solid geometry	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1
202042.3	CO3. CONSTRUCT solid models, assemblies using various modeling techniques & PERFORM mass property analys	1	3	3	2	2	2	2	1	1	1	1	1	1	1	1
202042.4	CO4. APPLY geometric transformations to simple 2D geometries	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
202042.5	CO5. USE CAD model data for various CAD based engineering applications viz. production drawings, 3D printing, F	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
202042.6	CO6. USE PMI & MBD approach for communication	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
202043	Engineering Thermodynamics															
202043.1	CO1. DESCRIBE the basics of thermodynamics with heat and work interactions.	1	3	3	2	2	2	2	1	1	1	1	1	1	1	1
202043.2	CO2. APPLY laws of thermodynamics to steady flow and non-flow processes. CO3. APPLY entropy, available and	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
202043.3	CO3. APPLY entropy, available and non available energy for an Open and Closed System	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
202043.4	CO4. DETERMINE the properties of steam and their effect on performance of vapour power cycle.	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
202043.5	CO5. ANALYSE the fuel combustion process and products of combustion.	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1
202043.6	CO6. SELECT various instrumentations required for safe and efficient operation of steam generator.	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
202044	Engineering Materials and Metallurgy															
202044.1	CO1. COMPARE crystal structures and ASSESS different lattice parameters.	1	2	3	2	3	1	1	1	1	1	1	1	1	1	1
202044.2	CO2. CORRELATE crystal structures and imperfections in crystals with mechanical behaviour of materials.	1	1	2	2	3	1	1	1	1	1	1	1	1	1	1
202044.3	CO3. DIFFERENTIATE and DETERMINE mechanical properties using destructive and non-destructive testing of ma	1	1	2	2	3	1	1	1	1	1	1	1	1	1	1
202044.4	CO4. IDENTIFY & ESTIMATE different parameters of the system viz., phases, variables, component, grains, grain b	3	2	2	2	2	1	2	1	1	1	1	2	1	1	1
202044.5	CO5. ANALYSE effect of alloying element & heat treatment on properties of ferrous & nonferrous alloy.	1	1	3	2	3	2	2	1	1	2	1	2	1	1	1
202044.6	CO6. SELECT appropriate materials for various applications.	1	1	3	2	3	2	2	1	1	1	2	1	1	1	1

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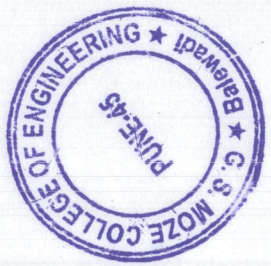
Course Code	Name of Course (2015)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PS03
302041	Design of Machine Elements-I															
302041.1	Ability to identify and understand failure modes for mechanical elements and design of machine elements based on str	1	3	1	2	1	2	1	1	1	1	1	1	1	1	1
302041.2	Ability to design Shafts, Keys and Coupling for industrial applications.	3	3	3	1	2	1	2	1	1	1	1	1	1	1	1
302041.3	Ability to design machine elements subjected to fluctuating loads.	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
302041.4	Ability to design Power Screws for various applications.	3	2	3	1	1	1	2	1	1	1	1	1	1	1	1
302041.5	Ability to design fasteners and welded joints subjected to different loading conditions.	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
302041.6	Ability to design various Springs for strength and stiffness.	3	2	3	1	1	1	1	1	1	1	1	1	1	1	1
302042	**Heat and Mass Transfer**															
302042.1	IDENTIFY the laws for different modes of heat transfer.	2	3	1	2	2	2	2	1	1	1	1	1	1	1	1
302042.2	UNDERSTAND the properties and economics of thermal insulation and ANALYZE heat transfer through fins and the	2	2	3	2	1	1	1	1	1	1	1	1	1	1	1
302042.3	ANALYZE the natural and forced convective mode of heat transfer in various geometric configurations.	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
302042.4	UNDERSTAND AND REALIZE various laws with their interrelations and analyzeRadiation heat transfer in black and	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
302042.5	UNDERSTAND the fundamentals and laws of mass transfer and its applications.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
202042.6	ANALYZE various performance parameters for existing heat exchanger and DEVELOPmethodologies for designing a	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
302043	Theory of Machines-II$															
302043.1	DESIGN AND ANALYZE the cotter and knuckle Joints, levers and components subjected to eccentric loading.	1	3	1	2	2	2	2	1	1	1	1	1	1	1	1
302043.2	DESIGN shafts, keys and couplings under static loading conditions.	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
302043.3	ANALYZE different stresses in power screws and APPLY those in the procedure to design screw jack.	2	3	2	2	1	1	1	1	1	1	1	1	1	1	1
302043.4	EVALUATE dimensions of machine components under fluctuating loads.	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
302043.5	EVALUATE & INTERPRET the stress developed on the different type of welded and threaded joints.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
302043.6	APPLY the design and development procedure for different types of springs.	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1
302044	Turbo Machines															
302044.1	Apply Momentum Principle And Velocity Triangle On a Pelton Turbines For Its Analysis.	2	1		1											
302044.2	Apply Momentum Principle And Velocity Triangle On a Reaction Turbine For Its Analysis.	2	2		1											
302044.3	Apply Momentum Principle And Velocity Triangle On Steam Turbines For Its Analysis.	3	2	2	1											
302044.4	Apply Momentum Principle And Velocity Triangle Concept Of Centrifugal Pump For Its Analysis.	3	2	2	1											
302044.5	Apply Thermodynamic Concept Using T S Diagram And Used Of Velocity Triangle On Centrifugal Compressor For I	3	2	2	1											
302044.6	Apply Thermodynamic Concept Using T S Diagram And Used Of Velocity Triangle On axial compress For Its Analys	2	2	2	1											
302045	Metrology and Quality Control															
302045.1	**1. Understand the methods of measurement, selection of measuring instruments / standards of measurement, ca**	3	3	2	1	2	1	1	1	1	1	1	1	1	1	1
302045.2	**2. Explain tolerance, limits of size, fits, geometric and position tolerances and gauge design**	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
302045.3	3. Understand and use/apply Quality Control Techniques/ Statistical Tools appropriately.	3	3	3	2	2	3	3	1	1	1	1	1	1	1	1
302045.4	4. Develop an ability of problem solving and decision making by identifying and analyzing the cause for variation and	3	2	3	1	2	1	2	1	1	1	1	1	1	1	1
302047	Numerical Methods and Optimization*															
302047.1	1. Use appropriate Numerical Methods to solve complex mechanical engineering problems.	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
302047.2	2. Formulate algorithms and programming.	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1
302047.3	3. Use Mathematical Solver.	2	3	2	1	1	1	2	1	1	1	1	1	1	1	1
302047.4	4. Generate Solutions for real life problem using optimization techniques.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
302047.5	5. Analyze the research problem	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1



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203156	**Electrical and Electronics Engineering**																
203156.1	APPLY programming concepts to UNDERSTAND role of Microprocessor and Microcontroller in embedded systems	1	1	3	2	3	1	1	1	1	1	1	1	1	1	1	1
203156.2	DEVELOP interfacing of different types of sensors and other hardware devices with Atmega328 based Arduino Board	1	1	2	2	3	1	1	1	1	1	1	1	1	1	1	1
203156.3	UNDERSTAND the operation of DC motor, its speed control methods and braking	3	2	2	2	2	1	2	1	1	1	1	1	1	1	1	1
203156.4	DISTINGUISH between types of three phase induction motor and its characteristic features	3	2	1	1	2	2	2	1	1	1	1	1	1	1	1	1
203156.5	EXPLAIN about emerging technology of Electric Vehicle (EV) and its modular subsystems	1	1	3	2	3	1	3	1	1	2	1	1	1	1	1	1
203156.6	CHOOSE energy storage devices and electrical drives for EVs	1	1	3	2	3	2	3	1	1	1	2	1	1	1	1	1
207002	**Engineering Mathematics III**																
207001.1	Solve higher order linear differential equation using appropriate techniques for modellinganalyzing of electrical circui	1	3	1	2	2	2	2	1	1	1	1	1	1	1	1	1
207001.2	Solve system of linear equations using direct and iterative numerical technichs and develop solutions for ordinary diff	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1	1
207001.3	Apply Statistical methods like correlation,regression and probability theory in data analysis and predictions in civil eng	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1
207001.4	Perform vector differentiation & integration, analyze the vector fields and apply to fluid flow problems.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1	1
207001.5	Solve Partial differential equations such that as wave equations , one and two dimensional heat flow equations	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1	1
202047	**Kinematics of Machinery**																
202047.1	1. To make the students conversant with kinematic analysis of mechanisms applied to real life and industrial applicatio	1	3	3	2	2	2	2	1	1	1	1	1	1	1	1	1
202047.2	2. To develop the competency to analyze the velocity and acceleration in mechanisms using analytical and graphical a	3	2	2	2	1	1	2	1	1	1	1	1	1	1	1	1
202047.3	3. To develop the skill to propose and synthesize the mechanisms using graphical and analytical technique.	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
202047.4	4. To develop the competency to understand & apply the principles of gear theory to design various applications.	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1	1
202047.5	5. To develop the competency to design a cam profile for various follower motions.	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
202048	Applied Thermodynamics																
202048.1	CO1. DETERMINE COP of refrigeration system and ANALYZE psychrometric processes.	1	1	2	2	3	1	1	1	1	1	1	1	1	1	1	1
202048.2	CO2. DISCUSS basics of engine terminology,air standard, fuel air and actual cycles.	3	2	2	2	2	1	2	1	1	1	1	2	1	1	1	1
202048.3	CO3. IDENTIFY factors affecting the combustion performance of SI and CI engines.	1	1	2	2	3	1	1	1	1	1	1	1	1	1	1	1
202048.4	CO4. DETERMINE performance parameters of IC Engines and emission control.	1	1	2	2	3	1	1	1	1	1	1	1	1	1	1	1
202048.5	CO5. EXPLAIN working of various IC Engine systems and use of alternative fuels.	1	1	2	2	3	1	1	1	1	1	1	1	1	1	1	1
202048.6	CO6. CALCULATE performance of single and multi stage reciprocating compressors and DISCUSS rotary positive displ	3	2	2	2	2	1	2	1	1	1	1	2	1	1	1	1
202049	Fluid Mechanics																
202049.1	**CO1. DETERMINE various properties of fluid**	1	1	2	2	3	1	1	1	1	1	1	1	1	1	1	1
202049.2	**CO2. APPLY the laws of fluid statics and concepts of buoyancy**	3	2	2	2	2	1	2	1	1	1	1	2	1	1	1	1
202049.3	CO3. IDENTIFY types of fluid flow and terms associated in fluid kinematics	1	1	2	2	3	1	1	1	1	1	1	1	1	1	1	1
202049.4	CO4. APPLY principles of fluid dynamics to laminar flow	3	2	2	2	2	1	2	1	1	1	1	2	1	1	1	1
202049.5	CO5. ESTIMATE friction and minor losses in internal flows and DETERMINE boundary layer formation over an exte	1	1	2	2	3	1	1	1	1	1	1	1	1	1	1	1
202049.6	CO6. CONSTRUCT mathematical correlation considering dimensionless parameters, also ABLE to predict the perfor	3	2	2	2	2	1	2	1	1	1	1	2	1	1	1	1
202050	Manufacturing Processes																
202050.1	CO1. SELECT appropriate moulding, core making and melting practice and estimate pouring time, solidification rate	3	2	2	2	2	1	2	1	1	1	1	2	1	1	1	1
202050.2	CO2. UNDERSTAND mechanism of metal forming techniques and CALCULATE load required for flat rolling	1	1	2	2	3	1	1	1	1	1	1	1	1	1	1	1
202050.3	CO3. DEMONSTRATE press working operations and APPLY the basic principles to DESIGN dies and tools for form	3	2	2	2	2	1	2	1	1	1	1	2	1	1	1	1
202050.4	CO4. CLASSIFY and EXPLAIN different welding processes and EVALUATE welding characteristics	3	2	2	2	2	1	2	1	1	1	1	2	1	1	1	1
202050.5	CO5. DIFFERENTIATE thermoplastics and thermosetting and EXPLAIN polymer processing techniques	1	1	2	2	3	1	1	1	1	1	1	1	1	1	1	1
202050.6	CO6. UNDERSTAND the principle of manufacturing of fibre-reinforce composites and metal matrix composites	3	2	2	2	2	1	2	1	1	1	1	2	1	1	1	1

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302048	Design of Machine Elements-II															
302048.1	CO 1: To understand and apply principles of gear design to spur gears and industrial spur gear boxes.	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
302048.2	CO 2 : To become proficient in Design of Helical and Bevel Gear	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
302048.3	CO 3: To develop capability to analyse Rolling contact bearing and its selection from manufacturer's Catalogue.	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1
302048.4	CO 4: To learn a skill to design worm gear box for various industrial applications.	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
302048.5	CO 5: To inculcate an ability to design belt drives and selection of belt, rope and chain drives.	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
302048.6	CO 6: To achieve an expertise in design of Sliding contact bearing in industrial applications.	3	2	3	1	1	1	1	1	1	1	1	1	1	1	1
302049	Refrigeration and Air Conditioning															
302049.1	**Illustrate the fundamental principles and applications of refrigeration and air conditioning system**	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
302049.2	**Obtain cooling capacity and coefficient of performance by conducting test on vapour compression refrigeration**	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1
302049.3	**Present the properties, applications and environmental issues of different refrigerants**	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
302049.4	**Calculate cooling load for air conditioning systems used for various**	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
302049.5	**Operate and analyze the refrigeration and air conditioning systems**	3	2	3	1	1	1	1	1	1	1	1	1	1	1	1
302050	**Mechatronics**															
302050.1	UNDERSTAND the basic concepts of Computer Aided Engineering (CAE) and CHARACTERISTICS of various elements require	1	2	1	2	2	2	2	1	1	1	1	1	1	1	
302050.2	NURTURE students about the discretization process and criteria for quality mesh.	3	3	2	1	1	1	1	1	1	1	1	1	1	1	
302050.3	UNDERSTAND the approaches of Finite Element Method (FEM) and to find displacement and stresses over the body.	2	3	3	2	1	1	1	1	1	1	1	1	1	1	
302050.4	DEVELOP the knowledge and skills needed to effectively evaluate the results using Finite Element Analysis (FEA).	2	2	2	1	1	1	2	1	1	1	1	1	1	1	
302050.5	APPLY computational technique to solve complex solid mechanics problems and its loading states.	2	3	1	1	1	1	2	1	1	1	1	1	1	1	
302050.6	STUDY the applications of CAE in the various domains of the Mechanical Engineering.	3	2	3	1	1	1	1	1	1	1	1	1	1	1	
302051	**Manufacturing -Process-II$**															
302051.1	1. APPLY fundamentals for the design and/or selection of elements in transmission systems.	1	3	1	2	2	2	2	1	1	1	1	1	1	1	
302051.2	2. UNDERSTAND the philosophy that real engineering design problems are open-ended and challenging.	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
302051.3	3. DEMONSTRATE design skills for the problems in real life industrial applications.	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1
302051.4	4. DEVELOP an attitude of team work, critical thinking, communication, planning and scheduling through design pro	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
302051.5	5. PERCEIVE about safety, ethical, legal, and other societal constraints in execution of their design projects.	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
302051.6	6. BUILD a holistic design approach to find out pragmatic solutions to realistic domestic and industrial problems	3	2	3	1	1	1	1	1	1	1	1	1	1	1	1

Course Code	Name of Course (2015 Pattern)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
402041	Hydraulics and Pneumatics															
402041.1	**□ Understand working principle of components used in hydraulic & pneumatic systems**	2	2	3	1	1	1	1	1	1	1	1	1	1	1	1
402041.2	**□ Identify various applications of hydraulic & pneumatic systems**	2	2	3	2	1	1	1	1	1	1	1	1	1	1	1
402041.3	**□ Selection of appropriate components required for hydraulic and pneumatic systems**	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
402041.4	**□ Analyse hydraulic and pneumatic systems for industrial/mobile applications**	2	2	3	2	2	2	2	1	1	1	1	1	1	1	1
402041.5	**□ Design a system according to the requirements**	3	2	3	2	2	2	2	1	1	1	1	1	1	1	1
402041.6	**□ Develop and apply knowledge to various applications**	1	2	1	2	2	2	2	1	1	1	1	1	1	1	1
402042	CAD CAM Automation															
402042.1	**□ Apply homogeneous transformation matrix for geometrical transformations of 2D CAD entities for basic geo**	2	2	3	2	1	1	1	1	1	1	1	1	1	1	1
402042.2	**□ Use analytical and synthetic curves and surfaces in part modeling.**	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
402042.3	**□ Do real times analysis of simple mechanical elements like beams, trusses, etc. and comment on safety of engin**	1	2	1	2	2	2	2	1	1	1	1	1	1	1	1
402042.4	**□ Generate CNC program for Turning / Milling and generate tool path using CAM software.**	2	2	3	1	1	1	1	1	1	1	1	1	1	1	1
402042.5	**□ Demonstrate understanding of various rapid manufacturing techniques and develop competency in designing**	2	2	3	2	1	1	1	1	1	1	1	1	1	1	1
402042.6	**□ Understand the robot systems and their applications in manufacturing industries.**	2	2	3	1	1	1	1	1	1	1	1	1	1	1	1

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402043	**Dynamics of Machinery**																
402043.1	To conversant with balancing problems of machines.	1	2	1	2	2	2	2	1	1	1	1	1	1	1	1	
402043.2	To understand mechanisms for system control – Gyroscope.	2	2	3	1	1	1	1	1	1	1	1	1	1	1	1	
402043.3	To understand fundamentals of free and forced vibrations.	2	2	3	2	1	1	1	1	1	1	1	1	1	1	1	
402043.4	To develop competency in understanding of vibration in Industry.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1	
402043.5	To develop analytical competency in solving vibration problems.	2	2	3	2	2	2	2	1	1	1	1	1	1	1	1	
402043.6	To understand the various techniques of measurement and control of vibration and noise.	3	2	3	2	2	2	2	1	1	1	1	1	1	1	1	
402044	Elective – I																
402044A.1	□ Understand the different techniques used to solve mechanical engineering problems.	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1	
402044A.2	□ Derive and use 1-D and 2-D element stiffness matrices and load vectors from various methods to solve for displacer	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1	
402044A.3	□ Apply mechanics of materials and machine design topics to provide preliminary results used for testing the reasonat	2	2	2	1	1	1	2	1	1	1	1	1	1	1	1	
402044A.4	□ Explain the inner workings of a finite element code for linear stress, displacement, temperature and modal analysis.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1	
402044A.5	□ Use commercial finite element analysis software to solve complex problems in solid mechanics and heat transfer.	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1	
402044A.6	□ Interpret the results of finite element analyses and make an assessment of the results in terms of modeling (physics a	2	3	1	2	2	2	2	1	1	1	1	1	1	1	1	
402045	Elective – II																
402045A.1	Understand Product design and Product development processes	2	3	1	2	2	2	2	1	1	1	1	1	1	1	1	
402045A.2	Understand Processes, tools and techniques for Market Survey & Product Specification Finalization	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1	
402045A.3	Understand Processes, tools and techniques for Concept Inception, Verification and selection	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1	
402045A.4	Understand Processes, tools and techniques for Concept Exploration & Development	2	2	2	1	1	1	2	1	1	1	1	1	1	1	1	
402045A.5	Understand Processes, tools and techniques for Design Verification and Validation	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1	
402045A.6	Understand Processes, tools and techniques for Robust Design and Development	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1	
402047	**Energy Engineering**																
402047.1	Describe the power generation scenario, the layout components of thermal power plant and analyze the improved R	1	3	1	2	2	2	2	1	1	1	1	1	1	1	1	
402047.2	Analyze the steam condensers, recognize the an environmental impacts of thermal power plant and method to contr	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1	
402047.3	Recognize the layout, component details of hydroelectric power plant and nuclear power plant	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1	
402047.4	Realize the details of diesel power plant, gas power plant and analyze gas turbine power cycle	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1	
402047.5	Emphasize the fundaments of non-conventional power plants	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1	
402047.6	Describe the different power plant electrical instruments and basic principles of economics of power generation.	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1	
402048	Mechanical System Design																
402050C.1	To help mechanical engineers understand broadly the functioning of manufacturing systems.	1	2	1	2	2	2	2	1	1	1	1	1	1	1	1	
402050C.2	To describe the role of facilities and support systems.	2	3	3	1	1	1	1	1	1	1	1	1	1	1	1	
402050C.3	To enable students understand various types of simulations used in manufacturing environment.	2	2	3	2	1	1	1	1	1	1	1	1	1	1	1	
402050C.4	To acquaint with the methodology of manufacturing simulation using computer software and the repercussions of changes & vari	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1	
402050C.5	To showcase the areas of simulation applications in manufacturing and allied field.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1	

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402049	Elective - III															
402051D.1	To develop an understanding of the nature, functioning and design of organization as social collectivities.	3	2	1	2	2	2	2	1	1	1	1	1	1	1	1
402051D.2	To orient the students to the application of principles of psychology in an industrial and organizational workplace	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
402051D.3	To demonstrate the understanding of job requirement and related fatigue, boredom and ways to handle it.	3	2	3	2	1	1	1	1	1	1	1	1	1	1	1
402051D.4	To develop the insights into performance management and understanding related improvement strategies.	2	2	3	2	1	1	2	1	1	1	1	1	1	1	1
402051D.5	To have an understanding of human behavior in groups and develop knowledge and skills in leadership, power, comm	3	3	2	2	1	1	2	1	1	1	1	1	1	1	1
402051D.6	To develop the acumen to understand the organizational culture, change management and organizational development	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1
402050	Elective - IV - Product Design and Development															
402050C.1	To understand essential factors for product design	2	3	2	2	2	2	2	1	1	1	1	1	1	1	1
402050C.2	To design product as per customer needs and satisfaction	2	2	3	1	1	1	1	1	1	1	1	1	1	1	1
402050C.3	To understand Processes and concepts during product development	3	2	3	2	2	1	1	1	1	1	1	1	1	1	1
402050C.4	To understand methods and processes of Forward and Reverse engineering	3	3	2	3	1	1	2	1	1	1	1	1	1	1	1
402050C.5	To carry various design processes as DFA, DFMEA, design for safety	3	3	3	3	1	1	2	1	1	1	1	1	1	1	1
402050C.6	To understand the product life cycle and product data management	2	2	3	1	1	1	1	1	1	1	1	1	1	1	1

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Mechanical Engineering Department

AY 2019-20

207002	Engineering Mathematics – III															
207002.1	**1) Solve higher order linear differential equations and apply to modeling and analyzing mass spring sy**	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
207002.2	**2) Apply Laplace transform and Fourier transform techniques to solve differential equations involved**	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
207002.3	**3) Apply statistical methods like correlation, regression analysis in analyzing, interpreting experiment**	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
207002.4	**4) Perform vector differentiation and integration, analyze the vector fields and apply to fluid flow pro**	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
207002.5	**5) Solve various partial differential equations such as wave equation, one and two dimensional heat fl**	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
202041	Manufacturing Process-I															
202041.1	• Understand and analyze foundry practices like pattern making, mold making, Core making and Inspection	**1**	**2**	**3**	**2**	**3**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
202041.2	• Understand and analyze Hot and Cold Working, Rolling, Forging, Extrusion and Drawing Processes.	**1**	**1**	**2**	**2**	**3**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
202041.3	• Understand different plastic molding processes, Extrusion of Plastic and Thermoforming	**3**	**2**	**2**	**2**	**2**	**1**	**2**	**1**	**1**	**1**	**1**	**2**	**1**	**1**	**1**
202041.4	• Understand different Welding and joining processes and its defects	**3**	**2**	**1**	**1**	**2**	**2**	**2**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
202041.5	• Understand, Design and Analyze different sheet metal working processes	**1**	**1**	**3**	**2**	**3**	**2**	**2**	**1**	**1**	**2**	**1**	**2**	**1**	**1**	**1**
202041.6	• Understand the constructional details and Working of Centre Lathe	**1**	**1**	**3**	**2**	**3**	**2**	**2**	**1**	**1**	**1**	**2**	**1**	**1**	**1**	**1**
202042	Computer Aided Machine Drawing															
202042.1	• Understand the importance of CAD in the light of allied technologies such as CAM, CAE, FEA, CFD, PLM.	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
202042.2	• Understand the significance of parametric technology and its application in 2D sketching.	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
202042.3	• Understand the significance of parametric feature-based modeling and its application in 3D machine com	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
202042.4	• Ability to create 3D assemblies that represent static or dynamic Mechanical Systems.	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
202042.5	• Ability to ensure manufacturability and proper assembly of components and assemblies.	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
202042.6	• Ability to communicate between Design and Manufacturing using 2D drawings.	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
202043	Thermodynamics															
202043.1	• Apply various laws of thermodynamics to various processes and real systems.	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
202043.2	• Apply the concept of Entropy, Calculate heat, work and other important thermodynamic properties for various ideal ga	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
202043.3	• Estimate performance of various Thermodynamic gas power cycles and gas refrigeration cycle and availability in each	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
202043.4	• Estimate the condition of steam and performance of vapour power cycle and vapour compression cycle.	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
202043.5	• Estimate Stoichiometric air required for combustion, performance of steam generators and natural draught requireme	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
202043.6	**• Use Psychromertic charts and estimate various essential properties related to Psychrometry and pro**	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
202044	Material Science															
202044.1	• Understand the basic concepts and properties of Material.	**1**	**2**	**3**	**2**	**3**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
202044.2	• Understand about material fundamental and processing.	**1**	**1**	**2**	**2**	**3**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
202044.3	• Select proper metal, alloys, nonmetal and powder metallurgical component for specific requirement	**3**	**2**	**2**	**2**	**2**	**1**	**2**	**1**	**1**	**1**	**1**	**2**	**1**	**1**	**1**
202044.4	• Detect the defects in crystal and its effect on crystal properties.	**3**	**2**	**1**	**1**	**2**	**2**	**2**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
202044.5	• Evaluate the different properties of material by studying different test	**1**	**1**	**3**	**2**	**3**	**2**	**2**	**1**	**1**	**2**	**1**	**2**	**1**	**1**	**1**
202044.6	• Recognize how metals can be strengthened by cold-working and hot working	**1**	**1**	**3**	**2**	**3**	**2**	**2**	**1**	**1**	**1**	**2**	**1**	**1**	**1**	**1**

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203156	Strength of Materials															
203156.1	**• Apply knowledge of mathematics, science for engineering applications**	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
203156.2	**• Design and conduct experiments, as well as to analyze and interpret data**	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
203156.3	**• Design a component to meet desired needs within realistic constraints of health and safety**	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
203156.4	**• Identify, formulate, and solve engineering problems**	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
203156.5	**• Practice professional and ethical responsibility**	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
203156.6	**• Use the techniques, skills, and modern engineering tools necessary for engineering practice**	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
202045	Fluid Mechanics															
202049.1	**CO1. DETERMINE various properties of fluid**	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
202049.2	**CO2. APPLY the laws of fluid statics and concepts of buoyancy**	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
202049.3	CO3. IDENTIFY types of fluid flow and terms associated in fluid kinematics	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
202049.4	CO4. APPLY principles of fluid dynamics to laminar flow	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
202049.5	CO5. ESTIMATE friction and minor losses in internal flows and DETERMINE boundary layer formation o	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
202049.6	CO6. CONSTRUCT mathematical correlation considering dimensionless parameters, also ABLE to predict	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
202048	Theory of Machines – I															
202048.1	**• Identify mechanisms in real life applications.**	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
202048.2	• Perform kinematic analysis of simple mechanisms.	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
202048.3	• Perform static and dynamic force analysis of slider crank mechanism.	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
202048.4	**• Determine moment of inertia of rigid bodies experimentally.**	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
202048.5	**• Analyze velocity and acceleration of mechanisms by vector and graphical methods.**	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
202049	Engineering Metallurgy															
202049.1	• describe how metals and alloys formed and how the properties change due to microstructure	1	3	3	2	2	2	2	1	1	1	1	1	1	1	1
202049.2	• apply core concepts in Engineering Metallurgy to solve engineering problems.	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
202049.3	• conduct experiments, as well as to analyze and interpret data	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
202049.4	• select materials for design and construction.	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
202049.5	• possess the skills and techniques necessary for modern materials engineering practice	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1
202049.6	• recognize how metals can be strengthened by alloying, cold-working, and heat treatment	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
202050	Applied Thermodynamics															
202050.1	**• Classify various types of Engines, Compare Air standard, Fuel Air and Actual cycles and make out v**	1	3	3	2	2	2	2	1	1	1	1	1	1	1	1
202050.2	**• Understand Theory of Carburetion, Modern Carburetor, Stages of Combustion in S. I. Engines and**	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
202050.3	• Understand Fuel Supply system, Types of Injectors and Injection Pumps, Stages of Combustion in CI Engi	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
202050.4	• Carry out Testing of I. C. Engines and analyze its performance.	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
202050.5	• Describe construction and working of various I. C. Engine systems (Cooling, Lubrication, Ignition, Goverr	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1
202050.6	• Describe construction, working of various types of reciprocating and rotary compressors with performance	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
203152	Electrical and Electronics Engineering															
203152.1	Develop the capability to identify and select suitable DC motor and its speed control method for given indus	3	3	2	2	2	1	1	1	1	1	1	1	1	1	1
203152.2	Develop the capability to identify and select suitable induction motor and its speed control method for given	3	3	2	2	2	1	1	1	1	1	1	1	1	1	1
203152.3	Develop the capability to identify and select suitable special purpose motor and its speed control method for	3	3	2	2	2	1	2	1	1	1	1	1	1	1	1
203152.4	Program Arduino IDE using conditional statements	1	1	1	2	2	2	2	1	1	1	1	1	1	1	1
203152.5	Interfacing sensors with Arduino IDE	1	1	1	2	3	2	2	1	1	1	1	1	1	1	1
203152.6	Data acquisition system for mechanical applications	1	1	1	2	3	2	2	1	1	1	1	1	1	1	1

Course Code	Name of Course (2015)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PS03
302041	Design of Machine Elements-I															
302041.1	Ability to identify and understand failure modes for mechanical elements and design of machine elements ba	1	3	1	2	1	2	1	1	1	1	1	1	1	1	1
302041.2	Ability to design Shafts, Keys and Coupling for industrial applications.	3	3	3	1	2	1	2	1	1	1	1	1	1	1	1
302041.3	Ability to design machine elements subjected to fluctuating loads.	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
302041.4	Ability to design Power Screws for various applications.	3	2	3	1	1	1	2	1	1	1	1	1	1	1	1
302041.5	Ability to design fasteners and welded joints subjected to different loading conditions.	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
302041.6	Ability to design various Springs for strength and stiffness.	3	2	3	1	1	1	1	1	1	1	1	1	1	1	1
302042	**Heat and Mass Transfer**															
302042.1	IDENTIFY the laws for different modes of heat transfer.	2	3	1	2	2	2	2	1	1	1	1	1	1	1	1
302042.2	UNDERSTAND the properties and economics of thermal insulation and ANALYZE heat transfer through fi	2	2	3	2	1	1	1	1	1	1	1	1	1	1	1
302042.3	ANALYZE the natural and forced convective mode of heat transfer in various geometric configurations.	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
302042.4	UNDERSTAND AND REALIZE various laws with their interrelations and analyzeRadiation heat transfer in	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
302042.5	UNDERSTAND the fundamentals and laws of mass transfer and its applications.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
202042.6	ANALYZE various performance parameters for existing heat exchanger and DEVELOPmethodologies for d	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
302043	Theory of Machines-II$															
302043.1	DESIGN AND ANALYZE the cotter and knuckle Joints, levers and components subjected to eccentric load	1	3	1	2	2	2	2	1	1	1	1	1	1	1	1
302043.2	DESIGN shafts, keys and couplings under static loading conditions.	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
302043.3	ANALYZE different stresses in power screws and APPLY those in the procedure to design screw jack.	2	3	3	2	1	1	1	1	1	1	1	1	1	1	1
302043.4	EVALUATE dimensions of machine components under fluctuating loads.	3	3	2	2	1	1	2	1	1	1	1	1	1	1	1
302043.5	EVALUATE & INTERPRET the stress developed on the different type of welded and threaded joints.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
302043.6	APPLY the design and development procedure for different types of springs.	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
302044	Turbo Machines															
302044.1	Apply Momentum Principle And Velocity Triangle On a Pelton Turbines For Its Analysis.	2	1		1											
302044.2	Apply Momentum Principle And Velocity Triangle On a Reaction Turbine For Its Analysis.	2	2		1											
302044.3	Apply Momentum Principle And Velocity Triangle On Steam Turbines For Its Analysis.	3	2	2	1											
302044.4	Apply Momentum Principle And Velocity Triangle Concept Of Centrifugal Pump For Its Analysis.	3	2	2	1											
302044.5	Apply Thermodynamic Concept Using T S Diagram And Used Of Velocity Triangle On Centrifugal Compre	3	2	2	1											
302044.6	Apply Thermodynamic Concept Using T S Diagram And Used Of Velocity Triangle On axial compress For	2	2	2	1											
302045	Metrology and Quality Control															
302045.1	**1. Understand the methods of measurement, selection of measuring instruments / standards of measur**	3	3	2	1	2	1	1	1	1	1	1	1	1	1	1
302045.2	**2. Explain tolerance, limits of size, fits, geometric and position tolerances and gauge design**	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
302045.3	3. Understand and use/apply Quality Control Techniques/ Statistical Tools appropriately.	3	3	3	2	2	3	3	1	1	1	1	1	1	1	1
302045.4	4. Develop an ability of problem solving and decision making by identifying and analyzing the cause for var	3	2	3	1	2	1	2	1	1	1	1	1	1	1	1
302047	Numerical Methods and Optimization*															
302047.1	1. Use appropriate Numerical Methods to solve complex mechanical engineering problems.	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
302047.2	2. Formulate algorithms and programming.	2	3	2	2	1	1	1	1	1	1	1	1	1	1	1
302047.3	3. Use Mathematical Solver.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
302047.4	4. Generate Solutions for real life problem using optimization techniques.	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
302047.5	5. Analyze the research problem	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1

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302048	Design of Machine Elements-II															
302048.1	CO 1: To understand and apply principles of gear design to spur gears and industrial spur gear boxes.	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
302048.2	CO 2 : To become proficient in Design of Helical and Bevel Gear	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
302048.3	CO 3: To develop capability to analyse Rolling contact bearing and its selection from manufacturer's Catalog	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1
302048.4	CO 4: To learn a skill to design worm gear box for various industrial applications.	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
302048.5	CO 5: To inculcate an ability to design belt drives and selection of belt, rope and chain drives.	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
302048.6	CO 6: To achieve an expertise in design of Sliding contact bearing in industrial applications.	3	2	3	1	1	1	1	1	1	1	1	1	1	1	1
302049	Refrigeration and Air Conditioning															
302049.1	**Illustrate the fundamental principles and applications of refrigeration and air conditioning system**	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
302049.2	**Obtain cooling capacity and coefficient of performance by conducting test on vapour compression refr**	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1
302049.3	**Present the properties, applications and environmental issues of different refrigerants**	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
302049.4	**Calculate cooling load for air conditioning systems used for various**	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
302049.5	**Operate and analyze the refrigeration and air conditioning systems**	3	2	3	1	1	1	1	1	1	1	1	1	1	1	1
302050	**Mechatronics**															
302050.1	UNDERSTAND the basic concepts of Computer Aided Engineering (CAE) and CHARACTERISTICS of various elemer	1	2	1	2	2	2	2	1	1	1	1	1	1	1	
302050.2	NURTURE students about the discretization process and criteria for quality mesh.	3	3	2	1	1	1	1	1	1	1	1	1	1	1	
302050.3	UNDERSTAND the approaches of Finite Element Method (FEM) and to find displacement and stresses over the body.	2	3	3	2	1	1	1	1	1	1	1	1	1	1	
302050.4	DEVELOP the knowledge and skills needed to effectively evaluate the results using Finite Element Analysis (FEA).	2	2	2	1	1	1	2	1	1	1	1	1	1	1	
302050.5	APPLY computational technique to solve complex solid mechanics problems and its loading states.	2	3	1	1	1	1	2	1	1	1	1	1	1	1	
302050.6	STUDY the applications of CAE in the various domains of the Mechanical Engineering.	3	2	3	1	1	1	1	1	1	1	1	1	1	1	
302051	**Manufacturing -Process-IIS**															
302051.1	1. APPLY fundamentals for the design and/or selection of elements in transmission systems.	1	3	1	2	2	2	2	1	1	1	1	1	1	1	1
302051.2	2. UNDERSTAND the philosophy that real engineering design problems are open-ended and challenging.	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
302051.3	3. DEMONSTRATE design skills for the problems in real life industrial applications.	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1
302051.4	4. DEVELOP an attitude of team work, critical thinking, communication, planning and scheduling through (	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
302051.5	5. PERCEIVE about safety, ethical, legal, and other societal constraints in execution of their design projects.	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
302051.6	6. BUILD a holistic design approach to find out pragmatic solutions to realistic domestic and industrial prob	3	2	3	1	1	1	1	1	1	1	1	1	1	1	1
Course Code	**Name of Course (2015 Pattern)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
402041	Hydraulics and Pneumatics															
402041.1	**□ Understand working principle of components used in hydraulic & pneumatic systems**	2	2	3	1	1	1	1	1	1	1	1	1	1	1	1
402041.2	**□ Identify various applications of hydraulic & pneumatic systems**	2	2	3	2	1	1	1	1	1	1	1	1	1	1	1
402041.3	**□ Selection of appropriate components required for hydraulic and pneumatic systems**	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
402041.4	**□ Analyse hydraulic and pneumatic systems for industrial/mobile applications**	2	2	3	2	2	2	2	1	1	1	1	1	1	1	1
402041.5	**□ Design a system according to the requirements**	3	2	3	2	2	2	2	1	1	1	1	1	1	1	1
402041.6	**□ Develop and apply knowledge to various applications**	1	2	1	2	2	2	2	1	1	1	1	1	1	1	1
402042	CAD CAM Automation															
402042.1	**□ Apply homogeneous transformation matrix for geometrical transformations of 2D CAD entities for**	2	2	3	2	1	1	1	1	1	1	1	1	1	1	1
402042.2	**□ Use analytical and synthetic curves and surfaces in part modeling.**	2	2	3	1	1	1	1	1	1	1	1	1	1	1	1
402042.3	**□ Do real times analysis of simple mechanical elements like beams, trusses, etc. and comment on safet**	1	2	1	2	2	2	2	1	1	1	1	1	1	1	1
402042.4	**□ Generate CNC program for Turning / Milling and generate tool path using CAM software.**	2	2	3	1	1	1	1	1	1	1	1	1	1	1	1
402042.5	**□ Demonstrate understanding of various rapid manufacturing techniques and develop competency in**	2	2	3	2	1	1	1	1	1	1	1	1	1	1	1
402042.6	**□ Understand the robot systems and their applications in manufacturing industries.**	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1

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402043	**Dynamics of Machinery**															
402043.1	To conversant with balancing problems of machines.	1	2	1	2	2	2	2	1	1	1	1	1	1	1	1
402043.2	To understand mechanisms for system control – Gyroscope.	2	2	3	1	1	1	1	1	1	1	1	1	1	1	1
402043.3	To understand fundamentals of free and forced vibrations.	2	2	3	2	1	1	1	1	1	1	1	1	1	1	1
402043.4	To develop competency in understanding of vibration in Industry.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
402043.5	To develop analytical competency in solving vibration problems.	2	2	3	2	2	2	2	1	1	1	1	1	1	1	1
402043.6	To understand the various techniques of measurement and control of vibration and noise.	3	2	3	2	2	2	2	1	1	1	1	1	1	1	1
402044	Elective – I															
402044A.1	□ Understand the different techniques used to solve mechanical engineering problems.	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
402044A.2	□ Derive and use 1-D and 2-D element stiffness matrices and load vectors from various methods to solve fo	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1
402044A.3	□ Apply mechanics of materials and machine design topics to provide preliminary results used for testing th	2	2	2	1	1	1	2	1	1	1	1	1	1	1	1
402044A.4	□ Explain the inner workings of a finite element code for linear stress, displacement, temperature and moda	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
402044A.5	□ Use commercial finite element analysis software to solve complex problems in solid mechanics and heat t	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1
402044A.6	□ Interpret the results of finite element analyses and make an assessment of the results in terms of modeling	2	3	1	2	2	2	2	1	1	1	1	1	1	1	1
402045	Elective – II															
402045A.1	Understand Product design and Product development processes	2	3	1	2	2	2	2	1	1	1	1	1	1	1	1
402045A.2	Understand Processes, tools and techniques for Market Survey & Product Specification Finalization	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
402045A.3	Understand Processes, tools and techniques for Concept Inception, Verification and selection	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1
402045A.4	Understand Processes, tools and techniques for Concept Exploration & Development	2	2	2	1	1	1	2	1	1	1	1	1	1	1	1
402045A.5	Understand Processes, tools and techniques for Design Verification and Validation	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
402045A.6	Understand Processes, tools and techniques for Robust Design and Development	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1
402047	**Energy Engineering**															
402047.1	Describe the power generation scenario, the layout components of thermal power plant and analyze the in	1	3	1	2	2	2	2	1	1	1	1	1	1	1	1
402047.2	Analyze the steam condensers, recognize the an environmental impacts of thermal power plant and metho	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
402047.3	Recognize the layout, component details of hydroelectric power plant and nuclear power plant	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1
402047.4	Realize the details of diesel power plant, gas power plant and analyze gas turbine power cycle	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
402047.5	Emphasize the fundaments of non-conventional power plants	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
402047.6	Describe the different power plant electrical instruments and basic principles of economics of power gener	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1
402048	Mechanical System Design															
402050C.1	To help mechanical engineers understand broadly the functioning of manufacturing systems.	1	2	1	2	2	2	2	1	1	1	1	1	1	1	1
402050C.2	To describe the role of facilities and support systems.	2	3	3	1	1	1	1	1	1	1	1	1	1	1	1
402050C.3	To enable students understand various types of simulations used in manufacturing environment.	2	2	3	2	1	1	1	1	1	1	1	1	1	1	1
402050C.4	To acquaint with the methodology of manufacturing simulation using computer software and the repercussions of chan	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
402050C.5	To showcase the areas of simulation applications in manufacturing and allied field.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1

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402049	Elective - III															
402051D.1	To develop an understanding of the nature, functioning and design of organization as social collectivities.	3	2	1	2	2	2	2	1	1	1	1	1	1	1	1
402051D.2	To orient the students to the application of principles of psychology in an industrial and organizational work	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
402051D.3	To demonstrate the understanding of job requirement and related fatigue, boredom and ways to handle it.	3	2	3	2	1	1	1	1	1	1	1	1	1	1	1
402051D.4	To develop the insights into performance management and understanding related improvement strategies.	2	2	3	2	1	1	2	1	1	1	1	1	1	1	1
402051D.5	To have an understanding of human behavior in groups and develop knowledge and skills in leadership, pov	3	3	2	2	1	1	2	1	1	1	1	1	1	1	1
402051D.6	To develop the acumen to understand the organizational culture, change management and organizational dev	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1
402050	Elective - IV - Product Design and Development															
402050C.1	To understand essential factors for product design	3	2	2	1	2	2	2	1	1	1	1	1	1	1	1
402050C.2	To design product as per customer needs and satisfaction	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1
402050C.3	To understand Processes and concepts during product development	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
402050C.4	To understand methods and processes of Forward and Reverse engineering	3	3	3	3	1	1	2	1	1	1	1	1	1	1	1
402050C.5	To carry various design processes as DFA, DFMEA, design for safety	2	2	3	2	1	1	2	1	1	1	1	1	1	1	1
402050C.6	To understand the product life cycle and product data management	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1

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GENBA SOPANRAO MOZE COLLEGE OF ENGINEERING

Balewadi, Pune - 411045.

Mechanical Engineering Department

AY 2018-19

Course Code	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
207002	Engineering Mathematics – III															
207002.1	**1) Solve higher order linear differential equations and apply to modeling and analyzing mass spring systems.**	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
207002.2	**2) Apply Laplace transform and Fourier transform techniques to solve differential equations involved in Vibration**	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
207002.3	**3) Apply statistical methods like correlation, regression analysis in analyzing, interpreting experimental data and p**	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
207002.4	**4) Perform vector differentiation and integration, analyze the vector fields and apply to fluid flow problems.**	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
207002.5	**5) Solve various partial differential equations such as wave equation, one and two dimensional heat flow equations.**	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
202041	Manufacturing Process-I															
202041.1	• Understand and analyze foundry practices like pattern making, mold making, Core making and Inspection of defects.	**1**	**2**	**3**	**2**	**3**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
202041.2	• Understand and analyze Hot and Cold Working, Rolling, Forging, Extrusion and Drawing Processes.	**1**	**1**	**2**	**2**	**3**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
202041.3	• Understand different plastic molding processes, Extrusion of Plastic and Thermoforming	**3**	**2**	**2**	**2**	**2**	**1**	**2**	**1**	**1**	**1**	**1**	**2**	**1**	**1**	**1**
202041.4	• Understand different Welding and joining processes and its defects	**3**	**2**	**1**	**1**	**2**	**2**	**2**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
202041.5	• Understand, Design and Analyze different sheet metal working processes	**1**	**1**	**3**	**2**	**3**	**2**	**2**	**1**	**1**	**2**	**1**	**2**	**1**	**1**	**1**
202041.6	• Understand the constructional details and Working of Centre Lathe	**1**	**1**	**3**	**2**	**3**	**2**	**2**	**1**	**1**	**1**	**2**	**1**	**1**	**1**	**1**
202042	Computer Aided Machine Drawing															
202042.1	• Understand the importance of CAD in the light of allied technologies such as CAM, CAE, FEA, CFD, PLM.	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
202042.2	• Understand the significance of parametric technology and its application in 2D sketching.	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
202042.3	• Understand the significance of parametric feature-based modeling and its application in 3D machine components mo	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
202042.4	• Ability to create 3D assemblies that represent static or dynamic Mechanical Systems.	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
202042.5	• Ability to ensure manufacturability and proper assembly of components and assemblies.	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
202042.6	• Ability to communicate between Design and Manufacturing using 2D drawings.	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
202043	Thermodynamics															
202043.1	• Apply various laws of thermodynamics to various processes and real systems.	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
202043.2	• Apply the concept of Entropy, Calculate heat, work and other important thermodynamic properties for various ideal gas processes.	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
202043.3	• Estimate performance of various Thermodynamic gas power cycles and gas refrigeration cycle and availability in each case.	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
202043.4	• Estimate the condition of steam and performance of vapour power cycle and vapour compression cycle.	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
202043.5	• Estimate Stoichiometric air required for combustion, performance of steam generators and natural draught requirements in boiler p	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
202043.6	• **Use Psychromertic charts and estimate various essential properties related to Psychrometry and processes**	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
202044	Material Science															
202044.1	• Understand the basic concepts and properties of Material.	**1**	**2**	**3**	**2**	**3**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
202044.2	• Understand about material fundamental and processing.	**1**	**1**	**2**	**2**	**3**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
202044.3	• Select proper metal, alloys, nonmetal and powder metallurgical component for specific requirement	**3**	**2**	**2**	**2**	**2**	**1**	**2**	**1**	**1**	**1**	**1**	**2**	**1**	**1**	**1**
202044.4	• Detect the defects in crystal and its effect on crystal properties.	**3**	**2**	**1**	**1**	**2**	**2**	**2**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
202044.5	• Evaluate the different properties of material by studying different test	**1**	**1**	**3**	**2**	**3**	**2**	**2**	**1**	**1**	**2**	**1**	**2**	**1**	**1**	**1**
202044.6	• Recognize how metals can be strengthened by cold-working and hot working	**1**	**1**	**3**	**2**	**3**	**2**	**2**	**1**	**1**	**1**	**2**	**1**	**1**	**1**	**1**

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203156	Strength of Materials															
203156.1	**• Apply knowledge of mathematics, science for engineering applications**	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
203156.2	**• Design and conduct experiments, as well as to analyze and interpret data**	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
203156.3	**• Design a component to meet desired needs within realistic constraints of health and safety**	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
203156.4	**• Identify, formulate, and solve engineering problems**	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
203156.5	**• Practice professional and ethical responsibility**	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
203156.6	**• Use the techniques, skills, and modern engineering tools necessary for engineering practice**	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
202045	Fluid Mechanics															
202049.1	**CO1. DETERMINE various properties of fluid**	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
202049.2	**CO2. APPLY the laws of fluid statics and concepts of buoyancy**	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
202049.3	CO3. IDENTIFY types of fluid flow and terms associated in fluid kinematics	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
202049.4	CO4. APPLY principles of fluid dynamics to laminar flow	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
202049.5	CO5. ESTIMATE friction and minor losses in internal flows and DETERMINE boundary layer formation over an externa	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
202049.6	CO6. CONSTRUCT mathematical correlation considering dimensionless parameters, also ABLE to predict the performar	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
202048	Theory of Machines – I															
202048.1	**• Identify mechanisms in real life applications.**	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
202048.2	• Perform kinematic analysis of simple mechanisms.	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
202048.3	• Perform static and dynamic force analysis of slider crank mechanism.	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
202048.4	**• Determine moment of inertia of rigid bodies experimentally.**	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
202048.5	**• Analyze velocity and acceleration of mechanisms by vector and graphical methods.**	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
202049	Engineering Metallurgy															
202049.1	• describe how metals and alloys formed and how the properties change due to microstructure	1	3	3	2	2	2	2	1	1	1	1	1	1	1	1
202049.2	• apply core concepts in Engineering Metallurgy to solve engineering problems.	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
202049.3	• conduct experiments, as well as to analyze and interpret data	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
202049.4	• select materials for design and construction.	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
202049.5	• possess the skills and techniques necessary for modern materials engineering practice	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1
202049.6	• recognize how metals can be strengthened by alloying, cold-working, and heat treatment	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
202050	Applied Thermodynamics															
202050.1	**• Classify various types of Engines, Compare Air standard, Fuel Air and Actual cycles and make out various losses**	1	3	3	2	2	2	2	1	1	1	1	1	1	1	1
202050.2	**• Understand Theory of Carburetion, Modern Carburetor, Stages of Combustion in S. I. Engines and Theory of De**	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
202050.3	• Understand Fuel Supply system, Types of Injectors and Injection Pumps, Stages of Combustion in CI Engines, Theory o	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
202050.4	• Carry out Testing of I. C. Engines and analyze its performance.	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
202050.5	• Describe construction and working of various I. C. Engine systems (Cooling, Lubrication, Ignition, Governing, and Start	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1
202050.6	• Describe construction, working of various types of reciprocating and rotary compressors with performance calculations	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
203152	Electrical and Electronics Engineering															
203152.1	Develop the capability to identify and select suitable DC motor and its speed control method for given industrial applicati	3	3	2	2	2	1	1	1	1	1	1	1	1	1	1
203152.2	Develop the capability to identify and select suitable induction motor and its speed control method for given industrial ap	3	3	2	2	2	1	1	1	1	1	1	1	1	1	1
203152.3	Develop the capability to identify and select suitable special purpose motor and its speed control method for given indust	3	3	2	2	2	1	2	1	1	1	1	1	1	1	1
203152.4	Program Arduino IDE using conditional statements	1	1	1	2	2	2	2	1	1	1	1	1	1	1	1
203152.5	Interfacing sensors with Arduino IDE	1	1	1	2	3	2	2	1	1	1	1	1	1	1	1
203152.6	Data acquisition system for mechanical applications	1	1	1	2	3	2	2	1	1	1	1	1	1	1	1

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Course Code	Name of Course (2015)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PS03
302041	Design of Machine Elements-I															
302041.1	Ability to identify and understand failure modes for mechanical elements and design of machine elements based on streng	1	3	1	2	1	2	1	1	1	1	1	1	1	1	1
302041.2	Ability to design Shafts, Keys and Coupling for industrial applications.	3	3	3	1	2	1	2	1	1	1	1	1	1	1	1
302041.3	Ability to design machine elements subjected to fluctuating loads.	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
302041.4	Ability to design Power Screws for various applications.	3	2	3	1	1	1	2	1	1	1	1	1	1	1	1
302041.5	Ability to design fasteners and welded joints subjected to different loading conditions.	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
302041.6	Ability to design various Springs for strength and stiffness.	3	2	3	1	1	1	1	1	1	1	1	1	1	1	1
302042	**Heat and Mass Transfer**															
302042.1	IDENTIFY the laws for different modes of heat transfer.	2	3	1	2	2	2	2	1	1	1	1	1	1	1	1
302042.2	UNDERSTAND the properties and economics of thermal insulation and ANALYZE heat transfer through fins and therm	2	2	3	2	1	1	1	1	1	1	1	1	1	1	1
302042.3	ANALYZE the natural and forced convective mode of heat transfer in various geometric configurations.	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
302042.4	UNDERSTAND AND REALIZE various laws with their interrelations and analyzeRadiation heat transfer in black and gr	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
302042.5	UNDERSTAND the fundamentals and laws of mass transfer and its applications.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
202042.6	ANALYZE various performance parameters for existing heat exchanger and DEVELOPmethodologies for designing a he	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1
302043	Theory of Machines-II$															
302043.1	DESIGN AND ANALYZE the cotter and knuckle Joints, levers and components subjected to eccentric loading.	1	3	1	2	2	2	2	1	1	1	1	1	1	1	1
302043.2	DESIGN shafts, keys and couplings under static loading conditions.	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
302043.3	ANALYZE different stresses in power screws and APPLY those in the procedure to design screw jack.	2	3	3	2	1	1	1	1	1	1	1	1	1	1	1
302043.4	EVALUATE dimensions of machine components under fluctuating loads.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
302043.5	EVALUATE & INTERPRET the stress developed on the different type of welded and threaded joints.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
302043.6	APPLY the design and development procedure for different types of springs.	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1
302044	Turbo Machines															
302044.1	Apply Momentum Principle And Velocity Triangle On a Pelton Turbines For Its Analysis.	2	1		1											
302044.2	Apply Momentum Principle And Velocity Triangle On a Reaction Turbine For Its Analysis.	2	2		1											
302044.3	Apply Momentum Principle And Velocity Triangle On Steam Turbines For Its Analysis.	3	2	2	1											
302044.4	Apply Momentum Principle And Velocity Triangle Concept Of Centrifugal Pump For Its Analysis.	3	2	2	1											
302044.5	Apply Thermodynamic Concept Using T S Diagram And Used Of Velocity Triangle On Centrifugal Compressor For Its A	3	2	2	1											
302044.6	Apply Thermodynamic Concept Using T S Diagram And Used Of Velocity Triangle On axial compress For Its Analysis.	2	2	2	1											
302045	Metrology and Quality Control															
302045.1	**1. Understand the methods of measurement, selection of measuring instruments / standards of measurement, carry**	3	3	2	1	2	1	1	1	1	1	1	1	1	1	1
302045.2	**2. Explain tolerance, limits of size, fits, geometric and position tolerances and gauge design**	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
302045.3	3. Understand and use/apply Quality Control Techniques/ Statistical Tools appropriately.	3	3	3	2	2	3	3	1	1	1	1	1	1	1	1
302045.4	4. Develop an ability of problem solving and decision making by identifying and analyzing the cause for variation and rec	3	2	3	1	2	1	2	1	1	1	1	1	1	1	1
302047	Numerical Methods and Optimization*															
302047.1	1. Use appropriate Numerical Methods to solve complex mechanical engineering problems.	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
302047.2	2. Formulate algorithms and programming.	2	3	3	2	1	1	1	1	1	1	1	1	1	1	1
302047.3	3. Use Mathematical Solver.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
302047.4	4. Generate Solutions for real life problem using optimization techniques.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
302047.5	5. Analyze the research problem	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1

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302048	Design of Machine Elements-II															
302048.1	CO 1: To understand and apply principles of gear design to spur gears and industrial spur gear boxes.	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
302048.2	CO 2 : To become proficient in Design of Helical and Bevel Gear	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
302048.3	CO 3: To develop capability to analyse Rolling contact bearing and its selection from manufacturer's Catalogue.	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1
302048.4	CO 4: To learn a skill to design worm gear box for various industrial applications.	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
302048.5	CO 5: To inculcate an ability to design belt drives and selection of belt, rope and chain drives.	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
302048.6	CO 6: To achieve an expertise in design of Sliding contact bearing in industrial applications.	3	2	3	1	1	1	1	1	1	1	1	1	1	1	1
302049	Refrigeration and Air Conditioning															
302049.1	**Illustrate the fundamental principles and applications of refrigeration and air conditioning system**	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
302049.2	**Obtain cooling capacity and coefficient of performance by conducting test on vapour compression refrigeration sys**	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1
302049.3	**Present the properties, applications and environmental issues of different refrigerants**	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
302049.4	**Calculate cooling load for air conditioning systems used for various**	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
302049.5	**Operate and analyze the refrigeration and air conditioning systems**	3	2	3	1	1	1	1	1	1	1	1	1	1	1	1
302050	**Mechatronics**															
302050.1	UNDERSTAND the basic concepts of Computer Aided Engineering (CAE) and CHARACTERISTICS of various elements required fo	1	2	1	2	2	2	2	1	1	1	1	1	1	1	
302050.2	NURTURE students about the discretization process and criteria for quality mesh.	3	3	2	1	1	1	1	1	1	1	1	1	1	1	
302050.3	UNDERSTAND the approaches of Finite Element Method (FEM) and to find displacement and stresses over the body.	2	3	3	2	1	1	1	1	1	1	1	1	1	1	
302050.4	DEVELOP the knowledge and skills needed to effectively evaluate the results using Finite Element Analysis (FEA).	2	2	2	1	1	1	2	1	1	1	1	1	1	1	
302050.5	APPLY computational technique to solve complex solid mechanics problems and its loading states.	2	3	1	1	1	1	2	1	1	1	1	1	1	1	
302050.6	STUDY the applications of CAE in the various domains of the Mechanical Engineering.	3	2	3	1	1	1	1	1	1	1	1	1	1	1	
302051	**Manufacturing -Process-IIS**															
302051.1	1. APPLY fundamentals for the design and/or selection of elements in transmission systems.	1	3	1	2	2	2	2	1	1	1	1	1	1	1	1
302051.2	2. UNDERSTAND the philosophy that real engineering design problems are open-ended and challenging.	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
302051.3	3. DEMONSTRATE design skills for the problems in real life industrial applications.	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1
302051.4	4. DEVELOP an attitude of team work, critical thinking, communication, planning and scheduling through design project	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
302051.5	5. PERCEIVE about safety, ethical, legal, and other societal constraints in execution of their design projects.	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
302051.6	6. BUILD a holistic design approach to find out pragmatic solutions to realistic domestic and industrial problems	3	2	3	1	1	1	1	1	1	1	1	1	1	1	1
Course Code	**Name of Course (2015 Pattern)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
402041	Hydraulics and Pneumatics															
402041.1	☐ **Understand working principle of components used in hydraulic & pneumatic systems**	2	2	3	1	1	1	1	1	1	1	1	1	1	1	1
402041.2	☐ **Identify various applications of hydraulic & pneumatic systems**	2	2	3	2	1	1	1	1	1	1	1	1	1	1	1
402041.3	☐ **Selection of appropriate components required for hydraulic and pneumatic systems**	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
402041.4	☐ **Analyse hydraulic and pneumatic systems for industrial/mobile applications**	2	2	3	2	2	2	2	1	1	1	1	1	1	1	1
402041.5	☐ **Design a system according to the requirements**	3	2	3	2	2	2	2	1	1	1	1	1	1	1	1
402041.6	☐ **Develop and apply knowledge to various applications**	1	2	1	2	2	2	2	1	1	1	1	1	1	1	1
402042	CAD CAM Automation															
402042.1	☐ **Apply homogeneous transformation matrix for geometrical transformations of 2D CAD entities for basic geomet**	1	2	1	2	2	2	2	1	1	1	1	1	1	1	1
402042.2	☐ **Use analytical and synthetic curves and surfaces in part modeling.**	2	2	3	1	1	1	1	1	1	1	1	1	1	1	1
402042.3	☐ **Do real times analysis of simple mechanical elements like beams, trusses, etc. and comment on safety of engineeri**	2	2	3	2	1	1	1	1	1	1	1	1	1	1	1
402042.4	☐ **Generate CNC program for Turning / Milling and generate tool path using CAM software.**	2	2	3	1	1	1	1	1	1	1	1	1	1	1	1
402042.5	☐ **Demonstrate understanding of various rapid manufacturing techniques and develop competency in designing an**	2	2	3	2	1	1	1	1	1	1	1	1	1	1	1
402042.6	☐ **Understand the robot systems and their applications in manufacturing industries.**	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1

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402043	**Dynamics of Machinery**															
402043.1	To conversant with balancing problems of machines.	1	2	1	2	2	2	2	1	1	1	1	1	1	1	1
402043.2	To understand mechanisms for system control – Gyroscope.	2	2	3	1	1	1	1	1	1	1	1	1	1	1	1
402043.3	To understand fundamentals of free and forced vibrations.	2	2	3	2	1	1	1	1	1	1	1	1	1	1	1
402043.4	To develop competency in understanding of vibration in Industry.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
402043.5	To develop analytical competency in solving vibration problems.	2	2	3	2	2	2	2	1	1	1	1	1	1	1	1
402043.6	To understand the various techniques of measurement and control of vibration and noise.	3	2	3	2	2	2	2	1	1	1	1	1	1	1	1
402044A	Elective – I (Finite Element Analysis)															
402044A.1	□ Understand the different techniques used to solve mechanical engineering problems.	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
402044A.2	□ Derive and use 1-D and 2-D element stiffness matrices and load vectors from various methods to solve for displacemer	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1
402044A.3	□ Apply mechanics of materials and machine design topics to provide preliminary results used for testing the reasonable	2	2	2	1	1	1	2	1	1	1	1	1	1	1	1
402044A.4	□ Explain the inner workings of a finite element code for linear stress, displacement, temperature and modal analysis.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
402044A.5	□ Use commercial finite element analysis software to solve complex problems in solid mechanics and heat transfer.	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1
402044A.6	□ Interpret the results of finite element analyses and make an assessment of the results in terms of modeling (physics assu	2	3	1	2	2	2	2	1	1	1	1	1	1	1	1
402045	Elective – II															
402045A.1	Understand Product design and Product development processes	2	3	1	2	2	2	2	1	1	1	1	1	1	1	1
402045A.2	Understand Processes, tools and techniques for Market Survey & Product Specification Finalization	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
402045A.3	Understand Processes, tools and techniques for Concept Inception, Verification and selection	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1
402045A.4	Understand Processes, tools and techniques for Concept Exploration & Development	2	2	2	1	1	1	2	1	1	1	1	1	1	1	1
402045A.5	Understand Processes, tools and techniques for Design Verification and Validation	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
402045A.6	Understand Processes, tools and techniques for Robust Design and Development	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1
402047	**Energy Engineering**															
402047.1	Describe the power generation scenario, the layout components of thermal power plant and analyze the improved Ran	1	3	1	2	2	2	2	1	1	1	1	1	1	1	1
402047.2	Analyze the steam condensers, recognize the an environmental impacts of thermal power plant and method to control	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
402047.3	Recognize the layout, component details of hydroelectric power plant and nuclear power plant	3	3	3	2	1	1	1	1	1	1	1	1	1	1	1
402047.4	Realize the details of diesel power plant, gas power plant and analyze gas turbine power cycle	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
402047.5	Emphasize the fundaments of non-conventional power plants	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
402048	Mechanical System Design															
402050C.1	To help mechanical engineers understand broadly the functioning of manufacturing systems.	1	2	1	2	2	2	2	1	1	1	1	1	1	1	1
402050C.2	To describe the role of facilities and support systems.	2	3	3	1	1	1	1	1	1	1	1	1	1	1	1
402050C.3	To enable students understand various types of simulations used in manufacturing environment.	2	2	3	2	1	1	1	1	1	1	1	1	1	1	1
402050C.4	To acquaint with the methodology of manufacturing simulation using computer software and the repercussions of changes & variabi	3	2	2	1	1	1	2	1	1	1	1	1	1	1	1
402050C.5	To showcase the areas of simulation applications in manufacturing and allied field.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1

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402049	Elective - III															
402051D.1	To develop an understanding of the nature, functioning and design of organization as social collectivities.	3	2	1	2	2	2	2	1	1	1	1	1	1	1	1
402051D.2	To orient the students to the application of principles of psychology in an industrial and organizational workplace	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
402051D.3	To demonstrate the understanding of job requirement and related fatigue, boredom and ways to handle it.	3	2	3	2	1	1	1	1	1	1	1	1	1	1	1
402051D.4	To develop the insights into performance management and understanding related improvement strategies.	2	2	3	2	1	1	2	1	1	1	1	1	1	1	1
402051D.5	To have an understanding of human behavior in groups and develop knowledge and skills in leadership, power, communi	3	3	2	2	1	1	2	1	1	1	1	1	1	1	1
402051D.6	To develop the acumen to understand the organizational culture, change management and organizational development.	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1
402050	Elective - IV - Product Design and Development															
402050C.1	To understand essential factors for product design	3	3	2	1	2	2	2	1	1	1	1	1	1	1	1
402050C.2	To design product as per customer needs and satisfaction	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
402050C.3	To understand Processes and concepts during product development	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1
402050C.4	To understand methods and processes of Forward and Reverse engineering	2	2	3	3	1	1	2	1	1	1	1	1	1	1	1
402050C.5	To carry various design processes as DFA, DFMEA, design for safety	3	2	3	2	1	1	2	1	1	1	1	1	1	1	1
402050C.6	To understand the product life cycle and product data management	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1

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(Approved by AICTE and Govt. of Maharashtra, Affiliated to Savitribai Phule Pune University
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Ph: 020-27390500 Website: www.gsmozecoe.org Email: gsmoze@yahoo.co.in
Founder President: Shri Rambhau Moze

Criteria 2.6.2 CO-PO Mapping E&TC 2019 Pattern

Sr. No.	Course Code	Course Name
		Semester - III
1	207005	Engineering Mathematics III
2	204181	Electronic Circuits
3	204182	Digital Circuits
4	204183	Electrical Circuits
5	204184	Data structures
		Semester - IV
6	204191	Signals & Systems
7	204192	Control Systems
8	204193	Principles of Communication Systems
9	204194	Object Oriented Programming
		Semester - V
10	304181	Digital Communication
11	304182	Electromagnetic Field Theory
12	304183	Database Management
13	304184	Microcontrollers
14	304185	Elective - I (Computer Networks)
		Semester - VI
15	304192	Cellular Networks
16	304193	Project Management
17	304194	Power Devices & Circuits
18	304195	Elective-II (Network Security)
		Semester - VII
19	404181	Radiation & Microwave Theory
20	404182	VLSI Design and Technology
21	404183	Cloud Computing
22	404184	Elective - 3 (Modernized IoT)
23	404185	Elective - 4 (Electronic Product Development)
		Semester - VIII
24	404190	Fiber Optic Communication
25	404191	Elective - 5 (Mobile Computing)
26	404192	Elective - 6 (Digital Marketing)

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Founder President: Shri Rambhau Moze

Criteria 2.6.2 CO-PO Mapping E&TC 2015 Pattern

Sr. No.	Course Code	Course Name
Semester - III		
1	204181	Signals and Systems
2	204182	Electronic Devices and Circuits
3	204183	Electrical Circuits and Machines
4	204184	Data Structures and Algorithms
5	204184	Digital Electronics
Semester - IV		
6	207005	Engineering Mathematics -III
7	204187	Integrated Circuits
8	204188	Control Systems
9	204189	Analog Communications
10	204190	Object Oriented Programming
Semester - V		
11	304181	Digital Communication
12	304182	Digital Signal Processing
13	304183	Electromagnetics
14	304184	Microcontroller
15	304185	Mechatronics
Semester - VI		
16	304186	Power Electronics
17	304187	Information Theory Coding Techniques and Communication Network
18	304188	Business Management
19	304189	Advanced Processors
20	304190	System Programming and Operating System
Semester - VII		
21	404181	VLSI Design& Technology
22	404182	Computer Networks & Security
23	404183	Radiation & Microwave Techniques
24	404184	Elective I (Digital Image and Video Processing)
25	404185	Elective II (Electronics Product Design)
Semester - VIII		
26	404189	Mobile Communication
27	404190	Broadband Communication Systems
28	404191	Elective III (Audio Video Engineering)
29	404192	Elective IV (Wireless Sensor Networks)

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2.6.2. CO-PO Mapping Matrix (BE E&TC) AY 18-19 to 22-23

Course Code	Name of Course BE (2015 Pattern) AY 18-19	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
404181	VLSI Design& Technology	3	3	3	2	3						3				
404181.1	Write effective HDL coding for digital design	3	3	3	3		2					3		1		
404181.2	Apply knowledge of real time issues in digital design	3	3	3	2	3									2	
404181.3	Model digital circuit with HDL, simulate, synthesis and prototype in PLDs	3	3	3	3	3						2		1		2
404181.4	Design CMOS circuits for specified applications.	3	3	3	3	2									1	1
404181.5	Analyze various issues and constraints in design of an ASIC	3	3	3	2											
404181.6	Apply knowledge of testability in design and build self test circuit															
404182	Computer Networks & Security															
404182.1	Understand fundamental underlying principles of computer networking	3	3	3	3	3							3		2	
404182.2	Describe and analyze the hardware, software, components of a network and their interrelations.	3	2	2	2		1		2	2			2			
404182.3	Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies	3	3	3			3	3	3				3		2	1
404182.4	Have a basic knowledge of installing and configuring networking applications.	3	3	3		2	3	3	3				3			
404182.5	Specify and identify deficiencies in existing protocols, and then go onto select new and better protocols	3	3	3	3	3	3	3	3	2					1	
404182.6	Have a basic knowledge of the use of cryptography and network security.	2	2	2	2		2						2			3
404183	Radiation & Microwave Techniques															
404183.1	Differentiate various performance parameters of radiating elements.	3	3	3	3	3							3			
404183.2	Analyze various radiating elements and arrays.	2	2	2	2				2				2	2		1
404183.3	Apply the knowledge of waveguide fundamentals in design of transmission lines.	3	3	3			3	3	3				3		2	
404183.4	Design and set up a system consisting of various passive microwave components.	3	3	3			3	3	3				3			1
404183.5	Analyze tube based and solid state active devices along with their applications.	3	3	3	3	3	3	3	3						3	
404183.6	Measure various performance parameters of microwave components.	2	2	2	2		2						2			

404184	**Elective I (Digital Image and Video Processing)**																
404184.1	Develop and implement basic mathematical operations on digital images.	3	2	2	1	2	2			1		2	2		3		
404184.2	Analyze and solve image enhancement and image restoration problems.	2	3	1	2	1	2			2		1	1	1			
404184.3	Identify and design image processing techniques for object segmentation and recognition	2	3	1	2	2				2		2				3	
404184.4	Represent objects and region of the image with appropriate method.	2	1	1		1	3			3		2	1		1		
404184.5	Apply 2-D data compression techniques for digital images	3	2	2	1	2	2			1		2	2		3		
404184.6	Explore video signal representation and different algorithm for video processing.	2	3	1	2	1	2			2		1	1	1			
404185	**Elective II (Electronics Product Design)**																
404185.1	Understand various stages of hardware, software and PCBdesign.	3		2	1	1	1	1	1	1	1	1	1	1	1	1	
404185.2	Importance of product test &testspecifications	3		3	1	1	1	1	1	1	1	1	1	1	1	1	
404185.3	Special design considerations and importance ofdocumentation.	3		3	1	1	1	1	1	1	1	1	1	1	1	1	
404185.4	Learn the different consideration of analog, didgital and mixed circuit design.	3		1	1	1	1	1	1	1	1	1	1	1	1	1	
404185.5	Understand the processess and importance of documentations	3		2	1	1	1	1	1	1	1	1	1	1	1	1	
404185.6	Learn PCB design and learn different tools in PCB design.	3		1	1	1	1	1	1	1	1	1	1	1	1	1	
404189	**Mobile Communication**																
404189.1	Explain and apply the concepts telecommunication switching, traffic and networks	3	2	2	2	1	1		1			1	2	2		1	
404189.2	Analyze the telecommunication traffic.	2	2	3	1		1					2		1		2	
404189.3	Analyze radio channel and cellular capacity.	3	2	1	1	2	3		2			1	3			2	
404189.4	Comparative study of different generation of Mobile system like 1G,2G,3G	2	2	2	1		1					2		1		2	
404189.5	Explain and apply concepts of GSM .	3	2		1	2	3		2			1	3			2	
404189.6	Explain and apply concepts of CDMA system.	3	2	2	2	1	1		1			1	2	2		1	
404190	**Broadband Communication Systems**																

404190.1	Understand the basic elements of optical fiber transmission link, fiber modes configurations, different kind of losses, optical sources and detectors	3	2	2	2	1	1		1			1	2	2		1
404190.2	Carry out Link power budget and Rise Time Budget	2	3	1	2	1	2			2		1	1	1		
404190.3	Learn the fiber optical network components and optical amplifiers.	2	3	1	2	2				2		2				3
404190.4	Understand the basic principle & terminologies of Satellite communication systems	2	1	1		1	3			3		2	1		1	
404190.5	Explain the principles, concepts and operation of satellite communication systems	1	2	2	2	1	1		1			1	2	2		1
404190.6	Analyze the design requirements and the performance of satellite communication systems	2	2	3	1		1					2		1		2
404191	**Elective III (Audio Video Engineering)**															
404191.1	To study the analysis and synthesis of TV Pictures, Composite Video Signal, Receiver, Picture Tubes and Television Camera Tubes.	3	2	2	1	2	2			1		2	2		3	
404191.2	To study the various Colour Television systems .	2	3	1	2	1	2			2		1	1	1		
404191.3	Greater emphasis on television standards.	2	3	1	2	2				2		2				3
404191.4	To study the advanced topics in Digital Television and High Definition Television.	2	1	1		1	3			3		2	1		1	
404191.5	To study audio recording systems such CD/DVD recording, Audio Standards,	2	3	1	2	1	2			2		1	1	1		
404191.6	To Study Acoustics principles. Application	2	3	1	2	2				2		2				3
404192	**Elective IV (Wireless Sensor Networks)**															
404192.1	Explain various concepts and terminologies used in WSN	3	2	2	2	1	1		1			1	2	2		1
404192.2	Describe importance and use of radio communication and link management in WSN	2	2	3	1		1					2		1		2
404192.3	Explain various wireless standards and protocols associated with WSN	3	2	1	1	2	3		2			1	3			2
404192.4	Recognize importance of localization and routing techniques used in WSN	1	2	2	2	1	1		1			1	2	2		1
404192.5	Understand techniques of data aggregation and importance of security in WSN	2	2	3			1					2		1		2
404192.6	Examine the issues involved in design and deployment of WSN	3	2	1	1		3		2			1	3			2
Course Code	Name of Course BE (2015 Pattern) AY 19-20	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

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404181	**VLSI Design& Technology**	3	3	3	2	3						3					
404181.1	Write effective HDL coding for digital design	3	3	3	3		2					3		1			
404181.2	Apply knowledge of real time issues in digital design	3	3	3	2	3									2		
404181.3	Model digital circuit with HDL, simulate, synthesis and prototype in PLDs	3	3	3	3	3						2		1		2	
404181.4	Design CMOS circuits for specified applications.	3	3	3	3	2									1	1	
404181.5	Analyze various issues and constraints in design of an ASIC	3	3	3	2												
404181.6	Apply knowledge of testability in design and build self test circuit																
404182	**Computer Networks & Security**																
404182.1	Understand fundamental underlying principles of computer networking	3	3	3	3	3							3		2		
404182.2	Describe and analyze the hardware, software, components of a network and their interrelations.	3	2	2	2		1		2	2			2				
404182.3	Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies	3	3	3			3	3	3				3		2	1	
404182.4	Have a basic knowledge of installing and configuring networking applications.	3	3	3		2	3	3	3				3				
404182.5	Specify and identify deficiencies in existing protocols, and then go onto select new and better protocols	3	3	3	3	3	3	3	3	2					1		
404182.6	Have a basic knowledge of the use of cryptography and network security.	2	2	2	2		2						2			3	
404183	**Radiation & Microwave Techniques**																
404183.1	Differentiate various performance parameters of radiating elements.	3	3	3	3	3							3				
404183.2	Analyze various radiating elements and arrays.	2	2	2	2				2	2			2	2		1	
404183.3	Apply the knowledge of waveguide fundamentals in design of transmission lines.	3	3	3			3	3	3				3		2		
404183.4	Design and set up a system consisting of various passive microwave components.	3	3	3			3	3	3				3			1	
404183.5	Analyze tube based and solid state active devices along with their applications.	3	3	3	3	3	3	3	3						3		
404183.6	Measure various performance parameters of microwave components.	2	2	2	2								2				
404184	**Elective I (Digital Image and Video Processing)**																
404184.1	Develop and implement basic mathematical operations on digital images.	3	2	2	1	2	2			1		2	2		3		

404184.2	Analyze and solve image enhancement and image restoration problems.	2	3	1	2	1	2			2		1	1	1		
404184.3	Identify and design image processing techniques for object segmentation and recognition	2	3	1	2	2				2		2				3
404184.4	Represent objects and region of the image with appropriate method.	2	1	1		1	3			3		2	1		1	
404184.5	Apply 2-D data compression techniques for digital images	3	2	2	1	2	2			1		2	2		3	
404184.6	Explore video signal representation and different algorithm for video processing.	2	3	1	2	1	2			2		1	1	1		
404185	**Elective II (Electronics Product Design)**															
404185.1	Understand various stages of hardware, software and PCBdesign.	3		2	1	1	1	1	1	1	1	1	1	1	1	1
404185.2	Importance of product test &testspecifications	3		3	1	1	1	1	1	1	1	1	1	1	1	1
404185.3	Special design considerations and importance ofdocumentation.	3		3	1	1	1	1	1	1	1	1	1	1	1	1
404185.4	Learn the different consideration of analog, didgital and mixed circuit design.	3		1	1	1	1	1	1	1	1	1	1	1	1	1
404185.5	Understand the processess and importance of documentations	3		2	1	1	1	1	1	1	1	1	1	1	1	1
404185.6	Learn PCB design and learn different tools in PCB design.	3		1	1	1	1	1	1	1	1	1	1	1	1	1
404189	**Mobile Communication**															
404189.1	Explain and apply the concepts telecommunication switching, traffic and networks	3	2	2	2	1	1		1			1	2	2		1
404189.2	Analyze the telecommunication traffic.	2	2	3	1		1					2		1		2
404189.3	Analyze radio channel and cellular capacity.	3	2	1	1	2	3		2			1	3			2
404189.4	Comparative study of different generation of Mobile system like 1G,2G,3G	2	2	3	1		1					2		1		2
404189.5	Explain and apply concepts of GSM .	3	2	1	1	2	3		2			1	3			2
404189.6	Explain and apply concepts of CDMA system.	3	2	2	2	1	1		1			1	2	2		1
404190	**Broadband Communication Systems**															
404190.1	Understand the basic elements of optical fiber transmission link, fiber modes configurations, different kind of losses, optical sources and detectors	3	2	2	2	1	1		1			1	2	2		1
404190.2	Carry out Link power budget and Rise Time Budget	2	3	1			2			2		1	1	1		
404190.3	Learn the fiber optical network components and optical amplifiers.	2	3	1	2	2				2		2				

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404190.4	Understand the basic principle & terminologies of Satellite communication systems	2	1	1		1	3			3		2	1		1				
404190.5	Explain the principles, concepts and operation of satellite communication systems	1	2	2	2	1	1		1			1	2	2		1			
404190.6	Analyze the design requirements and the performance of satellite communication systems	2	2	3	1		1					2		1		2			
404191	Elective III (Audio Video Engineering)																		
404191.1	To study the analysis and synthesis of TV Pictures, Composite Video Signal, Receiver, Picture Tubes and Television Camera Tubes.	3	2	2	1	2	2			1		2	2		3				
404191.2	To study the various Colour Television systems .	2	3	1	2	1	2			2		1	1	1					
404191.3	Greater emphasis on television standards.	2	3	1	2	2				2		2				3			
404191.4	To study the advanced topics in Digital Television and High Definition Television.	2	1	1		1	3			3		2	1		1				
404191.5	To study audio recording systems such CD/DVD recording, Audio Standards,	2	3	1	2	1	2			2		1	1	1					
404191.6	To Study Acoustics principles. Application	2	3	1	2	2				2		2				3			
404192	Elective IV (Wireless Sensor Networks)																		
404192.1	Explain various concepts and terminologies used in WSN	3	2	2	2	1	1		1			1	2	2		1			
404192.2	Describe importance and use of radio communication and link management in WSN	2	2	3	1		1					2		1		2			
404192.3	Explain various wireless standards and protocols associated with WSN	3	2	1	1	2	3		2			1	3			2			
404192.4	Recognize importance of localization and routing techniques used in WSN	1	2	2	2	1	1		1			1	2	2		1			
404192.5	Understand techniques of data aggregation and importance of security in WSN	2	2	3	1		1					2		1		2			
404192.6	Examine the issues involved in design and deployment of WSN	3	2	1	1	2	3		2			1	3			2			
Course Code	Name of Course BE (2015 Pattern) AY 20-21	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3			
404181	VLSI Design& Technology																		
404181.1	Write effective HDL coding for digital design	3	3	3	3		2					3		1					
404181.2	Apply knowledge of real time issues in digital design	3	2	3															

404181.3	Model digital circuit with HDL, simulate, synthesis and prototype in PLDs	3	3	3	3	3						2		1		2
404181.4	Design CMOS circuits for specified applications.	3	3	3	3	2									1	1
404181.5	Analyze various issues and constraints in design of an ASIC	3	3	3	2											
404181.6	Apply knowledge of testability in design and build self test circuit	2	3	3	2	3						3		2		1
404182	**Computer Networks & Security**															
404182.1	Understand fundamental underlying principles of computer networking	3	3	3	3	3							3		2	
404182.2	Describe and analyze the hardware, software, components of a network and their interrelations.	3	2	2	2		1		2	2			2			
404182.3	Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies	3	3	3			3	3	3				3		2	1
404182.4	Have a basic knowledge of installing and configuring networking applications.	3	3	3		2	3	3	3				3			
404182.5	Specify and identify deficiencies in existing protocols, and then go onto select new and better protocols	3	3	3	3	3	3	3	3	2					1	
404182.6	Have a basic knowledge of the use of cryptography and network security.	2	2	2	2		2						2			3
404183	**Radiation & Microwave Techniques**															
404183.1	Differentiate various performance parameters of radiating elements.	3	3	3	3	3							3			
404183.2	Analyze various radiating elements and arrays.	2	2	2	2				2	2			2	2		1
404183.3	Apply the knowledge of waveguide fundamentals in design of transmission lines.	3	3	3			3	3	3				3		2	
404183.4	Design and set up a system consisting of various passive microwave components.	3	3	3			3	3	3				3			1
404183.5	Analyze tube based and solid state active devices along with their applications.	3	3	3	3	3	3	3	3						3	
404183.6	Measure various performance parameters of microwave components.	2	2	2	2		2						2			
404184	**Elective I (Digital Image and Video Processing)**															
404184.1	Develop and implement basic mathematical operations on digital images.	3				2	2			1		2	2		3	
404184.2	Analyze and solve image enhancement and image restoration problems.	2	3		2	1	2			2		1	1	1		
404184.3	Identify and design image processing techniques for object segmentation and recognition	2	3	1	2	2				2		2	3			
404184.4	Represent objects and region of the image with appropriate method.	2	1	1		1	3			3		2	1			

404184.5	Apply 2-D data compression techniques for digital images	3	2	2	1	2	2			1		2	2		3			
404184.6	Explore video signal representation and different algorithm for video processing.	2	3	1	2	1	2			2		1	1	1				
404185	**Elective II (Electronics Product Design)**																	
404185.1	Understand various stages of hardware, software and PCBdesign.	3		2	1	1	1	1	1	1	1	1	1	1	1	1	1	1
404185.2	Importance of product test &testspecifications	3		3	1	1	1	1	1	1	1	1	1	1	1	1	1	1
404185.3	Special design considerations and importance ofdocumentation.	3		3	1	1	1	1	1	1	1	1	1	1	1	1	1	1
404185.4	Learn the different consideration of analog, didgital and mixed circuit design.	3		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
404185.5	Understand the processess and importance of documentations	3		2	1	1	1	1	1	1	1	1	1	1	1	1	1	1
404185.6	Learn PCB design and learn different tools in PCB design.	3		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
404189	**Mobile Communication**																	
404189.1	Explain and apply the concepts telecommunication switching, traffic and networks	3	2	2	2	1	1		1			1	2	2		1		
404189.2	Analyze the telecommunication traffic.	2	2	3	1		1					2		1		2		
404189.3	Analyze radio channel and cellular capacity.	3	2	1	1	2	3		2			1	3			2		
404189.4	Comparative study of different generation of Mobile system like 1G,2G,3G	2	2	3	1		1					2		1		2		
404189.5	Explain and apply concepts of GSM .	3	2	1	1	2	3		2			1	3			2		
404189.6	Explain and apply concepts of CDMA system.	3	2	2	2	1	1		1			1	2	2		1		
404190	**Broadband Communication Systems**																	
404190.1	Understand the basic elements of optical fiber transmission link, fiber modes configurations, different kind of losses, optical sources and detectors	3	2			1	1		1			1	2	2		1		
404190.2	Carry out Link power budget and Rise Time Budget	2		1	2		2			2		1	1	1				
404190.3	Learn the fiber optical network components and optical amplifiers.	2		1	2					2		2				3		
404190.4	Understand the basic principle & terminologies of Satellite communication systems	2	1			1	3			3		2	1		1			
404190.5	Explain the principles, concepts and operation of satellite communication systems	1	2	2	2	1	1		1			1	2					
404190.6	Analyze the design requirements and the performance of satellite communication systems	2	2	3	1		1					2		1		2		

404191	**Elective III (Audio Video Engineering)**															
404191.1	To study the analysis and synthesis of TV Pictures, Composite Video Signal, Receiver, Picture Tubes and Television Camera Tubes.	3	2	2	1	2	2			1		2	2		3	
404191.2	To study the various Colour Television systems .	2	3	1	2	1	2			2		1	1	1		
404191.3	Greater emphasis on television standards.	2	3	1	2	2				2		2				3
404191.4	To study the advanced topics in Digital Television and High Definition Television.	2	1	1		1	3			3		2	1		1	
404191.5	To study audio recording systems such CD/DVD recording, Audio Standards,	2	3	1	2	1	2			2		1	1	1		
404191.6	To Study Acoustics principles. Application	2	3	1	2	2				2		2				3
404192	**Elective IV (Wireless Sensor Networks)**															
404192.1	Explain various concepts and terminologies used in WSN	3	2	2	2	1	1		1			1	2	2		1
404192.2	Describe importance and use of radio communication and link management in WSN	2	2	3	1		1					2		1		2
404192.3	Explain various wireless standards and protocols associated with WSN	3	2	1	1	2	3		2			1	3			2
404192.4	Recognize importance of localization and routing techniques used in WSN	1	2	2	2	1	1		1			1	2	2		1
404192.5	Understand techniques of data aggregation and importance of security in WSN	2	2	3	1		1					2		1		2
404192.6	Examine the issues involved in design and deployment of WSN	3	2	1	1	2	3		2			1	3			2
Course Code	**Name of Course : BE (2015 Pattern) AY 21-22**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
404181	**VLSI Design& Technology**	3	3	3	2	3						3				
404181.1	Write effective HDL coding for digital design	3	3	3	3		2					3		1		
404181.2	Apply knowledge of real time issues in digital design	3	3	3		3									2	
404181.3	Model digital circuit with HDL, simulate, synthesis and prototype in PLDs	3	3	3	3	3						2		1		2
404181.4	Design CMOS circuits for specified applications.	3	3	3	3	2									1	1
404181.5	Analyze various issues and constraints in design of an ASIC	3	3	3	2											
404181.6	Apply knowledge of testability in design and build self test circuit															

404182	**Computer Networks & Security**																
404182.1	Understand fundamental underlying principles of computer networking	3	3	3	3	3							3		2		
404182.2	Describe and analyze the hardware, software, components of a network and their interrelations.	3	2	2	2		1		2	2			2				
404182.3	Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies	3	3	3			3	3	3				3		2	1	
404182.4	Have a basic knowledge of installing and configuring networking applications.	3	3	3		2	3	3	3				3				
404182.5	Specify and identify deficiencies in existing protocols, and then go onto select new and better protocols	3	3	3	3	3	3	3	3	2					1		
404182.6	Have a basic knowledge of the use of cryptography and network security.	2	2	2	2		2						2			3	
404183	**Radiation & Microwave Techniques**																
404183.1	Differentiate various performance parameters of radiating elements.	3	3	3	3	3							3				
404183.2	Analyze various radiating elements and arrays.	2	2	2	2				2	2			2	2		1	
404183.3	Apply the knowledge of waveguide fundamentals in design of transmission lines.	3	3	3			3	3	3				3		2		
404183.4	Design and set up a system consisting of various passive microwave components.	3	3	3			3	3	3				3			1	
404183.5	Analyze tube based and solid state active devices along with their applications.	3	3	3	3	3	3	3	3						3		
404183.6	Measure various performance parameters of microwave components.	2	2	2	2		2						2				
404184	**Elective I (Digital Image and Video Processing)**																
404184.1	Develop and implement basic mathematical operations on digital images.	3	2	2			2			1		2	2		3		
404184.2	Analyze and solve image enhancement and image restoration problems.	2	3	1	2	1	2			2		1	1	1			
404184.3	Identify and design image processing techniques for object segmentation and recognition	2	3		2	2				2		2				3	
404184.4	Represent objects and region of the image with appropriate method.	2	1	1		1	3			3		2	1		1		
404184.5	Apply 2-D data compression techniques for digital images	3	2	2	1	2	2			1		2	2		3		
404184.6	Explore video signal representation and different algorithm for video processing.	2	3	1	2	1	2			2		1	1				
404185	**Elective II (Electronics Product Design)**																

404185.1	Understand various stages of hardware, software and PCBdesign.	3		2	1	1	1	1	1	1	1	1	1	1	1	1	1		
404185.2	Importance of product test &testspecifications	3		3	1	1	1	1	1	1	1	1	1	1	1	1	1		
404185.3	Special design considerations and importance ofdocumentation.	3		3	1	1	L	1	1	1	1	1	1	1	1	1	1		
404185.4	Learn the different consideration of analog, didgital and mixed circuit design.	3		1	1	1	1	1	1	1	1	1	1	1	1	1	1		
404185.5	Understand the processess and importance of documentations	3		2	1	1	1	1	1	1	1	1	1	1	1	1	1		
404185.6	Learn PCB design and learn different tools in PCB design.	3		1	1	1	1	1	1	1	1	1	1	1	1	1	1		
404189	**Mobile Communication**																		
404189.1	Explain and apply the concepts telecommunication switching, traffic and networks	3	2	2	2	1	1		1			1	2	2		1			
404189.2	Analyze the telecommunication traffic.	2	2	3	1		1					2		1		2			
404189.3	Analyze radio channel and cellular capacity.	3	2	1	1	2	3		2			1	3			2			
404189.4	Comparative study of different generation of Mobile system like 1G,2G,3G	2	2	3	1		1					2		1		2			
404189.5	Explain and apply concepts of GSM .	3	2	1	1	2	3		2			1	3			2			
404189.6	Explain and apply concepts of CDMA system.	3	2	2	2	1	1		1			1	2	2		1			
404190	**Broadband Communication Systems**																		
404190.1	Understand the basic elements of optical fiber transmission link, fiber modes configurations, different kind of losses, optical sources and detectors	3	2	2	2	1	1		1			1	2	2		1			
404190.2	Carry out Link power budget and Rise Time Budget	2	3	1	2	1	2			2		1	1	1					
404190.3	Learn the fiber optical network components and optical amplifiers.	2	3	1	2	2				2		2				3			
404190.4	Understand the basic principle & terminologies of Satellite communication systems	2	1	1	1	3				3		2	1		1				
404190.5	Explain the principles, concepts and operation of satellite communication systems	1	2	2	2	1			1			1	2	2		1			
404190.6	Analyze the design requirements and the performance of satellite communication systems	2	2	3		1						2		1		2			
404191	**Elective III (Audio Video Engineering)**																		
404191.1	To study the analysis and synthesis of TV Pictures, Composite Video Signal, Receiver, Picture Tubes and Television Camera Tubes.	3	2	2	1	2	2			1		2	2						
404191.2	To study the various Colour Television systems .	2	3	1	2	1	2			2		1	1	1					

404191.3	Greater emphasis on television standards.	2	3	1	2	2				2		2				3
404191.4	To study the advanced topics in Digital Television and High Definition Television.	2	1	1		1	3			3		2	1		1	
404191.5	To study audio recording systems such CD/DVD recording, Audio Standards.	2	3	1	2	1	2			2		1	1	1		
404191.6	To Study Acoustics principles. Application	2	3	1	2	2				2		2				3
404192	**Elective IV (Wireless Sensor Networks)**															
404192.1	Explain various concepts and terminologies used in WSN	3	2	2	2	1	1		1			1	2	2		1
404192.2	Describe importance and use of radio communication and link management in WSN	2	2	3	1		1					2		1		2
404192.3	Explain various wireless standards and protocols associated with WSN	3	2	1	1	2	3		2			1	3			2
404192.4	Recognize importance of localization and routing techniques used in WSN	1	2	2	2	1	1		1			1	2	2		1
404192.5	Understand techniques of data aggregation and importance of security in WSN	2	2	3	1		1					2		1		2
404192.6	Examine the issues involved in design and deployment of WSN	3	2	1	1	2	3		2			1	3			2
Course Code	**Name of Course: BE (2019 Pattern) AY 22-23**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
404181	**Radiation & Microwave Theory**															
404181.1	Apply the fundamentals of electromagnetic to derive free space propagation equation and distinguish various performance parameters of antenna.	3	3	3	3	3							3	2	2	1
404181.2	Identify various modes in the waveguide. Compare: coaxial line, rectangular waveguides & striplines and identify applications of the same.	2	2	2	2				2	2			2			2
404181.3	Explore construction and working of principles passive microwave devices/components.	3	3	3			3	3	3				3		2	1
404181.4	Explore construction and working of principles active microwave devices/components	3	3	3			3	3	3				3		1	2
404181.5	Analyze the structure, characteristics, operation, equivalent circuits and applications of various microwave solid state active devices	3	3	3		3	3	3	3						1	3
404181.6	Know the various microwave systems, device set ups of microwave measurement devices and identify the effect of radiations on environmental sustainability.	2	2	2	2		2						2		2	1
404182	**VLSI Design and Technology**															
404182.1	Develop effective HDL codes for digital design.	3	3	3	2	3						3				
404182.2	Apply knowledge of real time issues in digital design.	3	3	3	3		2					3			2	

404182.3	Model digital circuit with HDL, simulate, synthesis and prototype in PLDs.	3	3	3	2	3												
404182.4	Design CMOS circuits for specified applications.	3	3	3	3	3						2					2	
404182.5	Analyze various issues and constraints in design of an ASIC.	3	3	3	3	2										1	1	
404182.6	Apply knowledge of testability in design and Build In Self Test (BIST) circuit.	3	3	3	2											1	1	
404183	**Cloud Computing**																	
404183.1	Understand the basic concepts of Cloud Computing.	3	3		3	2					1	1	2	1	0	0		
404183.2	Describe the underlying principles of different Cloud Service Models.	3	3	2	3	3					2	2	2					
404183.3	Classify the types of Virtualization.	3	3	3	3	3					3	3	3	1				
404183.4	Examine the Cloud Architecture and understand the importance of Cloud Security.	3	3	3	3	2					2	2	3					
404183.5	Develop applications on Cloud Platforms.	2	3	3	2	2					2	2	2			1		
404183.6	Evaluate distributed computing and the Internet of Things	3	3	3	3	3					3	3	3		1			
404184	**Elective - 3 (Modernized IoT)**																	
404184.1	Comprehend and analyze concepts of sensors, actuators, IoT and IoE.	3	2	3	3	3	1	1					1		1	1		
404184.2	Interpret IoT Architecture Design Aspects.	2	2	2	2	1	1	1				1	1		1	1		
404184.3	Comprehend the operation of IoT protocols.	3	3	3	3	3					3	3	3	1				
404184.4	Describe various IoT boards, interfacing, and programming for IoT	3	3	3	3	2					2	2	3					
404184.5	Illustrate the technologies, Catalysts, and precursors of IIoT using suitable use cases.	3	3	3	3	3	3	3	3						1	3		
404184.6	Provide suitable solution for domain specific applications of IoT	2	2	2	2		2						2		2	1		
404185	**Elective - 4 (Electronic Product Development)**																	
404185.1	Understand and explain design flow of design of electronics product.	3		2	1		1	1	2	3	2	2				3		
404185.2	Associate with various circuit design issues and testing.	3				3	2	2	2	1	3	2				2		
404185.3	Inferring different software designing aspects and the Importance of product test & test specifications.	3		2	1	3	2	1	1	3	1	2						
404185.4	Summarizing printed circuit boards and different parameters.	2		1	2	1	2	3	2	1	1	2		1	2	2		

404185.5	Estimating assorted product design aspects.	2		2	3	1	1	1	2	3	1	2				1	
404185.6	Exemplifying special design considerations and importance of documentation.	3		3	2	1	2	2	3	1	2	3			2	2	
404190	**Fiber Optic Communication**																
404190.1	Explain the working of components and measurement equipments in optical fiber networks.	2	1	2	1	1	1	1		1	2		2		1	1	
404190.2	Calculate the important parameters associated with optical components used in fiber optic telecommunication systems.	3	2	1	2	1	1	1		2	2		1		2	2	
404190.3	Compare and contrast the performance of major components in optical links.	3	1	2		1	1	1		1	2		2		1	1	
404190.4	Evaluate the performance viability of optical links using the power and rise time budget analysis.	2	1	2		1	1	1		1	2		2		1	1	
404190.5	Design digital optical link by proper selection of components and check its viability using simulation tools	2	1	2	1	1	1	1		1	2		2		1	1	
404190.6	Compile technical information related to state of art components, standards, simulation tools and current technological trends by accessing the online resources to update their domain knowledge.	3	1	2	1	1	1	1		1	2		2		1	1	
404191	**Elective - 5 (Mobile Computing)**																
404191.1	Understand concepts of Mobile Communication.	3	3		3	2					1	1	2	1	0	0	
404191.2	Analyse next generation Mobile Communication System.	3	3	2	3	3					2	2	2				
404191.3	Understand network layers of Mobile Communication.	3	3	3	3	3					3	3	3	1			
404191.4	Understand IP and Transport layers of Mobile Communication	3	3	3	3	2					2	2	3				
404191.5	Study of different mathematical models	2	3	3	2	2					2	2	2			1	
404191.6	Understand different mobile applications.	3	3	3	3	3					3	3	3		1		
404192	**Elective - 6 (Digital Marketing)**																
404192.1	Design websites using free tools like Wordpress and explore it for digital marketing.	2	1	2			1	1	2	3	2	2		1	0	0	
404192.2	Apply various keywords for a website & to perform SEO	1			3	3	2	2	2	1	3	2					
404192.3	Understand the various SEM Tools and implement the Digital Marketing Tools.	2				3	2	1	1	3	1	2		1	2	2	
404192.4	Illustrate the use of Facebook, Instagram and Youtube for Digital Marketing in real life.	2			2		2	3	2	1	1	2					
404192.5	Use Linked in platform for various campaigning.	2	2	2	3	1	1	1	2	3	1	2		2	1		
404192.6	Understand the importance of recent trends in digital marketing	2	2	3	2	1	2	2	3	1	2	3					

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2.6.2. CO-PO Mapping Matrix (TE E&TC) AY 18-19 to 22-23

Course Code	Name of Course TE (2015 Pattern) AY 18-19	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
304181	**Digital Communication**															
304181.1	Understand working of waveform coding techniques and analyse their performance. CO-2: Analyze the performance of a baseband and pass band digital communication system in	2	1	2	1	1						1	2		3	2
304181.2	Analyze the performance of a baseband and pass band digital communication system in terms of error rate and spectral efficiency.	1	2	2	1	2						1	2	1	2	2
304181.3	Perform the time and frequency domain analysis of the signals in a digital communication system.	2	1	2	1	1						1	2		3	2
304181.4	Study of signal space representation.	1	2	2	1	2						1	2	1	2	2
304181.5	Design of digital communication system.	2	1	2	1	1						1	2		3	2
304181.6	Understand working of spread spectrum communication system and analyze its performance	2	2	2	1	1						1	2		1	2
304182	**Digital Signal Processing**															
304182.1	Analyze the discrete time signals and concept of sampling theorem in time domain.	2	2	2	1								1	1		1
304182.2	Analyze fourier transform in discrete domain and concepts of linear and circular convolution.	2	2	1	1									2	1	
304182.3	Analyze the need of Z transform and relation between with different transforms	1	2	2	3	1	1								2	1
304182.4	Design and implement the IIR filter for filtering different real world signals.	2	2	1	1									2	1	
304182.5	Design and implement the FIR filter for filtering different real world signals.	1	2	2		1	1								2	
304182.6	Develop different signal processing applications using DSP processor.	2	2	1										2	1	2
304183	**Electromagnetics**															

304183.1	Understand the basic mathematical concepts related to electromagnetic vector fields.	3	3	2	3	3						1	3				
304183.2	Apply the principles of electrostatics to the solutions of problems relating to electric field and electric potential, boundary conditions and electric energy density.	3	2	2	2		1		2	2			2		1	2	
304183.3	Apply the principles of magnetostatics to the solutions of problems relating to magnetic field and magnetic potential, boundary conditions and magnetic energy density.	3	3	3			3	3	3		2	1	3		2		
304183.4	Understand the concepts related to Faraday's law, induced emf and Maxwell's equations.	3	3	2		2	3						3				
304183.5	Apply Maxwell's equations to solutions of problems relating to transmission lines	3	2	2	2		1						2		1	2	
304183.6	Apply Maxwell's equations to solutions of problems relating to uniform plane wave propagation.	3	3	3	3	3	3	3	3	2		3			1	1	
304184	**Microcontroller**																
304184.1	To understand architecture and features of typical Microcontroller.	3	3	2	1	2	1					3		1		1	
304184.2	Learn importance of microcontroller in designing embedded application	3	3	3	3	3	3					3					
304184.3	To understand need of microcontrollers in real life applications	3	2	3	2	3					2		1		1	2	
304184.4	To study various hardware and software tools for developing applications.	3	2	2	2	3					2		1	2	1	1	
304184.5	Develop interfacing to real world devices.LED, LCD (4&8 bits), and Key board	3	3	2		2	3						3				
304184.6	Develop interfacing to real world devices. UART, Sensor interfacing using ADC, RTC	3	2	1		3	3							2	3	2	
304185	**Mechatronics**																
304185.1	Identification of key elements of mechatronics system and its representation in terms of block diagram	3	2	3		3					2		1				
304185.2	Understanding basic principal of Sensors and Transducer. Understanding basic principal of Sensors and Transducer.	3	2	3		3					2		1		1	2	
304185.3	Study the Hydraulic systems	3	2	2	2						2		1		1	1	
304185.4	Understand pneumatic systems	3	3	2		2	3						3				

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304185.5	Study of electrical and electromechanical actuactors	3	2	2	2		1						2		1	2
304185.6	Understand the mechatronics system in automabile	3	3	3	3	3	3					3			1	1
304186	**Power Electronics**															
304186.1	Design and implement a triggering /gate drive circuit for a power device.	3	3	3	3	3	3					3				
304186.2	Perform & analyze different AC to DC power converters.	3	2											2		
304186.3	Perform & analyze different DC to A C power converters.	3	3	3	3	3						2				1
304186.4	Perform & analyze DC-DC converters & AC Voltage Controller.	3	3	3	3	2	1					2				
304186.5	Design & implement over voltage / over current protection circuit.	3	3	3	3	3						2			1	2
304186.6	Evaluate battery backup time & design a battery charger.	3	3	3	3	2	1					2		2	2	1
304187	**Information Theory Coding Techniques and Communication Network**	2	3	2	1	2							2		2	2
304187.1	Perform information theoretic analysis of communication system. CO-2: Design a data compression scheme using suitable source coding technique.	2	1	3	2	1							1	3	2	2
304187.2	Design a data compression scheme using suitable source coding technique.	2	3	2												
304187.3	Design a channel coding scheme for a communication system.	2	1	3										2		
304187.4	Design of different coding &decoding techniques.	2	3	2												
304187.5	Understand and apply fundamental principles of data communication and networking.															
304187.6	Apply flow and error control techniques in communication networks.	2	3	3											1	2
304188	**Business Management**															

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304188.1	Get overview of Management Science aspects useful in business.	3	2	3	3	3	1	1					1		1	1	
304188.2	To understand concept of Quality Management, Financial Management and Project Management.	3	3	3	1	1	1	1				2	1		1	1	
304188.3	Get motivation for Entrepreneurship	2	2	2	2	1	1	1				1	1		1	1	
304188.4	To learn Human Resource Management, marketing management are the major tasks in Business	2	3	3	3	1	1					1		1	1		
304188.5	Get Quality Aspects for Systematically Running the Business	3	3	3	1	1	1	1				2	1		1	1	
304188.6	To Develop Project Management aspect and Entrepreneurship Skills.	3	3	3	1	1	1	0				1	1		1	1	
304189	**Advanced Processors**																
304189.1	To understand need and application of ARM Microprocessors in embedded system.	3	3	3	3	3	3					3			2	2	
304189.2	Describe the ARM microprocessor architectures and its feature.	3	2											3	2	2	
304189.3	Interface the advanced peripherals to ARM based microcontroller	3	3	3	3	3						2					
304189.4	Design embedded system with available resources	3	3	3	3	2	1					2		2			
304189.5	Use of DSP Processors and resources for signal processing applications.	3	3	3	3	3						2					
304189.6	To understand architecture and features of typical ARM7& DSP Processors.	3	3	3	3	2	1					2		2			
304190	**System Programming and Operating System**														1	2	
304190.1	Demonstrate the knowledge of Systems Programming	3	2	3	2	3					2		1				
304190.2	Formulate the Problem and develop the solution for same.	3	2	3	2	3					2		1				
304190.3	Compare and analyze the different implementation approach of system programming	3	2	2	2						2		1				
304190.4	Demonstrate the knowledge of Operating Systems	3	3	3	3	2						2					

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304190.5	Formulate the Problem and develop the solution for same.	3	2	2	2	3					2		1		2	1
304190.6	Compare and analyze the different implementation approach operating system abstractions. Interpret various OS functions used in Linux / Ubuntu	3	3	3	3	2	1					2			1	1
Course Code	**Name of Course TE (2015 Pattern) AY 19-20**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
304181	**Digital Communication**															
304181.1	Understand working of waveform coding techniques and analyse their performance. CO-2: Analyze the performance of a baseband and pass band digital communication system in	2	1	2	1	1						1	2		3	2
304181.2	Analyze the performance of a baseband and pass band digital communication system in terms of error rate and spectral efficiency.	1	2	2	1	2						1	2	1	2	2
304181.3	Perform the time and frequency domain analysis of the signals in a digital communication system.	2	1	2	1	1						1	2		3	2
304181.4	Study of signal space representation.	1	2	2	1	2						1	2	1	2	2
304181.5	Design of digital communication system.	2	1	2	1	1						1	2		3	2
304181.6	Understand working of spread spectrum communication system and analyze its performance	2	2	2	1	1						1	2		1	2
304182	**Digital Signal Processing**															
304182.1	Analyze the discrete time signals and concept of sampling theorem in time domain.	2	2	2	1								1	1		1
304182.2	Analyze fourier transform in discrete domain and concepts of linear and circular convolution.	2	2	1	1									2	1	
304182.3	Analyze the need of Z transform and relation between with different transforms	1	2	2	3	1	1								2	1
304182.4	Design and implement the IIR filter for filtering different real world signals.	2	2	1	1									2	1	
304182.5	Design and implement the FIR filter for filtering different real world signals.	1	2	2		1	1								2	
304182.6	Develop different signal processing applications using DSP processor.	2	2	1										2	1	2

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304183	**Electromagnetics**															
304183.1	Understand the basic mathematical concepts related to electromagnetic vector fields.	3	3	2	3	3						1	3			
304183.2	Apply the principles of electrostatics to the solutions of problems relating to electric field and electric potential, boundary conditions and electric energy density.	3	2	2	2		1		2	2			2		1	2
304183.3	Apply the principles of magnetostatics to the solutions of problems relating to magnetic field and magnetic potential, boundary conditions and magnetic energy density.	3	3	3			3	3	3		2	1	3		2	
304183.4	Understand the concepts related to Faraday's law, induced emf and Maxwell's equations.	3	3	2		2	3						3			
304183.5	Apply Maxwell's equations to solutions of problems relating to transmission lines	3	2	2	2		1						2		1	2
304183.6	Apply Maxwell's equations to solutions of problems relating to uniform plane wave propagation.	3	3	3	3	3	3	3	3	2		3			1	1
304184	**Microcontroller**															
304184.1	To understand architecture and features of typical Microcontroller.	3	3	2	1	2	1					3		1		1
304184.2	Learn importance of microcontroller in designing embedded application	3	3	3	3	3	3					3				
304184.3	To understand need of microcontrollers in real life applications	3	2	3	2	3					2		1		1	2
304184.4	To study various hardware and software tools for developing applications.	3	2	2	2	3					2		1	2	1	1
304184.5	Develop interfacing to real world devices.LED, LCD (4&8 bits), and Key board	3	3	2		2	3						3			
304184.6	Develop interfacing to real world devices. UART, Sensor interfacing using ADC, RTC	3	2	1		3	3							2	3	2
304185	**Mechatronics**															
304185.1	Identification of key elements of mechatronics system and its representation in terms of block diagram	3	2	3	2	3					2		1			
304185.2	Understanding basic principal of Sensors and Transducer. Understanding basic principal of Sensors and Transducer.	3	2	3	2						2		1		1	2
304185.3	Study the Hydraulic systems	3	2	2	2	3					2		1		1	1

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304185.4	Understand pneumatic systems	3	3	2		2	3						3			
304185.5	Study of electrical and electromechanical actuactors	3	2	2	2		1						2		1	2
304185.6	Understand the mechatronics system in automabile	3	3	3	3	3	3					3			1	1
304186	**Power Electronics**															
304186.1	Design and implement a triggering /gate drive circuit for a power device.	3	3	3	3	3	3					3				
304186.2	Perform & analyze different AC to DC power converters.	3	2												2	
304186.3	Perform & analyze different DC to A C power converters.	3	3	3	3	3						2				1
304186.4	Perform & analyze DC-DC converters & AC Voltage Controller.	3	3	3	3	2	1					2		1		
304186.5	Design & implement over voltage / over current protection circuit.	3	3	3	3	3						2			1	2
304186.6	Evaluate battery backup time & design a battery charger.	3	3	3	3	2	1					2		2	2	1
304187	**Information Theory Coding Techniques and Communication Network**	2	3	2	1	2							2		2	2
304187.1	Perform information theoretic analysis of communication system. CO-2: Design a data compression scheme using suitable source coding technique.	2	1	3	2	1							1	3	2	2
304187.2	Design a data compression scheme using suitable source coding technique.	2	3	2												
304187.3	Design a channel coding scheme for a communication system.	2	1	3										2		
304187.4	Design of different coding &decoding techniques.	2	3	2												
304187.5	Understand and apply fundamental principles of data communication and networking.															
304187.6	Apply flow and error control techniques in communication networks.	2	3	3											1	2

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304188	**Business Management**																
304188.1	Get overview of Management Science aspects useful in business.	3	2	3	3	3	1	1					1		1	1	
304188.2	To understand concept of Quality Management, Financial Management and Project Management.	3	3	3	1	1	1	1				2	1		1	1	
304188.3	Get motivation for Entrepreneurship	2	2	2	2	1	1	1				1	1		1	1	
304188.4	To learn Human Resource Management, marketing management are the major tasks in Business	2	3	3	3	1	1					1		1	1		
304188.5	Get Quality Aspects for Systematically Running the Business	3	3	3	1	1	1	1				2	1		1	1	
304188.6	To Develop Project Management aspect and Entrepreneurship Skills.	3	3	3	1	1	1	0				1	1		1	1	
304189	**Advanced Processors**																
304189.1	To understand need and application of ARM Microprocessors in embedded system.	3	3	3	3	3	3					3			2	2	
304189.2	Describe the ARM microprocessor architectures and its feature.	3	2											3	2	2	
304189.3	Interface the advanced peripherals to ARM based microcontroller	3	3	3	3	3						2					
304189.4	Design embedded system with available resources	3	3	3	3	2	1					2		2			
304189.5	Use of DSP Processors and resources for signal processing applications.	3	3	3	3	3						2					
304189.6	To understand architecture and features of typical ARM7& DSP Processors.	3	3	3	3	2	1					2		2			
304190	**System Programming and Operating System**														1	2	
304190.1	Demonstrate the knowledge of Systems Programming	3	2	3	2						2		1				
304190.2	Formulate the Problem and develop the solution for same.	3	2	3	2						2		1				
304190.3	Compare and analyze the different implementation approach of system programming	3	2	2	2	3					2		1				

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304190.4	Demonstrate the knowledge of Operating Systems	3	3	3	3	2	1					2				
304190.5	Formulate the Problem and develop the solution for same.	3	2	2	2	3					2		1		2	1
304190.6	Compare and analyze the different implementation approach operating system abstractions. Interpret various OS functions used in Linux / Ubuntu	3	3	3	3	2	1					2			1	1
Course Code	**Name of Course TE (2015 Pattern) AY 20-21**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
304181	**Digital Communication**															
304181.1	Understand working of waveform coding techniques and analyse their performance. CO-2: Analyze the performance of a baseband and pass band digital communication system in	2	1	2	1	1						1	2		3	2
304181.2	Analyze the performance of a baseband and pass band digital communication system in terms of error rate and spectral efficiency.	1	2	2	1	2						1	2	1	2	2
304181.3	Perform the time and frequency domain analysis of the signals in a digital communication system.	2	1	2	1	1						1	2		3	2
304181.4	Study of signal space representation.	1	2	2	1	2						1	2	1	2	2
304181.5	Design of digital communication system.	2	1	2	1	1						1	2		3	2
304181.6	Understand working of spread spectrum communication system and analyze its performance	2	2	2	1	1						1	2		1	2
304182	**Digital Signal Processing**															
304182.1	Analyze the discrete time signals and concept of sampling theorem in time domain.	2	2	2	1								1	1		1
304182.2	Analyze fourier transform in discrete domain and concepts of linear and circular convolution.	2	2	1	1									2	1	
304182.3	Analyze the need of Z transform and relation between with different transforms	1	2	2	3	1									2	1
304182.4	Design and implement the IIR filter for filtering different real world signals.	2	2	1	1									2	1	
304182.5	Design and implement the FIR filter for filtering different real world signals.	1	2	2	3	1									2	

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304182.6	Develop different signal processing applications using DSP processor.	2	2	1	1									2	1	2	
304183	**Electromagnetics**																
304183.1	Understand the basic mathematical concepts related to electromagnetic vector fields.	3	3	2	3	3						1	3				
304183.2	Apply the principles of electrostatics to the solutions of problems relating to electric field and electric potential, boundary conditions and electric energy density.	3	2	2	2		1		2	2			2		1	2	
304183.3	Apply the principles of magnetostatics to the solutions of problems relating to magnetic field and magnetic potential, boundary conditions and magnetic energy density.	3	3	3			3	3	3		2	1	3		2		
304183.4	Understand the concepts related to Faraday's law, induced emf and Maxwell's equations.	3	3	2		2	3						3				
304183.5	Apply Maxwell's equations to solutions of problems relating to transmission lines	3	2	2	2		1						2		1	2	
304183.6	Apply Maxwell's equations to solutions of problems relating to uniform plane wave propagation.	3	3	3	3	3	3	3	3	2		3			1	1	
304184	**Microcontroller**																
304184.1	To understand architecture and features of typical Microcontroller.	3	3	2	1	2	1					3		1		1	
304184.2	Learn importance of microcontroller in designing embedded application	3	3	3	3	3	3					3					
304184.3	To understand need of microcontrollers in real life applications	3	2	3	2	3					2		1		1	2	
304184.4	To study various hardware and software tools for developing applications.	3	2	2	2	3					2		1	2	1	1	
304184.5	Develop interfacing to real world devices LED, LCD (4&8 bits), and Key board	3	3	2		2	3						3				
304184.6	Develop interfacing to real world devices UART, Sensor interfacing using ADC, RTC	3	2	1		3	3							2	1	3	
304185	**Mechatronics**																
304185.1	Identification of key elements of mechatronics system and its representation in terms of block diagram	3	2	3	2	3					2		1				

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	asic principal of Sensors and Transducer. Understanding basic principal of ...s and Transducer.	3	2	3	2	3					2		1		1	2
304185.3	Study the Hydraulic systems	3	2	2	2	3					2		1		1	1
304185.4	Understand pneumatic systems	3	3	2		2	3						3			
304185.5	Study of electrical and electromechanical actuactors	3	2	2	2		1						2		1	2
304185.6	Understand the mechatronics system in automabile	3	3	3	3	3	3					3			1	1
304186	**Power Electronics**															
304186.1	Design and implement a triggering /gate drive circuit for a power device.	3	3	3	3	3	3					3				
304186.2	Perform & analyze different AC to DC power converters.	3	2													
304186.3	Perform & analyze different DC to A C power converters.	3	3	3	3	3						2				
304186.4	Perform & analyze DC-DC converters & AC Voltage Controller.	3	3	3	3	2	1					2				
304186.5	Design & implement over voltage / over current protection circuit.	3	3	3	3	3						2			1	2
304186.6	Evaluate battery backup time & design a battery charger.	3	3	3	3	2	1					2		2	2	1
304187	**Information Theory Coding Techniques and Communication Network**															
304187.1	Perform information theoretic analysis of communication system. CO-2: Design a data compression scheme using suitable source coding technique.	2	1	3	2	1							1	3	2	2
304187.2	Design a data compression scheme using suitable source coding technique.	2	3	2												
304187.3	Design a channel coding scheme for a communication system.	2	1	3										2		
304187.4	Design of different coding &decoding techniques.	2	3	2												
304187.5	Understand and apply fundamental principles of data communication and networking.	2	3	2	1	2							2		2	2

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304187.6	Apply flow and error control techniques in communication networks.	2	3	3											1	2
304188	**Business Management**															
304188.1	Get overview of Management Science aspects useful in business.	3	2	3	3	3	1	1					1		1	1
304188.2	To understand concept of Quality Management, Financial Management and Project Management.	3	3	3	1	1	1	1				2	1		1	1
304188.3	Get motivation for Entrepreneurship	2	2	2	2	1	1	1				1	1		1	1
304188.4	To learn Human Resource Management, marketing management are the major tasks in Business	2	3	3	3	1	1					1		1	1	
304188.5	Get Quality Aspects for Systematically Running the Business	3	3	3	1	1	1	1				2	1		1	1
304188.6	To Develop Project Management aspect and Entrepreneurship Skills.	3	3	3	1	1	1	0				1	1		1	1
304189	**Advanced Processors**															
304189.1	To understand need and application of ARM Microprocessors in embedded system.	3	3	3	3	3	3					3			2	2
304189.2	Describe the ARM microprocessor architectures and its feature.	3	2											3	2	2
304189.3	Interface the advanced peripherals to ARM based microcontroller	3	3	3	3	3						2				
304189.4	Design embedded system with available resources	3	3	3	3	2	1					2		2		
304189.5	Use of DSP Processors and resources for signal processing applications.	3	3	3	3	3						2				
304189.6	To understand architecture and features of typical ARM7& DSP Processors.	3	3	3	3	2	1					2		2		
304190	**System Programming and Operating System**															
304190.1	Demonstrate the knowledge of Systems Programming	3	2	3	2	3					2		1		1	2

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304190.2	Formulate the Problem and develop the solution for same.	3	2	3	2	3					2		1			
304190.3	Compare and analyze the different implementation approach of system programming	3	2	2	2	3					2		1			
304190.4	Demonstrate the knowledge of Operating Systems	3	3	3	3	2	1					2				
304190.5	Formulate the Problem and develop the solution for same.	3	2	2	2	3					2		1		2	1
304190.6	Compare and analyze the different implementation approach operating system abstractions. Interpret various OS functions used in Linux / Ubuntu	3	3	3	3	2	1					2			1	1
Course Code	**Name of Course TE (2019 Pattern) AY 21-22**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
304181	**Digital Communication**															
304181.1	Apply the statistical theory for describing various signals in a communication system.	2	1	2	1	1	2	2	1		2	1	2		3	2
304181.2	Understand and explain various digital modulation techniques used in digital communication systems and analyze their performance in presence of AWGN noise.	1	2	2	1	2	1	1	2		1	1	2	1	2	2
304181.3	Analyze performance of digital modulation techniques in presence of AWGN noise.	2	1	2	1	1	2	2	1		2	1	2		3	2
304181.4	Describe and analyze the digital communication system with spread spectrum modulation.	1	2	2	1	2	1	1	2		1	1	2	1	2	2
304181.5	Analyze a communication system using information theoretic approach.	2	2	2	1	1	2	1	1	1	2	1	2		1	2
304181.6	Use error control coding techniques to improve performance of a digital communication system	2	1	2	1	1	2	2	1		2	1	2		3	2
304182	**Electromagnetic Field Theory**															
304182.1	Apply the basic electromagnetic principles and determine the fields (E & H) due to the given source.	2	2	2	1								1	1		
304182.2	Apply boundary conditions to the boundaries between various media to interpret behavior of the fields on either sides	2	2	1	1									2	1	
304182.3	State, Identify and Apply Maxwell's equations (integral and differential forms) in both the forms (Static, time-varying or Time-harmonic field) for various sources, Calculate the time average power density using Poynting Theorem, Retarded magnetic vector potential.	1	2	2	3	1	1								2	

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304182.4	Formulate, Interpret and solve simple uniform plane wave (Helmholtz Equations) equations, and analyze the incident/reflected/transmitted waves at normal incidence	2	2	1	2									1	1	
304182.5	Interpret and Apply the transmission line equation to transmission line problems with load impedance to determine input and output voltage/current at any point on the Transmission line, Find input/load impedance, input/load admittance, reflection coefficient, SWR, Vmax/Vmin, length of transmission line using Smith Chart	2	1	2	2	1					1					2
304182.6	Carry out a detailed study, interpret the relevance and applications of Electromagnetics	1	2	1	2	1								2	1	
304183	**Database Management**															
304183.1	Ability to implement the underlying concepts of a database system	3	3	2	3	3						1	3		2	2
304183.2	Design and implement a database schema for a given problem-domain using data model.	3	2	2	2		1		2	2			2		1	2
304183.3	Formulate, using SQL/DML/DDL commands, solutions to a wide range of query and update problems	3	3	3			3	3	3		2	1	3		1	2
304183.4	Implement transactions, concurrency control, and be able to do Database recovery	3	3	2		2	3	3	3				3		2	2
304183.5	Able to understand various Parallel Database Architectures and its applications.	3	3	3	3	3	3	3	3	2		3			1	2
304183.6	Able to understand various Distributed Databases and its applications	2	2	2	2		2		2		2		2			
304184	**Microcontrollers**															
304184.1	Understand the fundamentals of microcontroller and programming	3	3	2	1	2	1					3		1		
304184.2	Interface various electronic components with microcontroller	3	3	3	3	3	3					3		2	1	
304184.3	Analyze the features of PIC 18F XXXX	3	2												2	
304184.4	Describe the programming details in peripheral support.	3	3	3	3	3						2		1	1	
304184.5	Develop interfacing models according to applications.	3	3	3	3	2	1					2				2
304184.6	Evaluate the serial communication details and interfaces.	3	3	3	2							1		2	1	

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304185	**Elective - I (Computer Networks)**																
304185.1	Design LAN using appropriate networking architecture, topologies, transmission media, and networking devices.	3	2	3	2	3					2		1	1			
304185.2	Understand the working of controlling techniques for flawless data communication using data link layer protocols.	3	2	3	2	3					2		1	2	1		
304185.3	Learn the functions of network layer, variousswitching techniques and internet protocol addressing	3	2	2	2	3					2		1		2		
304185.4	Explore various interior and exterior, unicasting and multicasting protocols.	3	2	3	2	3					2		1	1	1		
304185.5	Analyze data flow using TCP/UDP Protocols, congestion control techniques for QoS.	3	2	3	2	3					2		1			2	
304185.6	Illustrate the use of protocols at application layer.	3	1	3	2	3					2		2	2	1		
304192	**Cellular Networks**																
304192.1	Understand fundamentals of wireless communications.	3	3	3	3	3	3					3		1			
304192.2	Discuss and study OFDM and MIMO concepts.	3	2											2	1		
304192.3	Elaborate fundamentals mobile communication.	3	3	3	3	3						2			2		
304192.4	Describes aspects of wireless system planning.	3	3	3	3	2	1					2		1	1		
304192.5	Understand of modern and futuristic wireless networks architecture.	3	3	3	2							1				2	
304192.6	Summarize different issues in performance analysis	3	3	3	3	3	3					3		2	1		
304193	**Project Management**																
304193.1	Apply the fundamental knowledge of project management for effectively handling the projects.	2		2	1	2	3	2		3	3	3	2	3	2	2	
304193.2	Identify and select the appropriate project based on feasibility study and undertake its effective planning.	2		3	2	1	1	1	1	2	2	3	1	3	2	2	

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304193.3	Assimilate effectively within the organizational structure of project and handle project management related issues in an efficient manner.	2		2	1	2	3	2	3	3	3	3	2	3	1	2
304193.4	Apply the project scheduling techniques to create a Project Schedule Plan and accordingly utilize theresources to meet the project deadline.	2		3	2	1	1	1	1	2	2	3	1	2	1	2
304193.5	Identify and assess the project risks and manage finances in line with Project Financial Management Process.	2		2	2	2	2	1	1	2	2	3	2	3	2	2
304193.6	Develop new products assessing their commercial viability and develop skillsetsfor becoming successful entrepreneurs while being fully aware of the legal issuesrelated to Product development and Entrepreneurship.	2		3	3	2	2	2	2	3	3	3	3	3	1	2
304194	**Power Devices & Circuits**															
304194.1	To differentiate based on the characteristic parameters among SCR, GTO, MOSFET & IGBT and identify suitability of the power device for certain applications and understand the significance of device ratings.	3	2	3	3	3	1	1					1		1	1
304194.2	To design triggering / driver circuitsfor various power devices	2	2	2	2	1	1	1				1	1		1	1
304194.3	To evaluate and analyze various performance parameters of the different converters and its topologies.	3	3	3	1	1	1	1				2	1		1	1
304194.4	To understand significance and design of various protections circuitsfor power devices.	3	3	3	1	1	1	0				1	1		1	1
304194.5	To evaluate the performance of uninterruptible power supplies, switch mode power supplies and battery.	3	3	3	3	3	1	0					1		1	1
304194.6	To understand case studies of power electronics in applicationslike electric vehicles, solar systems etc.	2	2	2	2	1	1	0				0	1		1	1
304195	**Elective-II (Network Security)**															
204194.1	Analyze attacks on computers and computer security.	3	3	3	3	3	3					3				
204194.2	Demonstrate knowledge of cryptography techniques	3	2													
204194.3	Illustrate various Symmetric and Asymmetric keys for Ciphers	3	3	3	3	3						2				
204194.4	Evaluate different Message Authentication Algorithms and Hash Functions	3	3	3	3		1					2				
204194.5	Get acquainted with various aspects of E-Mail Security	3	3	3	2							1				
204194..6	Assimilate various aspects of Web Security	3	3	3	3	3						3				

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304181	**Digital Communication**															
304181.1	Apply the statistical theory for describing various signals in a communication system.	2	1	2	1	1	2	2	1		2	1	2		2	2
304181.2	Understand and explain various digital modulation techniques used in digital communication systems and analyze their performance in presence of AWGN noise.	1	2	2	1	2	1	1	2		1	1	2	1	2	2
304181.3	Analyze performance of digital modulation techniques in presence of AWGN noise.	2	1	2	1	1	2	2	1		2	1	2		2	2
304181.4	Describe and analyze the digital communication system with spread spectrum modulation.	1	2	2	1	2	1	1	2		1	1	2	1	2	2
304181.5	Analyze a communication system using information theoretic approach.	2	2	2	1	1	2	1	1	1	2	1	2		1	2
304181.6	Use error control coding techniques to improve performance of a digital communication system	2	1	2	1	1	2	2	1		2	1	2		2	2
304182	**Electromagnetic Field Theory**															
304182.1	Apply the basic electromagnetic principles and determine the fields (E & H) due to the given source	2	2	2	1								1	1		
304182.2	Apply boundary conditions to the boundaries between various media to interpret behavior of the fields on either sides	2	2	1	1									2	1	
304182.3	State, Identify and Apply Maxwell's equations (integral and differential forms) in both the forms (Static, time-varying or Time-harmonic field) for various sources, Calculate the time average power density using Poynting Theorem, Retarded magnetic vector potential	1	2	2	3	1	1								2	
304182.4	Formulate, Interpret and solve simple uniform plane wave (Helmholtz Equations) equations, and analyze the incident/reflected/transmitted waves at normal incidence	2	2	1	2									1	1	
304182.5	Interpret and Apply the transmission line equation to transmission line problems with load impedance to determine input and output voltage/current at any point on the Transmission line, Find input/load impedance, input/load admittance, reflection coefficient, SWR, Vmax/Vmin, length of transmission line using Smith Chart	2	1	2	2						1					2
304182.6	Carry out a detailed study, interpret the relevance and applications of Electromagnetics	1	2	1	2	1								2	1	

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304183	**Database Management**																
304183.1	Ability to implement the underlying concepts of a database system	3	3	2	3	3						1	3				
304183.2	Design and implement a database schema for a given problem-domain using data model.	3	2	2	2		1		2	2			2				
304183.3	Formulate, using SQL/DML/DDL commands, solutions to a wide range of query and update problems	3	3	3			3	3	3		2	1	3				
304183.4	Implement transactions, concurrency control, and be able to do Database recovery	3	3	2		2	3	3	3				3				
304183.5	Able to understand various Parallel Database Architectures and its applications.	3	3	3	3	3	3	3	3	2		3					
304183.6	Able to understand various Distributed Databases and its applications	2	2	2	2		2		2		2		2				
304184	**Microcontrollers**																
304184.1	Understand the fundamentals of microcontroller and programming	3	3	2	1	2	1					3					
304184.2	Interface various electronic components with microcontroller	3	3	3	3	3	3					3					
304184.3	Analyze the features of PIC 18F XXXX	3	2														
304184.4	Describe the programming details in peripheral support.	3	3	3	3	3						2					
304184.5	Develop interfacing models according to applications.	3	3	3	3	2	1					2					
304184.6	Evaluate the serial communication details and interfaces.	3	3	3	2							1					
304185	***Elective - I (Computer Networks)***																
304185.1	Design LAN using appropriate networking architecture, topologies, transmission media, and networking devices.	3	2	3	2						2		1				
304185.2	Understand the working of controlling techniques for flawless data communication using data link layer protocols.	3	2	3	2	3					2		1				

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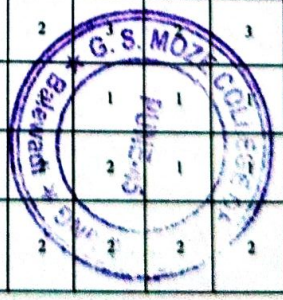
304185.3	Learn the functions of network layer, variousswitching techniques and internet protocol addressing	3	2	2	2	3					2		1				
304185.4	Explore various interior and exterior, unicasting and multicasting protocols	3	2	3	2	3					2		1				
304185.5	Analyze data flow using TCP/UDP Protocols, congestion control techniques for QoS	3	2	3	2	3					2		1				
304185.6	Illustrate the use of protocols at application layer	3	1	3	2	3					2		2				
304192	**Cellular Networks**																
304192.1	Understand fundamentals of wireless communications	3	3	3	3	3	3					3					
304192.2	Discuss and study OFDM and MIMO concepts	3	2														
304192.3	Elaborate fundamentals mobile communication	3	3	3	3	3						2					
304192.4	Describes aspects of wireless system planning	3	3	3	3	2	1					2					
304192.5	Understand of modern and futuristic wireless networks architecture	3	3	3	2							1					
304192.6	Summarize different issues in performance analysis	3	3	3	3	3	3					3					
304193	**Project Management**																
304193.1	Apply the fundamental knowledge of project management for effectively handling the projects	2		2	1	2	3	2	3	3	3	3	2	3	2	2	
304193.2	Identify and select the appropriate project based on feasibility study and undertake its effective planning	2		3	2	1	1	1	1	2	2	3	1	3	2	2	
304193.3	Assimilate effectively within the organizational structure of project and handle project management related issues in an efficient manner	2		2	1	2	3		3	3	3	3	2	3	1	2	
304193.4	Apply the project scheduling techniques to create a Project Schedule Plan and accordingly utilize theresources to meet the project deadline	2		3	2		1	1	1	2	2	3	1	2	1	2	
304193.5	Identify and assess the project risks and manage finances in line with Project Financial Management Process	2		2	2		2	1	1	2	2	3	2	3	2	2	
304193.6	Develop new products assessing their commercial viability and develop skillsetsfor becoming successful entrepreneurs while being fully aware of the legal issuesrelated to Product development and Entrepreneurship	2		3	3	2	2	2	2	3	3	3	3	3	1	2	



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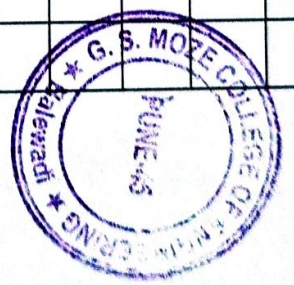
304194	**Power Devices & Circuits**																
304194.1	To differentiate based on the characteristic parameters among SCR, GTO, MOSFET & IGBT and identify suitability of the power device for certain applications and understand the significance of device ratings.	3	2	3	3	3	1	1					1		1	1	
304194.2	To design triggering / driver circuitsfor various power devices	2	2	2	2	1	1	1				1	1		1	1	
304194.3	To evaluate and analyze various performance parameters of the different converters and its topologies.	3	3	3	1	1	1	1				2	1		1	1	
304194.4	To understand significance and design of various protections circuitsfor power devices.	3	3	3	1	1	1	0				1	1		1	1	
304194.5	To evaluate the performance of uninterruptible power supplies, switch mode power supplies and battery.	3	3	3	3	3	1	0					1		1	1	
304194.6	To understand case studies of power electronics in applicationslike electric vehicles, solar systems etc.	2	2	2	2	1	1	0				0	1		1	1	
304195	**Elective-II (Network Security)**																
204194.1	Analyze attacks on computers and computer security.	3	3	3	3	3	3					3					
204194.2	Demonstrate knowledge of cryptography techniques	3	2														
204194.3	Illustrate various Symmetric and Asymmetric keys for Ciphers	3	3	3	3	3						2					
204194.4	Evaluate different Message Authentication Algorithms and Hash Functions	3	3	3	3	2	1					2					
204194.5	Get acquainted with various aspects of E-Mail Security	3	3	3	2							1					
204194..6	Assimilate various aspects of Web Security	3	3	3	3	3	3					3					



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2.6.2. CO-PO Attainment Matrix (SE E&TC) AY 18-19 to 22-23

Course Code	Name of Course SE (2015 Pattern) AY 18-19	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
204181	**Signals and Systems**															
204181	Understand mathematical description and representation of continuous and discrete time signals and systems.	3	2	2							1		1	2	2	3
204181	Develop input output relationship for linear shift invariant system and understand the Convolution operator for continuous and discrete time system.			2	2	3		1			1		2	2	2	1
204181	Use transform domain technique for analysis of linear shift invariant system.		3	2	1	3					1		2	2	1	
204181	Understand and resolve the signals in frequency domain using Fourier series and Fourier transforms.	3	3	3							1		1		2	
204182	Understand the limitations of Fourier transform and need for Laplace transform. Develop the ability to analyze the system in s- domain.	3	2			3		1			1		2	2	1	2
204182	Understand the basic concept of probability, random variables and random signals..	2	3	2	1	3					1		2	2	1	2
204182	**Electronic Devices and Circuits**															
204182	Comply and verify parameters after exciting devices by any stated method.	3	2	2	1	2	1	1		1			2			2
204182	Implement circuit and test the performance.	2	3	3	3	1	2	1					2		2	1
204182	Analyze small signal model of FET	2	3	2	2	1	2	2		1			1		1	2
204182	Explain behaviour of FET at low frequency.	2	3	3	3	1	2	1					2		1	3
204183	Analyze small signal model MOSFET.	2	1	3	1	2	2						1		2	1
204183	Design an adjustable voltage regulator circuits	2	3	3	3	1	2	1					2		1	3
204183	**Electrical Circuits and Machines**															
204183	Analyze basic AC & DC circuit for voltage, current and power by using various circuit simplification techniques & network theorems.	3	2	2	1	2	1	1		1			2			2
204183	Explain working principle & different types of transformers.	2	3	3	3	1	2	1					2		2	1
204183	Explain the working principle of DC motor & different methods of speed control of DC motor	3	3	2	1	1	1									1
204183	Explain working principle, slip & torque equation of AC motor.	3	2	1	2		1									1
204184	Select motors for given application.	2	3	3	3	1	2	1					2		2	1
204184	Explain the construction and working principle of stepper motor and single phase induction motor.	3	3	2	1	1	1									1
204184	**Data Structures and Algorithms**															
204184	Discuss the computational efficiency of the principal algorithms such as sorting & searching.	3	2	3	2	1	2									2
204184	Write and understand the programs that use arrays & pointers in C	3	2	3	3	3	1									1

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204184	Describe how arrays, records, linked structures are represented in memory and use them in algorithms.	3	3	2	1	1	1										1
204184	Implement stacks & queues for various applications.	3	2	1	2	0	1										1
204185	Understand various terminologies and traversals of trees and use them for various applications.	2	2	1	2	1	2										2
204185	Understand various terminologies and traversals of graphs and use them for various applications	3	3	2	2	3	1										1
204184	**Digital Electronics**																
204184	Use the basic logic gates and various reduction techniques of digital logic circuit in detail and design of combinational circuits	3	2	2	2		1		2	2			2		2	1	
204184	Design sequential circuits and use of application		3	3			3	3	3				3	1			
204184	Conceptualize the State Machine		3	3		2	3	3	3				3		1	1	
204184	Design Logic families and use of it		3	3	3	3	3	3	3	2					2		
204185	Design PLD and implement hardware circuit to test performance and application	3	3		2	3	3	3				3			2	2	
204185	Understand the architecture and use of microcontrollers for basic operations and Simulate using simulation software	3	3	3	3	3	3	3	2								

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207005	**Engineering Mathematics -III**															
207005	Solve higher order linear differential equation using appropriate techniques for modeling and analyzing electrical circuits.	3	3	3	3	3				1	3	3				
207005	Solve problems related to Fourier transform, Z-transform and applications to Communication systems and Signal processing.	3			3	3	1	1	1	1	3	3				
207005	Obtain Interpolating polynomials, numerically differentiate and integrate functions, numerical solutions of differential equations using single step and multi-	3			3	3						2	3	2	3	1
207005	Perform vector differentiation and integration, analyze the vector fields and apply to Electro-Magnetic fields.	3			3	3						2	3	1	2	3
207006	Analyze conformal mappings, transformations and perform contour integration of complex functions in the study of electrostatics and signal processing.	2			2	2						2	3	2	1	3
204187	**Integrated Circuits**															
204187	Understand the characteristics of IC and Op-Amp and identify the internal structure.	2	3	1	3	2	1	1	1	3	3	3	3	3	1	2
204187	Understand and identify various manufacturing techniques.	2	2	2	2	2	2	2	2			2		1	3	2
204187	Derive and determine various performances based parameters and their significance for Op-Amp. Comply and verify parameters after exciting IC by any	2							2	3	3	3	2	1		2
204187	Analyze and identify the closed loop stability considerations and I/O limitations. And linear and nonlinear applications of Op-Amp.	2	2										3		1	3
204188	Implement hardwired circuit to test performance and application for what it is being		3	1	2		2							1	1	1
204188	Understand and apply the functionalities of PLL to Frequency synthesizer, multiplier, FM, and AM demodulators	3	3			1			1		2	1	1	1	1	1
204188	**Control Systems**															
204188	Determine and use models of physical systems in forms suitable for use in the analysis and design of control systems.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
204188	Determine the (absolute) stability of a closed-loop control system.	3	2	2	1	2	1	1		1			2			2
204188	Perform time domain and frequency domain analysis of control systems required for	2	3	3	3	1	2	1					2		2	1
204188	Perform time domain and frequency domain correlation analysis.	3	3	2	1	1	1									1
204189	Apply root-locus, Frequency Plots technique to analyze control systems.	3	2	1	2	0	1									1
204189	Express and solve system equations in state variable form.	1	3	1	2	2	2	2	1	1	1	1	1	1	1	1
204189	**Analog Communications**															
204189	Understand and identify the fundamental concepts and various components of analogcommunication systems.	3	2	2	2		1		2	2			2			
204189	Analyze the fundamental concepts and various components of analogcommunication systems.	3	2	1	2	0	1									1
204189	Explain signal to noise ratio, noise figure and noise temperature for single and cascaded stages in a communication system.	3	3	3			3	3	3				3			
204189	Describe analog pulse modulation techniques and digital modulation technique.	3	3	3		2	3	3	3				3	2		2
204190	Develop the ability to compare and contrast the strengths and weaknesses of variouscommunication systems.	3	3	3	3	3	3	3	3	5						

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204190	Convert analog signals to digital format and describe Pulse and digital Modulation techniques	3	2	1	2	0	1							1		1
204190	**Object Oriented Programming**																
204190	Describe the principles of object oriented programming.	2	3		3	2	1	1		3	3	3		3	1	2	
204190	Apply the concepts of data encapsulation, inheritance in C++.		2	2	2	2					3				3	2	
204190	Understand basic program constructs in Java	2		2		3							2	1		2	
204190	Apply the concepts of classes, methods and inheritance to write programs Java		2								1		3	2	2		
204191	Use arrays, vectors and strings concepts and interfaces to write programs in Java	2	2		2	2					2	2		2			
204191	Describe and use the concepts in Java to develop user friendly program			2		1		2		1	1		3	1		1	
	Note- SE (2015 Pattern) AY 19-20																
204181	**Signals and Systems**																
204181	Understand mathematical description and representation of continuous and discrete time signals and systems.	3	2	2							1		1	2	2	3	
204181	Develop input output relationship for linear shift invariant system and understand the Convolution operator for continuous and discrete time system.			2	2	3		1			1		2	2	2	1	
204181	Use transform domain technique for analysis of linear shift invariant system.		3	2	1	3					1		2	2	1		
204181	Understand and resolve the signals in frequency domain using Fourier series and Fourier transforms.	3	3	3							1		1		2		
204182	Understand the limitations of Fourier transform and need for Laplace transform. Develop the ability to analyze the system in s- domain.	3	2			3		1			1		2	2	1	2	
204182	Understand the basic concept of probability, random variables and random signals.	2	3	2	1	3					1		2	2	1	2	

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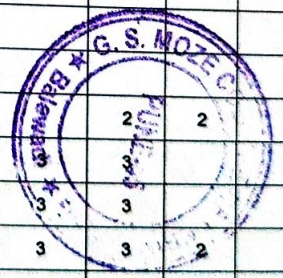
204182	**Electronic Devices and Circuits**																	
204182	Comply and verify parameters after exciting devices by any stated method.	3	2	2	1	2	1	1		1			2			2		
204182	Implement circuit and test the performance.	2	3	3	3	1	2	1					2		2	1		
204182	Analyze small signal model of FET	2	3	2	2	1	2	2		1			1		1	2		
204183	Explain behaviour of FET at low frequency.	2	3	3	3	1	2	1					2		1	3		
204183	Analyze small signal model MOSFET.	2	1	3	1	2	2						1		2	1		
	Design an adjustable voltage regulator circuits	2	3	3	3	1	2	1					2		1	3		
204183	**Electrical Circuits and Machines**																	
204183	Analyze basic AC & DC circuit for voltage, current and power by using various circuit simplification techniques & network theorems.	3	2	2	1	2	1	1		1			2			2		
204183	Explain working principle & different types of transformers.	2	3	3	3	1	2	1					2	1	2	1		
204183	Explain the working principle of DC motor & different methods of speed control of DC motor	3	3	2	1	1	1									1		
204184	Select motors for given application.	3	2	1	2		1							1		1		
204184	Explain the construction and working principle of stepper motor and single phase induction motor.	2	3	3	3	1	2	1					2		2	1		
		3	3	2	1	1	1									1		
204184	**Data Structures and Algorithms**																	
204184	Discuss the computational efficiency of the principal algorithms such as sorting & searching	3	2	3	2	1	2									2		
204184	Write and understand the programs that use arrays & pointers in C	3	2	3	3	3	1									1		
204184	Describe how arrays, records, linked structures are represented in memory and use them in algorithms.	3	3	2	1	1	1									1		
204184	Implement stacks & queues for various applications.	3	2	1	2	0	1									1		
204185	Understand various terminologies and traversals of trees and use them for various applications.	2	2	1	2	1	2									2		
204185	Understand various terminologies and traversals of graphs and use them for various applications	3	3	2	2	3	1									1		
204184	**Digital Electronics**																	
204184	Use the basic logic gates and various reduction techniques of digital logic circuit in detail and design of combinational circuits	3	2	2	2		1		2	2			2		2	1		
204184	Design sequential circuits and use of application		3	3			3	3					3	1				
204184	Conceptualize the State Machine		3	3		2	3	3	3				3		1	1		
204184	Design Logic families and use of it		3	3	3	3	3	3	3	2					2			
204185	Design PLD and implement hardware circuit to test performance and application	3	3		2	3	3	3				3			2	2		



204185	Understand the architecture and use of microcontrollers for basic operations and Simulate using simulation software	3	3	3	3	3	3	3	2								
207005	**Engineering Mathematics -III**																
207005	Solve higher order linear differential equation using appropriate techniques for modeling and analyzing electrical circuits.	3	3	3	3	3				1	3	3					
207005	Solve problems related to Fourier transform, Z-transform and applications to Communication systems and Signal processing.	3			3	3	1	1	1	1	3	3					
207005	Obtain Interpolating polynomials, numerically differentiate and integrate functions, numerical solutions of differential equations using single step and multi-	3			3	3						2	3	2	3	1	
207005	Perform vector differentiation and integration, analyze the vector fields and apply to Electro-Magnetic fields.	3			3	3						2	3	1	2	3	
207006	Analyze conformal mappings, transformations and perform contour integration of complex functions in the study of electrostatics and signal processing.	2			2	2						2	3	2	1	3	

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204187	**Integrated Circuits**															
204187	Understand the characteristics of IC and Op-Amp and identify the internal structure.	2	3	1	3	2	1	1	1	3	3	3	3	3	1	2
204187	Understand and identify various manufacturing techniques.	2	2	2	2	2	2	2	2			2		1	3	2
204187	Derive and determine various performances based parameters and their significance for Op-Amp. Comply and verify parameters after exciting IC by any	2							2	3	3	3	2	1		2
204187	Analyze and identify the closed loop stability considerations and I/O limitations. And linear and nonlinear applications of Op-Amp.	2	2										3		1	3
204188	Implement hardwired circuit to test performance and application for what it is being		3	1	2		2							1	1	1
204188	Understand and apply the functionalities of PLL to Frequency synthesizer, multiplier, FM, and AM demodulators	3	3			1			1		2	1	1	1	1	1
204188	**Control Systems**															
204188	Determine and use models of physical systems in forms suitable for use in the analysis and design of control systems.	3	3	2	1	1	1	2	1	1	1	1	1	1	1	1
204188	Determine the (absolute) stability of a closed-loop control system.	3	2	2	1	2	1	1		1			2			2
204188	Perform time domain and frequency domain analysis of control systems required for	2	3	3	3	1	2	1					2		2	1
204188	Perform time domain and frequency domain correlation analysis.	3	3	2	1	1	1									1
204189	Apply root-locus, Frequency Plots technique to analyze control systems.	3	2	1	2	0	1									1
204189	Express and solve system equations in state variable form.	1	3	1	2	2	2	2	1	1	1	1	1	1	1	1
204189	**Analog Communications**															
204189	Understand and identify the fundamental concepts and various components of analogcommunication systems.	3	2	2	2		1		2	2			2			
204189	Analyze the fundamental concepts and various components of analogcommunication systems.	3	2	1	2	0	1									1
204189	Explain signal to noise ratio, noise figure and noise temperature for single and cascaded stages in a communication system.	3	3	3			3	3	3				3			
204189	Describe analog pulse modulation techniques and digital modulation technique.	3	3	3		2	3	3	3				3	2		2
204190	Develop the ability to compare and contrast the strengths and weaknesses of variouscommunication systems.	3	3	3	3	3	3	3	3	5						
204190	Convert analog signals to digital format and describe Pulse and digital Modulation techniques	3	2	1	2	0	1							1		1
204190	**Object Oriented Programming**															
204190	Describe the principles of object oriented programming.	2	3		3	2		1			3	3		3	1	2
204190	Apply the concepts of data encapsulation, inheritance in C++.		2	2	2	2					3				3	2
204190	Understand basic program constructs in Java	2		2		3							2	1		2
204190	Apply the concepts of classes, methods and inheritance to write programs Java		2								1		3	2	2	
204191	Use arrays, vectors and strings concepts and interfaces to write programs in Java	2	2		2	2					2	2		2		

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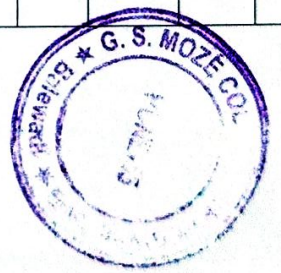
204191	Describe and use the concepts in Java to develop user friendly program			2		1		2		1	1		3	1		1
	Note- SE (2019 Pattern) AY 20-21															
ourse Co	**Name of Course**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
207005	**Engineering Mathematics III**															
207005	Solve higher order linear differential equation using appropriate techniques for modelling, analyzing of electrical circuits and control systems	3	2	2										2	2	3
207005	Apply concept of Fourier transform & Z-transform and its applications to continuous & discrete systems, signal & image processing and communication			2	2	3								2	2	1
207005	Obtain Interpolating polynomials, numerically differentiate and integrate functions, numerical solutions of differential equations using single step and multi-		3	2	1	3								2	1	
207005	Perform vector differentiation & integration, analyze the vector fields and apply to electro- magnetic fields & wave theory.	3	3	3											2	
207006	Analyze Complex functions, Conformal mappings, Contour integration applicable to electrostatics, digital filters, signal and image processing.	3	2			3								2	1	2
204181	**Electronic Circuits**															
204181	Assimilate the physics, characteristics and parameters of MOSFET towards its application as amplifier.	3	2	2	1	2	1	1		1			2	2	2	1
204181	Design MOSFET amplifiers, with and without feedback, & MOSFET oscillators, for given specifications	3	2	2	1	2	1	1		1			2			2
204181	Analyze and assess the performance of linear and switching regulators, with their variants, towards applications in regulated power supplies.	2	3	3	3	1	2	1					2		2	1
204181	Explain internal schematic of Op-Amp and define its performance parameters.	2	3	2	2	1	2	2		1			1		1	2
204182	Design, Build and test Op-amp based analog signal processing and conditioning circuits towards various real time applications.	2	3	3	3	1	2	1					2		1	3
204182	Understand and compare the principles of various data conversion techniques and PLL with their applications.	2	1	3	1	2	2						1		2	1

204182	**Digital Circuits**															
204182	Identify and prevent various hazards and timing problems in a digital design	3	2	2	1	2	1	1		1			2	2	2	1
204182	Use the basic logic gates and various reduction techniques of digital logic circuit.	3	2	2	1	2	1	1		1			2			2
204182	Analyze, design and implement combinational logic circuits.	2	3	3	3	1	2	1					2		2	1
204182	Analyze, design and implement sequential circuits.	3	3	2	1	1	1									1
204183	Differentiate between Mealy and Moore machines.	3	2	1	2	0	1									1
204183	Analyze digital system design using PLD.	2	2	1	2	1	2									2
204183	**Electrical Circuits**															
204183	Analyze the simple DC and AC circuit with circuit simplification techniques.	3	3	2	2	3	1									1
204183	Formulate and analyze driven and source free RL and RC circuits.	3	2	3	2	1	2									2
204183	Formulate & determine network parameters for given network and analyze the given network	3	2	3	3	3	1									1
204183	Explain construction, working and applications of DC Machines / Single Phase & Three	3	3	2	1	1	1									1
204184	Explain construction, working and applications of special purpose motors & understand	3	2	1	2	0	1									1
204184	Analyze and select a suitable motor for different applications.	2	2	1	2	1	2									2
204184	**Data structures**															
204184	Solve mathematical problems using C programming language	3	3	3	3	3							3			
204184	Implement sorting and searching algorithms and calculate their complexity	3	2	2	2		1		2	2			2			
204184	Develop applications of stack and queue using array	3	3	3			3	3	3				3			
204184	Demonstrate applicability of Linked List.	3	3	3		2	3	3	3				3			
204185	Demonstrate applicability of nonlinear data structures - Binary Tree with respect to its time complexity	3	3	3	3	3	3	3	3	2						
204185	Apply the knowledge of graph for solving the problems of spanning tree and shortest path algorithm.	2	2	2	2		2						2			



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204191	**Signals & Systems**																
204191	Identify, classify basic signals and perform operations on signals.	3			1	3								1	1	3	
204191	Identify, Classify the systems based on their properties in terms of input output relation and in	3	2	1	2	3					3					3	
204191	Analyze and resolve the signals in frequency domain using Fourier series and Fourier Transform	3	3	3	3	3					3					3	
204191	Resolve the signals in complex frequency domain using Laplace Transform, and will be able to	3			3	3					3					3	
204192	Define and Describe the probability, random variables and random signals. Compute the	3			3	3					1					1	
204192	Compute the mean, mean square, variance and standard deviation for given random variables	3	3	3	3	3					2	2	3	1	2	3	
204192	**Control Systems**																
204192	Determine and use models of physical systems in forms suitable for use in the analysis and	3			1	3								1	1	3	
204192	Determine the (absolute) stability of a closed-loop control system	3	2	1	2	3	2	2	1	2	3	3	3	1	1	3	
204192	Perform time domain analysis of control systems required for stability analysis.	3	3	3	3	3				1	3	3	3	1	1	3	
204192	Perform frequency domain analysis of control systems required for stability analysis. Apply root-locus, Frequency Plots technique to analyze control systems.	3	3	3	3	3	1	1	1	1	3	3	3	1	1	3	
204193	Express and solve system equations in state variable form	3	3	3	3	3	1	2	2	2	2	2	3	1	2	3	
204193	Differentiate between various digital controllers and understand the role of the controllers in	3	3	3	3	3	1	1	1	1	3	3	3	1	1	3	
204193	**Principles of Communication Systems**																
204193	To compute & compare the bandwidth and transmission power requirements by analyzing time and frequency domain spectra of signal required for modulation	2	2	3	2	1	2	3	3	3	3	2	2	1	2	3	
204193	Describe and analyze the techniques of generation, transmission and reception of Amplitude	2	3	1	3	2	1	1	1	3	3	3	3	3	1	2	
204193	Explain generation and detection of FM systems and compare with AM systems	2	2							2	3	2	1	1	3	2	
204193	Exhibit the importance of Sampling Theorem and correlate with Pulse Modulation technique (PAM, PWM, and PPM)	2	1							3	3	3	2	1	3	2	
204194	Characterize the quantization process and elaborate digital representation techniques (PCM, DPCM, DM and ADM)	2	2							2	1	2	3	2	2	3	
204194	Illustrate waveform coding, multiplexing and synchronization techniques and articulate their	2	2							2	2	2	3	2	1	3	
204194	**Object Oriented Programming**																
204194	Describe the principles of object oriented programming.	1	3	1	2	2						1	1	1	1	1	
204194	Apply the concepts of data encapsulation, inheritance in C++.	3	3	2	1	1	1										
204194	Understand Operator overloading and friend functions in C++.	3	3	3	2	1	1										
204194	Apply the concepts of classes, methods inheritance and polymorphism to write programs C++.	3	3	2	2	1	2										
204195	Apply Templates, Namespaces and Exception Handling concepts to write programs in C++.	3	3	2	1	1	1										

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204194..6	Describe and use of File handling in C++.	3	1	2	1	1	1									
ourse Co	**Name of Course : SE (2019 Pattern) AY 21-22**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
207005	**Engineering Mathematics III**															
207005	Solve higher order linear differential equation using appropriate techniques for modelling, analyzing of electrical circuits and control systems	3	2	2										2	2	3
207005	Apply concept of Fourier transform & Z-transform and its applications to continuous & discrete systems, signal & image processing and communication			2	2	3								2	2	1
207005	Obtain Interpolating polynomials, numerically differentiate and integrate functions, numerical solutions of differential equations using single step and multi-		3	2	1	3								2	1	
207005	Perform vector differentiation & integration, analyze the vector fields and apply to electro- magnetic fields & wave theory.	3	3	3											2	
207006	Analyze Complex functions, Conformal mappings, Contour integration applicable to electrostatics, digital filters, signal and image processing.	3	2			3								2	1	2

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204181	Explain internal schematic of Op-Amp and define its performance parameters.	2	3	2	2	1	2	2		1			2		2	1
204182	Design, Build and test Op-amp based analog signal processing and conditioning circuits towards various real time applications.	2	3	3	3	1	2	1					1		1	2
204182	Understand and compare the principles of various data conversion techniques and PLL with their applications.	2	1	3	1	2	2						2		1	3
													1		2	1
204182	**Digital Circuits**															
204182	Identify and prevent various hazards and timing problems in a digital design	3	2	2	1	2	1	1		1			2	2	2	1
204182	Use the basic logic gates and various reduction techniques of digital logic circuit.	3	2	2	1	2	1	1		1			2			2
204182	Analyze, design and implement combinational logic circuits.	2	3	3	3	1	2	1					2		2	1
204183	Analyze, design and implement sequential circuits.	3	3	2	1	1	1									1
204183	Differentiate between Mealy and Moore machines.	3	2	1	2	0	1									1
		2	2	1	2	1	2									2
204183	**Electrical Circuits**															
204183	Analyze the simple DC and AC circuit with circuit simplification techniques.	3	3	2	2	3	1									1
204183	Formulate and analyze driven and source free RL and RC circuits.	3	2	3	2	1	2									2
204183	Formulate & determine network parameters for given network and analyze the given network	3	2	3	3	3	1									1
204184	Explain construction, working and applications of DC Machines / Single Phase & Three	3	3	2	1	1	1									1
204184	Explain construction, working and applications of special purpose motors & understand	3	2	1	2	0	1									1
	Analyze and select a suitable motor for different applications.	2	2	1	2	1	2									2
204184	**Data structures**															
204184	Solve mathematical problems using C programming language	3	3	3	3	3							3			
204184	Implement sorting and searching algorithms and calculate their complexity	3	2	2	2		1	2	2				2			
204184	Develop applications of stack and queue using array	3	3	3			3	3	3				3			
204185	Demonstrate applicability of Linked List.	3	3	3		2	3	3	3				3			
	Demonstrate applicability of nonlinear data structures - Binary Tree with respect to its time complexity	3	3	3	3	3	3	3	2							

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204185	Apply the knowledge of graph for solving the problems of spanning tree and shortest path algorithm.	2	2	2	2		2						2				
204191	**Signals & Systems**																
04191	Identify, classify basic signals and perform operations on signals.	3			1	3											
04191	Identify, Classify the systems based on their properties in terms of input output relation and in	3	2	1	2	3	2							1	1	3	
04191	Analyze and resolve the signals in frequency domain using Fourier series and Fourier Transform	3	3	3	3	3						3	3	1	1	3	
04191	Resolve the signals in complex frequency domain using Laplace Transform, and will be able to	3	3	3	3	3	1					3	3	1	1	3	
04192	Define and Describe the probability, random variables and random signals. Compute the	3	3	3	3	3	1					3	3	1	1	3	
04192	Compute the mean, mean square, variance and standard deviation for given random variables	3	3	3	3	3	1					2	3	2	3	1	
												2	3	1	2	3	
04192	**Control Systems**																
04192	Determine and use models of physical systems in forms suitable for use in the analysis and	3			1	3								1	1	3	
04192	Determine the (absolute) stability of a closed-loop control system	3	2	1	2	3	2	2	1	2	3	3	3	1	1	3	
04192	Perform time domain analysis of control systems required for stability analysis.	3	3	3	3	3				1	3	3	3	1	1	3	
04192	Perform frequency domain analysis of control systems required for stability analysis. Apply root-locus, Frequency Plots technique to analyze control systems.	3	3	3	3	3	1	1	1	1	3	3	3	1	1	3	
04193	Express and solve system equations in state variable form	3	3	3	3	3	1	2	2	2	2	2	3	1	2	3	
04193	Differentiate between various digital controllers and understand the role of the controllers in	3	3	3	3	3	1	1	1	1	3	3	3	1	1	3	

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204193	**Principles of Communication Systems**															
204193	To compute & compare the bandwidth and transmission power requirements by analyzing time and frequency domain spectra of signal required for modulation	2	2	3	2								2	1	2	3
204193	Describe and analyze the techniques of generation, transmission and reception of Amplitude	2	3	1	3								3	3	1	2
204193	Explain generation and detection of FM systems and compare with AM systems	2	2	2	2									1	3	2
204193	Exhibit the importance of Sampling Theorem and correlate with Pulse Modulation technique (PAM, PWM, and PPM)			2	3								2	1	3	2
204194	Characterize the quantization process and elaborate digital representation techniques (PCM, DPCM, DM, and ADM)	2	2	2	2									2		3
204194	Illustrate waveform coding, multiplexing and synchronization techniques and articulate their	2	2	2	2								3	2	1	3
204194	**Object Oriented Programming**															
204194	Describe the principles of object oriented programming.	1	3	1	2	2	2	2	1	1	1	1	1	1	1	1
204194	Apply the concepts of data encapsulation, inheritance in C++.	3	3	2	1	1								1	1	1
204194	Understand Operator overloading and friend functions in C++.	3	3											1	1	1
204195	Apply Templates, Namespaces and Exception Handling concepts to write programs in C++.	3	3	2	1	1								1	1	1
204194..6	Describe and use of File handling in C++.	3	1	2	1	1	1	1	2	1	1	1	2	1	1	1
ourse Co	**Name of Course: SE (2019 Pattern) AY 22-23**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
207005	**Engineering Mathematics III**															
207005	Solve higher order linear differential equation using appropriate techniques for modelling, analyzing of electrical circuits and control systems	3	2	2										2	2	3
207005	Apply concept of Fourier transform & Z-transform and its applications to continuous & discrete systems, signal & image processing and communication			2	2	3								2	2	1
207005	Obtain Interpolating polynomials, numerically differentiate and integrate functions, numerical solutions of differential equations using single step and multi-		3	2	1	3								2	1	
207005	Perform vector differentiation & integration, analyze the vector fields and apply to electro- magnetic fields & wave theory.	3	3	3											2	
207006	Analyze Complex functions, Conformal mappings, Contour integration applicable to electrostatics, digital filters, signal and image processing.	3	2			3								2	1	2
204181	**Electronic Circuits**															
204181	Assimilate the physics, characteristics and parameters of MOSFET towards its application as amplifier.	3	2	2	1	2	1	1					2	2	2	1
204181	Design MOSFET amplifiers, with and without feedback, & MOSFET oscillators, for given specifications	3	2	2	1	2	1	1					2			2
204181	Analyze and assess the performance of linear and switching regulators, with their variants, towards applications in regulated power supplies.	2	3	3	3	1	2	1					2		2	1
204181	Explain internal schematic of Op-Amp and define its performance parameters.	2	3	2	2	1	2	2					1		1	2
204182	Design, Build and test Op-amp based analog signal processing and conditioning circuits towards various real time applications.	2	3	3	3	1	2	1					2		1	3

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204182	Understand and compare the principles of various data conversion techniques and PLL with their applications.	2	1	3	1	2	2						1		2	1
204182	**Digital Circuits**															
204182	Identify and prevent various hazards and timing problems in a digital design	3	2	2	1	2	1	1		1			2	2	2	1
204182	Use the basic logic gates and various reduction techniques of digital logic circuit.	3	2	2	1	2	1	1		1			2			2
204182	Analyze, design and implement combinational logic circuits.	2	3	3	3	1	2	1					2		2	1
204182	Analyze, design and implement sequential circuits.	3	3	2	1	1	1									1
204183	Differentiate between Mealy and Moore machines.	3	2	1	2	0	1									1
204183	Analyze digital system design using PLD.	2	2	1	2	1	2									2
204183	**Electrical Circuits**															
204183	Analyze the simple DC and AC circuit with circuit simplification techniques.	3	3	2	2	3	1									1
204183	Formulate and analyze driven and source free RL and RC circuits.	3	2	3	2	1	2									2
204183	Formulate & determine network parameters for given network and analyze the given network	3	2	3	3	3	1									1
204183	Explain construction, working and applications of DC Machines / Single Phase & Three	3	3	2	1	1	1									1
204184	Explain construction, working and applications of special purpose motors & understand	3	2	1	2	0	1									1
204184	Analyze and select a suitable motor for different applications.	2	2	1	2	1	2									2

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204184	**Data structures**																
204184	Solve mathematical problems using C programming language	3	3	3	3	3							3				
204184	Implement sorting and searching algorithms and calculate their complexity	3	2	2	2		1		2	2			2				
204184	Develop applications of stack and queue using array	3	3	3			3	3	3				3				
204185	Demonstrate applicability of Linked List.	3	3	3		2	3	3	3				3				
204185	Demonstrate applicability of nonlinear data structures - Binary Tree with respect to its time complexity	3	3	3	3	3	3	3	3	2							
	Apply the knowledge of graph for solving the problems of spanning tree and shortest path algorithm.	2	2	2	2		2						2				
204191	**Signals & Systems**																
204191	Identify, classify basic signals and perform operations on signals.	3			1	3								1	1	3	
204191	Identify, Classify the systems based on their properties in terms of input output relation and in	3	2	1	2	3	2	2	1				3	1	1	3	
204191	Analyze and resolve the signals in frequency domain using Fourier series and Fourier Transform	3	3	3	3	3							3	1	1	3	
204191	Resolve the signals in complex frequency domain using Laplace Transform, and will be able to	3	3												1	3	
204192	Define and Describe the probability, random variables and random signals. Compute the	3	3	3	3	3	1	2	3				3	2	3	1	
204192	Compute the mean, mean square, variance and standard deviation for given random variables	3	3	3	3	3	1	2	2				3	1	2	3	
204192	**Control Systems**																
204192	Determine and use models of physical systems in forms suitable for use in the analysis and	3			1	3								1	1	3	
204192	Determine the (absolute) stability of a closed-loop control system	3	2	1	2	3	2	2	1	2	3	3	3	1	1	3	
204192	Perform time domain analysis of control systems required for stability analysis.	3	3	3	3	3				1	3	3	3	1	1	3	
204192	Perform frequency domain analysis of control systems required for stability analysis. Apply root-locus, Frequency Plots technique to analyze control systems.	3	3	3	3	3	1	1	1	1	3	3	3	1	1	3	
204193	Express and solve system equations in state variable form	3	3	3	3	3	1	2	2	2	2	2	3	1	2	3	
204193	Differentiate between various digital controllers and understand the role of the controllers in	3	3	3	3	3	1			1	3	3	3	1	1	3	
204193	**Principles of Communication Systems**																
204193	To compute & compare the bandwidth and transmission power requirements by analyzing time and frequency domain spectra of signal required for modulation	2	2	3	2						3	2	2	1	2	3	
204193	Describe and analyze the techniques of generation, transmission and reception of Amplitude	2	3	1									3	3	1	2	
204193	Explain generation and detection of FM systems and compare with AM systems	2	2	2									1		3	2	
204193	Exhibit the importance of Sampling Theorem and correlate with Pulse Modulation technique (PAM, PWM, and PPM)	2	1	2									2		3	2	

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204194	Characterize the quantization process and elaborate digital representation techniques (PCM, DPCM, DM and ADM)	2	2	2	2	2	2	2	1	2	1	2	3		2	3	
204194	Illustrate waveform coding, multiplexing and synchronization techniques and articulate their	2	2	2	2	2					2	2	3	2	1	3	
204194	**Object Oriented Programming**																
204194	Describe the principles of object oriented programming.	1	3	1	2	2	2	2	1	1	1	1	1	1	1	1	
204194	Apply the concepts of data encapsulation, inheritance in C++.	3	3	2	1	1								1	1	1	
204194	Understand Operator overloading and friend functions in C++.	3	3											1	1	1	
204194	Apply the concepts of classes, methods inheritance and polymorphism to write programs C++.	3	3											1	1	1	
204195	Apply Templates, Namespaces and Exception Handling concepts to write programs in C++.	3	3	2	1	1								1	1	1	
204194..0	Describe and use of File handling in C++.	3	1	2	1	1	1	1	2	1	1	1	2	1	1	1	

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Department of Computer Engineering
Academic Year 2018-19

Sr. No.	Course Code	Course Name
		Semester - III
1	210241	DiscreteMathematics
2	210242	Digital Electronics and Logic Design
3	210243	Data Structures and Algorithms
4	210244	Computer Organization and Architecture
5	210245	Object Oriented Programming
		Semester - IV
6	207003	Engineering Mathematics III
7	210251	Computer Graphics
8	210252	Advanced Data Structures
9	210253	Microprocessor
10	210254	Principles of Programming Languages
		Semester - V
11	310241	Theory of Computation
12	310242	Database Management Systems
13	310243	Software Engineering and Project Management
14	310244	Information Systems and Engineering Economics
15	310245	Computer Networks
		Semester - VI
16	310250	Design and Analysis of Algorithms
17	310251	Systems Programming and Operating System
18	310252	Embedded Systems and Internet of Things
19	310253	Software Modeling and Design
20	310254	Web Technology
		Semester – VII
20	410241	High Performance Computing
21	410242	Artificial Intelligence and Robotics
22	410243	Data Analytics
23	410244(C)	Pervasive & Ubiquitous Computing
24	410245(B)	Software Testing and Quality Assurance
		Semester – VIII
25	410250	Machine Learning
26	410251	Information and Cyber Security
27	410252(C)	Embedded & Real Time Operating System
28	410253(C)	Cloud Computing

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urse Code	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
210241	**DiscreteMathematics**															
10241.1	Solve real world problems logically using appropriate set, function, and relation models and interpret the associated operations and terminologies in context.	3	3	3	2	-	-	-	-	-	-	-	-	1	1	1
10241.2	Analyze and synthesize the real world problems using discrete mathematics.	3	3	-	2	-	-	-	-	-	-	-	-	1	1	1
10241.3	Associate the applications of Graph theory models and data structures.	-	3	3	2	-	-	-	-	-	-	-	-	1	1	1
10241.4	Describe the concepts and properties of algebraic structures such as groups, rings and fields.	3	-	3	-	-	-	-	-	-	-	-	-	1	1	1
10241.5	Extend the concepts of Boolean algebra in the area of lattices.	3	3	3	2	-	-	-	-	-	-	-	-	1	1	1
10241.6	Apply the knowledge of argumental discrete mathematical problems.	3	3	3	2	-	-	-	-	-	-	-	-	1	1	1
210242	**Digital Electronics and Logic Design**															
10242.1	Realize and simplify Boolean Algebraic assignments for designing digital circuits using K- Maps.	2	-	2	-	-	-	-	-	-	-	-	-	1	1	1
10242.2	Design and implement Sequential and Combinational digital circuits as per the specifications	2	1	2	-	-	-	-	-	-	-	-	-	1	1	1
0242.3	Apply the knowledge to appropriate IC as per the design specifications	-	1	2	-	-	-	-	-	-	-	-	-	1	1	1
0242.4	Design simple digital systems using VHDL.	2	-	2	1	-	-	-	-	-	-	-	-	1	1	1
0242.5	Develop simple embedded system for simple real world application.	2	2	-	-	-	-	-	-	-	-	-	-	1	1	1
0242.6	Compare various digital logic families based on power, speed and interfacing characteristics	2	-	-	-	-	-	-	-	-	-	-	-	1	1	1

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210243	**Data Structures and Algorithms**																
210243.1	To discriminate the usage of various structures in approaching the problem solution.	2	1	2	1	-	-	-	-	-	-	-	-	1	1	1
210243.2	To design the algorithms to solve the programming problems.	1	2	-	-	-	-	-	-	-	-	-	-	1	1	1
210243.3	To use effective and efficient data structures in solving various Computer Engineering domain problems.	2	-	1	-	-	-	-	-	-	-	-	-	1	1	1
210243.4	To analyze the problems to apply suitable algorithm and data structure.	1	2	-	1	-	-	-	-	-	-	-	-	1	1	1
210243.5	To use appropriate algorithmic strategy for better efficiency	1		1	1	-	-	-	-	-	-	-	-	1	1	1
210243.6	Understand the concepts of Hashing, Files and their Organization and Sorting Algorithms.	2	1	1	1	-	-	-	-	-	-	-	-	1	1	1
210244	**Computer Organization and Architecture**																
210244.1	Demonstrate computer architecture concepts related to design of modern processors, memories and I/Os	2	1	1	-	-	-	-	-	-	-	-	-	1	1	1
210244.2	Analyze the principles of computer architecture using examples drawn from commercially available computers.	3	-	1	1	-	-	-	-	-	-	-	-	1	1	1
210244.3	Evaluate various design alternatives in processor organization.	1	2	-	1	-	-	-	-	-	-	-	-	1	1	1
210244.4	Understand the basics of memory systems and cache Memories.	2	1	-	2	-	-	-	-	-	-	-	-	1	1	1
210244.5	Design arithmetic and logical operations with integer and floating-point operands.	1	-	1	1	-	-	-	-	-	-	-	-	1	1	1
210244.6	Understand the basic processing unit, embedded and other large computing systems.	2	1	1	-	-	-	-	-	-	-	-	-	1	1	1
210245	**Object Oriented Programming**																
210245.1	Analyze the strengths of object oriented programming	2	-	2	-	-	-	-	-	-	-	-	-	1	1	1
210245.2	Design and apply OOP principles for effective programming	2	1	2	-	-	-	-	-	-	-	-	-	1	1	1
210245.3	Develop programming application using object oriented programming language C++	2	1	2	-	-	-	-	-	-	-	-	-	1	1	1
210245.4	Percept the utility and applicability of OOP	2	-	2	1	-	-	-	-	-	-	-	-	1	1	1
210245.5	Relate Java applications with threads and generics classes	1	-	-	-	-	-	-	-	-	-	-	-	1	1	1
210245.6	Demonstrate simple Graphical User Interfaces	1	2	-	-	-	-	-	-	-	-	-	-	1	1	1

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207003	**Engineering Mathematics III**																
207003.1	Solve higher order linear differential equation using appropriate techniques for modeling and analyzing electrical circuits.	3	2	3	2	2	2	2	1	1	1	1	1	1	1	1	1
207003.2	Solve problems related to Fourier transform, Z-Transform and applications to Signal and Image processing.	2	3	3	1	1	1	1	1	1	1	1	1	1	1	1	1
207003.3	Apply statistical methods like correlation, regression analysis and probability theory for analysis and prediction of a given data as applied to machine intelligence.	3	2	3	3	3	1	1	1	1	1	1	1	1	1	1	1
207003.4	Perform vector differentiation and integration to analyze the vector fields and apply to compute line, surface and volume integrals.	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1	1
207003.5	Analyze conformal mappings, transformations and perform contour integration of complex functions required in Image processing, Digital	2	3	2	3	1	1	1	1	1	1	1	1	1	1	1	1
07003.6	Determine the externals of functional using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.	2	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1
210251	**Computer Graphics**																
10251.1	Apply mathematics and logic to develop Computer programs for elementary graphic operations	2	1	2	1	-	-	-	-	-	-	-	-	1	1	1	1
10251.2	Develop scientific and strategic approach to solve complex problems in the domain of Computer Graphics	1	2	-	-	-	-	-	-	-	-	-	-	1	1	1	1
10251.3	Develop the competency to understand the concepts related to Computer Vision and Virtual reality	2	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1
10251.4	Apply the logic to develop animation and gaming programs	-	2	-	1	-	-	-	-	-	-	-	-	1	1	1	1
10251.5	Design Geometric transformations on 3D objects, 2D clipping and color models.	2	1	1	-	-	-	-	-	-	-	-	-	1	1	1	1
10251.6	Demonstrate visible surface detection methods and different types of projections.	1	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1
10252	**Advanced Data Structures**																
0252.1	To apply appropriate advanced data structure and efficient algorithms to approach the problems of various domain.	-	2	-	-	-	-	-	-	-	-	-	-	1	1	1	1
0252.2	To design the algorithms to solve the programming problems.	1	-	-	-	-	2	2	2	-	-	-	-	1	1	1	1
0252.3	To use effective and efficient data structures in solving various Computer Engineering domain problems.	-	-	2	-	-	2	-	-	-	-	-	-	1	1	1	1
0252.4	To analyze the algorithmic solutions for resource requirements and optimization	-	2	2	-	-	-	-	-	-	-	-	-	1	1	1	1

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210252.5	To use appropriate modern tools to understand and analyze the functionalities confined to the data structure usage	-	2	2	-	-	-	-	-	-	-	-	-	1	1	1
210252.6	Understand the concepts of Hashing, Files and their organization and sorting algorithms.	3	-	-	-	-	-	-	-	-	-	-	-	1	1	1
210253	**Microprocessor**															
10253.1	To apply the assembly language programming to develop small real life embedded application.	2	2	2	2	-	-	-	-	-	-	-	-	1	1	1
10253.2	To understand the architecture of the advanced processor thoroughly to use the resources for programming	2	-	1	-	-	-	-	-	-	-	-	-	1	1	1
10253.3	To understand the higher processor architectures descended from 80386 architecture	2	-	2	-	-	-	-	-	-	-	-	-	1	1	1
10253.4	Apply 8086 assembly language code to handle strings and overflow conditions and I/O programming interface using 8255 PPI	2	1	1	-	-	-	-	-	-	-	-	2	1	1	1
10253.5	Understand the architecture and features of ARM Embedded system	1	1	1	-	-	-	-	-	-	-	-	1	1	1	1
10253.6	Apply arm assembly code to solve problems related to Embedded systems	2	1	1	-	-	-	-	-	-	-	-	2	1	1	1
210254	**Principles of Programming Languages**															
10254.1	To analyze the strengths and weaknesses of programming languages for effective and efficient program development	2	2	2	2	-	-	-	-	-	-	-	-	1	1	1
10254.2	To inculcate the principles underlying the programming languages enabling to learn new programming languages	2	-	1	-	-	-	-	-	-	-	-	-	1	1	1
10254.3	To grasp different programming paradigms	2	-	2	-	-	-	-	-	-	-	-	-	1	1	1
10254.4	To use the programming paradigms effectively in application development.	2	-	2	-	-	-	-	-	-	-	-	-	1	1	1
10254.5	Design to program in different language paradigms and evaluate their	1	1	-	-	-	-	-	-	-	-	-	-	1	1	1
10254.6	Knowledge to compare the features of various programming languages	1	-	-	-	-	-	-	-	-	-	-	-	1	1	1

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Course Code	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
310241	**Theory of Computation**															
310241.1	Design deterministic Turing machine for all inputs and all outputs	2	2	3	1	-	-	-	1	-	-	-	3	1	1	1
310241.2	Subdivide problem space based on input subdivision using constraints	-	2	3	-	-	2	-	-	3	-	2	3	1	1	1
310241.3	Apply linguistic theory	-	2	3	-	1	-	3	-	-	1	-	3	1	1	1
310241.4	Apply Turing machine to propose computation solutions	1	-	-	2	-	-	-	2	-	-	1	2	1	1	1
310241.5	Interpret whether a problem is decidable or not	1	2	-	-	3	2	1	3	1	2	-	2	1	1	1
310241.6	Interpret NP class problems	1	-	-	-	-	-	-	-	-	-	-	2	1	1	1
310242	**Database Management Systems**															
310242.1	Design E-R Model for given requirements and convert the same into database tables.	3	3	2	2	1	2	-	-	-	-	-	2	1	1	1
310242.2	Use database techniques such as SQL & PL/SQL.	3	3	2	2	1	-	1	-	1	-	1	1	1	2	1
310242.3	Use modern database techniques such as NOSQL.	2	3	2	1	1	-	-	-	-	2	-	1	1	1	1
310242.4	Explain transaction Management in relational database System.	3	2	1	2	1	1	2	1	-	-	2	1	2	1	1
310242.5	Describe different database architecture and analyses the use of appropriate architecture in real time environment.	3	3	3	2	1	-	-	-	2	1	-	2	1	1	2
310242.6	Use advanced database Programming concepts	3	3	3	3	1	-	-	-	-	-	-	1	1	1	1
310243	**Software Engineering and Project Management**															
310243.1	Decide on a process model for a developing a software project	2	2	2	1	-	-	-	-	-	-	-	-	1	1	1
310243.2	Classify software applications and Identify unique features of various domains	2	2	1	2	-	-	1	-	-	-	-	-	1	2	1
310243.3	Design test cases of a software system.	2	2	1	1	2	-	-	2	-	1	-	-	2	1	1
310243.4	Understand basics of IT Project management.	2	1	2	1	-	-	-	-	2	-	2	-	1	1	1
310243.5	Plan, schedule and execute a project considering the risk management.	2	2	1	2	-	1	-	-	-	-	-	-	1	1	2
310243.6	Apply quality attributes in software development life cycle.	2	1	2	1	-	-	2	-	-	2	-	2	1	1	1

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310244	**Information Systems and Engineering Economics**																
310244.1	Understand the need, usage and importance of an Information System to an organization.	1	-	1	2	2	1	-	-	-	-	1	1	1	1	1	
310244.2	Understand the activities that are undertaken while managing, designing, planning, implementation, and deployment of computerized information system in an organization.	1	1	1	1	1	-	1			1	-	-	1	1	1	
310244.3	Further the student would be aware of various Information System solutions like ERP, CRM, Data warehouses and the issues in successful implementation of these technology solutions in any organizations	3	1	2	1	2	2	2	2	2	-	2	1	1	1	1	
310244.4	Outline the past history, present position and expected performance of a company engaged in engineering practice or in the computer industry.	1	2	1	2	2	-	-	-	-	-	1	1	1	1	1	
310244.5	Perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives.	1	3	-	-	1	-	1	1	1	2	-	-	1	1	1	
310244.6	Be able to carry out and evaluate benefit/cost, life cycle and breakeven analyses on one or more economic alternatives.	1	-	2	1	-	1	-	-	-	-	-	1	1	1	1	
310245	**Computer Networks**																
310245.1	Analyze the requirements for a given organizational structure to select the most appropriate networking architecture, topologies, transmission mediums, and technologies	3	1	1	2	-	-	-	-	1	-	1	-	1	1	1	
310245.2	Demonstrate design issues, flow control and error control	3	2	1	2	1	-	-	-	-	-	-	-	1	1	-	
310245.3	Analyze data flow between TCP/IP model using Application, Transport and Network Layer Protocols.	2	3	3	3	2	3	1	-	2	-	1	-	-	1	1	
310245.4	Illustrate applications of Computer Network capabilities, selection and usage for various sectors of user community.	1	2	2	2	3	3	-	-	2	1	2	2	1	1	1	
310245.5	Illustrate Client-Server architectures and prototypes by the means of correct standards and technology.	2	2	2	3	3	3	-	-	2	1	2	2	1	1	1	
310245.6	Demonstrate different routing and switching algorithms	2	2	1	2	2	2	-	1	1	-	1	1	1	-	1	
310250	**Design and Analysis of Algorithms**																
310250.1	Formulate the problem	1	3	2	1	-	-	-	1	1	-	-	1	1	1	1	
310250.2	Analyze the asymptotic performance of algorithms.	1	2	1	2	-	1	-	-	1	-	-	1	1	1	1	
310250.3	Decide and apply algorithmic strategies to solve given problem	2	1	2	1	-	1	-	-	1	-	-	1	1	1	1	
310250.4	Find optimal solution by applying various methods	1	2	2	2	2	-	-	-	1	1	-	1	1	1	1	
310250.5	Analyze the performance of merge sort and quick sort algorithms using divide and conquer technique.	1	1	2	1	-	-	1	-	-	-	-	1	1	1	1	
310250.6	Design algorithms using dynamic programming and back tracking methods.	1	2	2	2	-	-	-	-	-	-	-	1	1	1	1	

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310251	**Systems Programming and Operating System**																
310251.1	Analyze and synthesize system software	1	1	2	1	1	-	-	1	-	-	-	-	1	1	1	
310251.2	Use tools like LEX & YACC.	-	2	1	3	1	-	2	-	1	-	-	-	1	1	1	
310251.3	Implement operating system functions.	2	-	2	1	-	1	-	-	-	-	1	-	1	1	1	
310251.4	Understand the concepts related to deadlock and memory management.	1	1	-	-	-	-	-	2	-	-	-	2	1	1	1	
310251.5	Understand the concepts of virtual memory management, file system	1	1	-	-	-	-	1	-	2	1	2	2	1	1	1	
310251.6	Understand the concepts of secondary storage structure, protection and case study of Linux operating system.	1	1	-	-	-	-	-	-	-	-	-	2	1	1	1	
310252	**Embedded Systems and Internet of Things**																
310252.1	Implement an architectural design for IoT for specified requirement	1	2	2	1	-	-	1	3	-	2	-	-	1	1	1	
310252.2	Solve the given societal challenge using IoT	1	3	3	2	3	1	-	3	1	2	-	-	1	1	1	
310252.3	Choose between available technologies and devices for stated IoT challenge	3	2	2	2	1	1	1	-	-	2	-	-	1	1	1	
310252.4	Understand device drivers and interrupt service mechanism.	2	-	-	-	-	-	-	-	-	-	-	2	1	1	1	
310252.5	Apply threads, tasks, process, semaphores and RPC for IPC.	2	-	-	-	-	-	-	-	-	-	-	2	1	1	1	
310252.6	Develop embedded systems modules using RTOS	2	-	-	-	-	-	-	-	-	-	-	-	1	1	1	
310253	**Software Modeling and Design**																
310253.1	Analyze the problem statement (SRS) and choose proper design	1	2	1	-	-	-	-	-	-	-	-	-	1	1	1	
310253.2	Design and analyze an application using UML modeling as	1	2	1	-	-	-	-	-	-	-	-	-	1	1	1	
310253.3	Apply design patterns to understand reusability in OO design	1	2	1	-	2	-	-	-	-	-	-	-	1	1	1	
310253.4	Decide and apply appropriate modern tool for designing and	1	2	2	1	-	-	-	-	-	-	-	-	1	1	1	
310253.5	Decide and apply appropriate modern testing tool for testing web-	1	2	2	-	-	-	-	-	-	-	-	-	1	1	1	
310253.6	Apply their knowledge of modelling and design to solve	1	2	2	-	-	-	-	-	-	-	-	-	1	1	1	
310254	**Web Technology**																
310254.1	Analyze given assignment to select sustainable web development	1	2	2	1	-	-	1	3	-	2	-	-	1	2	1	
310254.2	Develop web based application using suitable client side and	1	3	3	2	3	1	-	3	1	2	-	-	1	1	1	
310254.3	Develop solution to complex problems using appropriate method, technologies, frameworks, web services and content management	3	2	2	2	1	1	1	-	-	2	-	-	1	1	1	
310254.4	Develop Client-Side programs using JavaScript and Server-Side	1	-	2	-	-	-	-	-	-	-	1	2	2	1	1	
310254.5	Outline Object Oriented Programming capabilities of PHP.	1	-	1	-	1	-	-	-	-	-	-	2	1	1	2	
310254.6	Examine JavaScript frameworks such as jQuery and Backbone.	1	-	2	-	-	-	-	1	-	-	-	2	1	2	1	

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Course Code	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
410241	**High Performance Computing**															
410241.1	Describe different parallel architectures, inter-connect networks, programming models	3	2	3	2	2	2	2	1	1	1	1	1	1	1	1
410241.2	Develop an efficient parallel algorithm to solve given problem	2	3	3	1	1	1	1	1	1	1	1	1	1	1	1
410241.3	Analyze and measure performance of modern parallel computing systems	3	2	3	3	3	1	1	1	1	1	1	1	1	1	1
410241.4	Build the logic to parallelize the programming task	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
410242	**Artificial Intelligence and Robotics**															
410242.1	Identify and apply suitable Intelligent agents for various AI applications	2	3	2	3	3	2	2	1	1	1	1	1	1	1	1
410242.2	Design smart system using different informed search / uninformed search or heuristic approaches.	3	3	2	2	1	3	1	1	1	1	1	1	1	1	1
410242.3	Identify knowledge associated and represent it by ontological engineering to plan a strategy to solve given problem.	3	3	2	2	2	1	1	1	1	1	1	2	1	1	1
410242.4	Apply the suitable algorithms to solve AI problems	2	2	3	1	2	1	2	1	1	1	1	1	1	1	1
410243	**Data Analytics**															
410243.1	Write case studies in Business Analytic and Intelligence using mathematical models	3	2	2	3	1	2	2	1	3	1	1	2	1	1	1
410243.2	Present a survey on applications for Business Analytic and Intelligence	3	3	2	2	1	3	1	2	1	1	1	1	1	1	1
410243.3	Provide problem solutions for multi-core or distributed, concurrent/Parallel environments	1	3	2	2	2	1	1	2	1	2	1	2	1	1	1
410244(C)	**Pervasive & Ubiquitous Computing**															
410244(C).1	Design and implement primitive pervasive applications	3	3	2	3	3	2	2	3	1	1	1	1	1	1	1
410244(C).2	Analyze and estimate the impact of pervasive computing on future computing applications and society	2	2	2	2	1	3	1	1	2	2	1	1	1	1	1
410244(C).3	Develop skill sets to propose solutions for problems related to pervasive computing system	3	3	2	2	2	1	1	1	1	1	1	2	1	1	1

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410244(C).4	Design a preliminary system to meet desired needs within the constraints of a particular problem space	1	1	3	1	2	3	2	2	1	1	1	3	1	1	1
410245(B)	**Software Testing and Quality Assurance**															
410245(B).1	Describe fundamental concepts in software testing such as manual testing, automation testing and software quality	2	3	2	3	3	2	2	3	1	1	1	1	1	1	1
410245(B).2	Design and develop project test plan, design test cases, test data, and conduct test operations	2	2	2	2	1	3	1	1	2	2	1	2	1	1	1
410245(B).3	Apply recent automation tool for various software testing for	3	3	2	2	2	1	3	2	1	1	3	2	1	1	1
410245(B).4	Apply different approaches of quality management, assurance, and quality standard to software system	3	1	3	1	3	3	2	2	1	1	1	3	1	1	1
410245(B).5	Apply and analyze effectiveness Software Quality Tools	2	3	2	3	2	1	1	1	1	2	1	1	1	1	1
410250	**Machine Learning**															
410250.1	Distinguish different learning based applications	3	2	3	2	2	2	2	1	1	1	1	1	1	1	1
410250.2	Apply different preprocessing methods to prepare training data set for machine learning.	2	3	3	1	1	1	1	1	1	1	1	1	1	1	1
410250.3	Design and implement supervised and unsupervised machine	3	2	3	3	3	1	1	1	1	1	1	1	1	1	1
410250.4	Implement different learning models	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
410250.5	Learn Meta classifiers and deep learning concepts	2	3	3	3	1	1	2	1	1	1	1	1	1	1	1
410251	**Information and Cyber Security**															
410251.1	Gauge the security protections and limitations provided by today's	3	2	3	2	2	2	2	1	2	1	2	1	1	1	1
410251.2	Identify information security and cyber security threats.	2	3	3	2	1	1	1	1	1	1	1	1	1	1	1
410251.3	Analyze threats in order to protect or defend it in cyberspace from	3	3	3	3	3	1	2	1	1	1	2	1	1	1	1
410251.4	Build appropriate security solutions against cyber-attacks.	3	3	3	1	1	1	3	2	1	2	1	2	1	1	1
410252(C)	**Embedded & Real Time Operating System**															
410252(C).1	Recognize and classify embedded and real-time systems.	3	2	3	2	2	2	2	1	1	1	1	1	1	1	1
410252(C).2	Explain communication bus protocols used for embedded and real-time systems.	2	3	3	1	1	1	2	2	1	1	2	1	1	1	1
410252(C).3	Classify and exemplify scheduling algorithms.	3	2	3	3	3	2	1	1	1	1	1	1	1	1	1
410252(C).4	Apply software development process to a given RTOS application.	3	2	3	3	2	1	2	1	1	1	1	3	1	1	1

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410252(C).5	Design a given RTOS based application.	3	3	3	3	1	1	2	3	1	3	1	1	1	1	1
410253	**Cloud Computing**															
410253.1	To install cloud computing environments.	3	2	3	2	2	2	2	2	2	2	1	2	1	1	1
410253.2	To develop any one type of cloud.	3	3	3	2	1	1	3	2	1	1	2	1	1	1	1
410253.3	To explore future trends of cloud computing.	3	2	2	3	3	3	1	1	2	3	1	2	1	1	1

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" EMPOWERMENT THROUGH TECHNOLOGICAL EXCELLENCE "

GENBA SOPANRAO MOZE COLLEGE OF ENGINEERING

Department of Computer Engineering

Academic Year 2019-20

Sr. No.	Course Code	Course Name
Semester - III		
1	210241	DiscreteMathematics
2	210242	Digital Electronics and Logic Design
3	210243	Data Structures and Algorithms
4	210244	Computer Organization and Architecture
5	210245	Object Oriented Programming
Semester - IV		
6	207003	Engineering Mathematics III
7	210251	Computer Graphics
8	210252	Advanced Data Structures
9	210253	Microprocessor
10	210254	Principles of Programming Languages
Semester - V		
11	310241	Theory of Computation
12	310242	Database Management Systems
13	310243	Software Engineering and Project Management
14	310244	Information Systems and Engineering Economics
15	310245	Computer Networks
Semester - VI		
16	310250	Design and Analysis of Algorithms
17	310251	Systems Programming and Operating System
18	310252	Embedded Systems and Internet of Things
19	310253	Software Modeling and Design
20	310254	Web Technology
Semester – VII		
20	410241	High Performance Computing
21	410242	Artificial Intelligence and Robotics
22	410243	Data Analytics
23	410244(C)	Pervasive & Ubiquitous Computing
24	410245(B)	Software Testing and Quality Assurance
Semester – VIII		
25	410250	Machine Learning
26	410251	Information and Cyber Security
27	410252(C)	Embedded & Real Time Operating System
28	410253(C)	Cloud Computing

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210241	**DiscreteMathematics**															
210241.1	Solve real world problems logically using appropriate set, function, and relation models and interpret the associated operations and terminologies in context.	3	3	3	2	-	-	-	2	-	-	3	-	1	1	1
210241.2	Analyze and synthesize the real world problems using discrete mathematics.	3	3	-	2	-	-	2	-	-	1	-	-	1	-	1
210241.3	Associate the applications of Graph theory models and data structures.	-	3	3	2	3	-	-	-	-	-	-	2	-	1	1
210241.4	Describe the concepts and properties of algebraic structures such as groups, rings and fields.	3	-	3	-	-	-	-	-	2	-	-	-	1	1	1
210241.5	Extend the concepts of Boolean algebra in the area of lattices.	3	3	3	2	-	1	-	3	-	2	1	-	1	1	2
210241.6	Apply the knowledge of argumental discrete mathematical problems.	3	3	3	2	-	-	1	-	-	-	-	-	1	2	1
210242	**Digital Electronics and Logic Design**															
210242.1	Realize and simplify Boolean Algebraic assignments for designing digital circuits using K- Maps.	2	-	2	-	-	-	-	-	-	-	-	-	1	1	1
210242.2	Design and implement Sequential and Combinational digital circuits as per the specifications	2	1	2	-	-	3	-	3	-	3	-	-	1	-	1
210242.3	Apply the knowledge to appropriate IC as per the design specifications	3	1	2	-	2	-	-	-	-	-	1	-	1	1	1
210242.4	Design simple digital systems using VHDL.	2	-	2	1	-	-	1	-	1	1	-	3	-	1	1
210242.5	Develop simple embedded system for simple real world application.	2	2	-	-	-	-	-	2	-	-	2	-	1	1	-
210242.6	Compare various digital logic families based on power, speed and interfacing characteristics	2	-	1	-	-	-	-	-	2	-	3	-	1	2	2

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210243	**Data Structures and Algorithms**															
210243.1	To discriminate the usage of various structures in approaching the problem solution.	2	1	2	1	-	-	-	3	-	-	-	-	1	1	1
210243.2	To design the algorithms to solve the programming problems.	1	2	-	-	2	-	1	-	2	-	-	3	1	-	1
210243.3	To use effective and efficient data structures in solving various Computer Engineering domain problems.	2	-	1	2	-	1	-	2	3	-	3	-	1	1	1
210243.4	To analyze the problems to apply suitable algorithm and data structure.	1	2	-	1	3	-	2	-	-	-	-	1	-	1	1
210243.5	To use appropriate algorithmic strategy for better efficiency	1		1	1	-	-	-	-	1	2	-	-	1	1	1
210243.6	Understand the concepts of Hashing, Files and their Organization and Sorting Algorithms.	2	1	1	1	-	3	-	-	-	-	-	2	1	2	2
210244	**Computer Organization and Architecture**															
210244.1	Demonstrate computer architecture concepts related to design of modern processors, memories and I/Os	2	1	1	-	-	-	2	-	3	-	3	-	1	1	1
210244.2	Analyze the principles of computer architecture using examples drawn from commercially available computers.	3	-	1	1	1	-	-	1	-	1	-	1	1	1	1
210244.3	Evaluate various design alternatives in processor organization.	1	2	-	1	-	3	2	-	1	2	1	2	1	1	-
210244.4	Understand the basics of memory systems and cache Memories.	2	1	-	2	2	-	1	3	-	-	-	-	1	1	1
210244.5	Design arithmetic and logical operations with integer and floating-point operands.	1	-	1	1	-	1	-	-	-	2	2	3	-	1	1
210244.6	Understand the basic processing unit, embedded and other large computing systems.	2	1	1	-	-	-	-	-	-	-	-	-	1	2	2
210245	**Object Oriented Programming**															
210245.1	Analyze the strengths of object oriented programming	2	-	2	-	3	-	2	-	2	-	-	-	1	1	1
210245.2	Design and apply OOP principles for effective programming	2	1	2	2	-	-	-	1	-	-	3	-	1	1	1
210245.3	Develop programming application using object oriented programming language C++	2	1	2	-	1	2	-	-	3	2	-	2	-	1	1
210245.4	Percept the utility and applicability of OOP	2	-	2	1	-	-	3	3	-	-	-	-	1	1	1
210245.5	Relate Java applications with threads and generics classes	1	-	-	-	-	3	-	2	1	-	-	1	1	1	1
210245.6	Demonstrate simple Graphical User Interfaces	1	2	3	-	-	-	-	-	-	-	-	-	1	2	2

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207003	**Engineering Mathematics III**															
207003.1	Solve higher order linear differential equation using appropriate techniques for modeling and analyzing electrical circuits.	3	2	3	2	2	2	2	1	1	1	1	1	1	1	1
207003.2	Solve problems related to Fourier transform, Z-Transform and applications to Signal and Image processing.	2	3	3	1	1	1	1	1	1	1	1	1	1	1	1
207003.3	Apply statistical methods like correlation, regression analysis and probability theory for analysis and prediction of a given data as applied to machine intelligence.	3	2	3	3	3	1	1	1	1	1	1	1	1	1	1
207003.4	Perform vector differentiation and integration to analyze the vector fields and apply to compute line, surface and volume integrals.	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
207003.5	Analyze conformal mappings, transformations and perform contour integration of complex functions required in Image processing, Digital	2	3	2	3	1	1	1	1	1	1	1	1	1	1	1
207003.6	Determine the externals of functional using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.	2	-	-	-	-	-	-	-	-	-	-	-	1	1	1
210251	**Computer Graphics**															
210251.1	Apply mathematics and logic to develop Computer programs for elementary graphic operations	2	1	2	1	-	-	3	-	-	-	3	-	1	1	1
210251.2	Develop scientific and strategic approach to solve complex problems in the domain of Computer Graphics	1	2	-	-	-	-	-	3	2	-	-	-	1	1	1
210251.3	Develop the competency to understand the concepts related to Computer Vision and Virtual reality	2	-	-	-	3	-	-	-	-	2	-	-	-	1	1
210251.4	Apply the logic to develop animation and gaming programs	-	2	-	1	-	2	2	-	1	-	-	2	1	1	1
210251.5	Design Geometric transformations on 3D objects, 2D clipping and color models.	2	1	1	-	-	-	-	1	-	-	-	-	1	2	1
210251.6	Demonstrate visible surface detection methods and different types of projections.	1	-	-	-	-	-	-	-	-	1	-	-	1	1	2
210252	**Advanced Data Structures**															
210252.1	To apply appropriate advanced data structure and efficient algorithms to approach the problems of various domain.	-	2	-	3	-	-	-	-	3	3	-	-	1	1	1
210252.2	To design the algorithms to solve the programming problems.	1	-	-	-	3	2	2	2	-	-	-	3	1	1	1
210252.3	To use effective and efficient data structures in solving various Computer Engineering domain problems.	-	-	2	2	-	2	-	-	1	-	1	-	1	1	1
210252.4	To analyze the algorithmic solutions for resource requirements and optimization	-	2	2	-	-	-	-	-	-	2	-	2	-	1	1

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210252.5	To use appropriate modern tools to understand and analyze the functionalities confined to the data structure usage	-	2	2	-	1	-	1	-	-	-	-	-	1	1	1
210252.6	Understand the concepts of Hashing, Files and their organization and sorting algorithms.	3	-	-	-	-	-	-	-	-	-	-	-	1	2	1
210253	**Microprocessor**															
210253.1	To apply the assembly language programming to develop small real life embedded application.	2	2	2	2	-	3	-	3	-	-	3	3	1	1	1
210253.2	To understand the architecture of the advanced processor thoroughly to use the resources for programming	2	-	1	-	-	-	2	-	-	3	-	-	1	1	1
210253.3	To understand the higher processor architectures descended from 80386 architecture	2	-	2	-	2	-	-	-	2	-	2	-	1	1	1
210253.4	Apply 8086 assembly language code to handle strings and overflow conditions and I/O programming interface using 8255 PPI	2	1	1	1	-	-	-	-	-	-	-	2	-	1	1
210253.5	Understand the architecture and features of ARM Embedded system	1	1	1	-	-	-	1	-	-	2	-	1	1	-	1
210253.6	Apply arm assembly code to solve problems related to Embedded systems	2	1	1	-	-	-	-	-	1	-	3	2	1	2	2
210254	**Principles of Programming Languages**															
210254.1	To analyze the strengths and weaknesses of programming languages for effective and efficient program development	2	2	2	2	3	3	3	3	3	-	3	3	1	1	1
210254.2	To inculcate the principles underlying the programming languages enabling to learn new programming languages	2	-	1	-	-	-	-	-	-	3	-	2	1	1	1
210254.3	To grasp different programming paradigms	2	1	2	1	-	2	-	2	-	2	-	-	1	1	1
210254.4	To use the programming paradigms effectively in application development.	2	-	2	-	2	-	2	-	2	-	2	-	-	1	1
210254.5	Design to program in different language paradigms and evaluate their relative benefits	1	1	-	-	-	1	-	-	-	2	-	1	1	2	1
210254.6	Knowledge to compare the features of various programming languages	1	-	-	-	-	-	-	-	1	-	-	-	1	1	2

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Course Code	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
310241	**Theory of Computation**															
310241.1	Design deterministic Turing machine for all inputs and all outputs	2	2	3	1	-	-	-	1	-	1	-	3	1	1	1
310241.2	Subdivide problem space based on input subdivision using constraints	-	2	3	-	-	2	-	-	-	-	-	3	1	1	1
310241.3	Apply linguistic theory	-	2	3	-	1	-	-	2	-	-	-	3	1	1	1
310241.4	Apply Turing machine to propose computation solutions	1	-	-	-	-	-	1	-	-	-	1	2	1	1	1
310241.5	Interpret whether a problem is decidable or not	1	-	-	-	-	-	-	-	1	-	-	2	1	1	1
310241.6	Interpret NP class problems	1	-	-	-	-	-	-	-	-	-	-	2	1	1	1
310242	**Database Management Systems**															
310242.1	Design E-R Model for given requirements and convert the same into database tables.	3	3	2	1	1	-	-	-	-	-	2	2	1	1	1
310242.2	Use database techniques such as SQL & PL/SQL.	3	2	2	2	1	-	-	-	-	1	-	1	1	1	1
310242.3	Use modern database techniques such as NOSQL.	3	3	1	2	1	-	2	-	2	-	-	1	1	1	1
310242.4	Explain transaction Management in relational database System.	2	3	2	2	1	-	-	2	-	2	-	1	1	1	1
310242.5	Describe different database architecture and analyses the use of appropriate architecture in real time environment.	3	3	3	2	1	2	-	-	-	-	1	2	2	1	2
310242.6	Use advanced database Programming concepts	3	3	3	3	1	-	1	-	-	-	-	1	1	1	1
310243	**Software Engineering and Project Management**															
310243.1	Decide on a process model for a developing a software project	2	2	2	1	1	2	3	-	-	3	-	-	1	1	1
310243.2	Classify software applications and Identify unique features of various domains	1	2	1	2	-	-	-	-	-	-	3	-	1	-	1
310243.3	Design test cases of a software system.	2	2	1	1	2	-	-	-	2	2	-	1	1	1	1
310243.4	Understand basics of IT Project management.	2	1	2	1	-	-	-	2	-	-	-	-	1	1	1
310243.5	Plan, schedule and execute a project considering the risk management.	2	2	1	2	-	-	-	-	-	-	2	-	2	1	-
310243.6	Apply quality attributes in software development life cycle.	2	1	2	1	-	-	-	-	-	1	-	-	1	1	1

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310244	**Information Systems and Engineering Economics**																
310244.1	Understand the need, usage and importance of an Information System to an organization.	1	-	1	2	2	1	-	-	-	-	1	1	1	1	1	
310244.2	Understand the activities that are undertaken while managing, designing, planning, implementation, and deployment of computerized information system in an organization.	1	1	1	1	1	-	1			1	-	-	1	1	1	
310244.3	Further the student would be aware of various Information System solutions like ERP, CRM, Data warehouses and the issues in successful implementation of these technology solutions in any organizations	3	1	2	1	2	-	-	-	2	-	-	1	1	1	1	
310244.4	Outline the past history, present position and expected performance of a company engaged in engineering practice or in the computer industry.	1	2	1	2	2	-	-	-	-	-	1	1	1	1	1	
310244.5	Perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives.	1	3	-	-	1	-	1	1	-	-	-	-	1	1	1	
310244.6	Be able to carry out and evaluate benefit/cost, life cycle and breakeven analyses on one or more economic alternatives.	1	-	2	1	-	1	-	-	-	-	-	1	1	1	1	
310245	**Computer Networks**																
310245.1	Analyze the requirements for a given organizational structure to select the most appropriate networking architecture, topologies, transmission mediums, and technologies	3	1	1	2	-	-	-	-	1	-	1	-	1	1	1	
310245.2	Demonstrate design issues, flow control and error control	3	2	1	2	1	-	-	-	-	-	-	-	1	1	1	
310245.3	Analyze data flow between TCP/IP model using Application, Transport and Network Layer Protocols.	2	3	3	3	2	3	2	-	2	-	1	-	1	1	1	
310245.4	Illustrate applications of Computer Network capabilities, selection and usage for various sectors of user community.	1	2	2	2	3	3	-	-	2	1	2	2	1	1	1	
310245.5	Illustrate Client-Server architectures and prototypes by the means of correct standards and technology.	2	2	2	3	3	3	-	-	2	1	2	2	1	1	1	
310245.6	Demonstrate different routing and switching algorithms	2	2	1	2	2	2	-	1	1	-	1	1	1	1	1	
310250	**Design and Analysis of Algorithms**																
310250.1	Formulate the problem	1	3	2	1	-	-	-	1	1	-	-	1	1	1	1	
310250.2	Analyze the asymptotic performance of algorithms.	1	2	1	2	-	1	-	-	1	-	-	1	1	1	1	
310250.3	Decide and apply algorithmic strategies to solve given problem	2	1	2	1	-	1	2	-	1	-	2	1	1	1	1	
310250.4	Find optimal solution by applying various methods	1	2	2	2	2	-	-	-	1	1	-	1	1	1	1	
310250.5	Analyze the performance of merge sort and quick sort algorithms using divide and conquer technique.	1	1	2	1	-	-	-	-	-	-	-	1	1	1	1	
310250.6	Design algorithms using dynamic programming and back tracking methods.	1	2	2	2	-	-	-	-	-	-	-	1	1	1	1	

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310251	**Systems Programming and Operating System**															
310251.1	Analyze and synthesize system software	1	1	2	1	1	-	-	-	-	-	-	-	1	1	1
310251.2	Use tools like LEX & YACC.	-	2	1	3	1	-	-	1	1	-	-	-	1	1	1
310251.3	Implement operating system functions.	2	-	2	1	-	1	-	-	-	1	1	-	-	1	1
310251.4	Understand the concepts related to deadlock and memory management.	1	1	-	-	-	-	1	-	-	-	-	2	1	1	1
310251.5	Understand the concepts of virtual memory management, file system	1	1	-	-	-	-	-	-	-	-	-	2	1	1	1
310251.6	Understand the concepts of secondary storage structure, protection and case study of Linux operating system.	1	1	-	-	-	-	-	-	-	-	-	2	1	1	-
310252	**Embedded Systems and Internet of Things**															
310252.1	Implement an architectural design for IoT for specified requirement	1	2	2	1	-	-	1	3	-	2	2	-	1	1	1
310252.2	Solve the given societal challenge using IoT	1	3	3	2	3	1	-	3	1	2	-	-	1	1	1
310252.3	Choose between available technologies and devices for stated IoT challenge	3	2	2	2	1	1	1	-	-	2	-	-	1	1	1
310252.4	Understand device drivers and interrupt service mechanism.	2	-	-	-	-	-	-	-	-	-	-	2	1	1	1
310252.5	Apply threads, tasks, process, semaphores and RPC for IPC.	2	-	-	-	-	-	-	-	-	-	-	2	1	1	1
310252.6	Develop embedded systems modules using RTOS	2	-	-	-	-	-	-	-	-	-	-	-	1	1	1
310253	**Software Modeling and Design**															
310253.1	Analyze the problem statement (SRS) and choose proper design	1	2	1	-	-	-	-	-	-	-	-	-	1	1	1
310253.2	Design and analyze an application using UML modeling as	1	2	1	-	-	1	-	-	-	1	-	-	1	1	1
310253.3	Apply design patterns to understand reusability in OO design	2	2	1	-	2	-	-	1	-	-	-	1	1	1	1
310253.4	Decide and apply appropriate modern tool for designing and	1	2	2	1	-	-	-	-	1	-	-	-	1	1	1
310253.5	Decide and apply appropriate modern testing tool for testing web-	1	2	2	-	-	2	1	-	-	2	2	-	1	1	1
310253.6	Apply their knowledge of modelling and design to solve	1	2	2	-	2	-	-	-	-	-	-	2	1	1	1
310254	**Web Technology**															
310254.1	Analyze given assignment to select sustainable web development	1	2	2	1	-	-	1	3	-	2	-	-	1	1	-
310254.2	Develop web based application using suitable client side and	1	3	3	2	3	1	-	3	1	2	-	-	-	1	1
310254.3	Develop solution to complex problems using appropriate method, technologies, frameworks, web services and content management	3	2	2	2	1	1	1	-	-	2	1	-	1	1	1
310254.4	Develop Client-Side programs using JavaScript and Server-Side	1	-	2	-	-	-	-	-	-	-	-	2	1	-	1
310254.5	Outline Object Oriented Programming capabilities of PHP.	1	-	2	-	-	-	-	-	-	-	-	2	1	1	1
310254.6	Examine JavaScript frameworks such as jQuery and Backbone.	1	-	2	-	-	-	-	-	-	-	-	2	1	1	1

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Course Code	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
410241	**High Performance Computing**															
410241.1	Describe different parallel architectures, inter-connect networks, programming models	3	2	3	2	2	2	2	1	1	1	1	1	1	1	1
410241.2	Develop an efficient parallel algorithm to solve given problem	2	3	3	1	1	1	1	1	1	1	1	1	1	1	1
410241.3	Analyze and measure performance of modern parallel computing systems	3	2	3	3	3	1	1	1	1	1	1	1	1	1	1
410241.4	Build the logic to parallelize the programming task	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
410242	**Artificial Intelligence and Robotics**															
410242.1	Identify and apply suitable Intelligent agents for various AI applications	2	3	2	3	3	2	2	1	1	1	1	1	1	1	1
410242.2	Design smart system using different informed search / uninformed search or heuristic approaches.	3	3	2	2	1	3	1	1	1	1	1	1	1	1	1
410242.3	Identify knowledge associated and represent it by ontological engineering to plan a strategy to solve given problem.	3	3	2	2	2	1	1	1	1	1	1	2	1	1	1
410242.4	Apply the suitable algorithms to solve AI problems	2	2	3	1	2	1	2	1	1	1	1	1	1	1	1
410243	**Data Analytics**															
410243.1	Write case studies in Business Analytic and Intelligence using mathematical models	3	2	2	3	1	2	2	1	3	1	1	2	1	1	1
410243.2	Present a survey on applications for Business Analytic and Intelligence	3	3	2	2	1	3	1	2	1	1	1	1	1	1	1
410243.3	Provide problem solutions for multi-core or distributed, concurrent/Parallel environments	1	3	2	2	2	1	1	2	1	2	1	2	1	1	1
410244(C)	**Pervasive & Ubiquitous Computing**															
410244(C).1	Design and implement primitive pervasive applications	3	3	2	3	3	2	2	3	1	1	1	1	1	1	1
410244(C).2	Analyze and estimate the impact of pervasive computing on future computing applications and society	2	2	2	2	1	3	1	1	2	2	1	1	1	1	1
410244(C).3	Develop skill sets to propose solutions for problems related to pervasive computing system	3	3	2	2	2	1	1	1	1	1	1	2	1	1	1

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410244(C).4	Design a preliminary system to meet desired needs within the constraints of a particular problem space	1	1	3	1	2	3	2	2	1	1	1	3	1	1	1
410245(B)	**Software Testing and Quality Assurance**															
410245(B).1	Describe fundamental concepts in software testing such as manual testing, automation testing and software quality	2	3	2	3	3	2	2	3	1	1	1	1	1	1	1
410245(B).2	Design and develop project test plan, design test cases, test data, and conduct test operations	2	2	2	2	1	3	1	1	2	2	1	2	1	1	1
410245(B).3	Apply recent automation tool for various software testing for	3	3	2	2	2	1	3	2	1	1	3	2	1	1	1
410245(B).4	Apply different approaches of quality management, assurance, and quality standard to software system	3	1	3	1	3	3	2	2	1	1	1	3	1	1	1
410245(B).5	Apply and analyze effectiveness Software Quality Tools	2	3	2	3	2	1	1	1	1	2	1	1	1	1	1
410250	**Machine Learning**															
410250.1	Distinguish different learning based applications	3	2	3	2	2	2	2	1	1	1	1	1	1	1	1
410250.2	Apply different preprocessing methods to prepare training data set for machine learning.	2	3	3	1	1	1	1	1	1	1	1	1	1	1	1
410250.3	Design and implement supervised and unsupervised machine	3	2	3	3	3	1	1	1	1	1	1	1	1	1	1
410250.4	Implement different learning models	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
410250.5	Learn Meta classifiers and deep learning concepts	2	3	3	3	1	1	2	1	1	1	1	1	1	1	1
410251	**Information and Cyber Security**															
410251.1	Gauge the security protections and limitations provided by today's	3	2	3	2	2	2	**2**	1	2	1	2	1	1	1	1
410251.2	Identify information security and cyber security threats.	2	3	3	2	1	1	1	1	1	1	1	1	1	1	1
410251.3	Analyze threats in order to protect or defend it in cyberspace from	3	3	3	3	3	1	2	1	1	1	2	1	1	1	1
410251.4	Build appropriate security solutions against cyber-attacks.	3	3	3	1	1	1	3	2	1	2	1	2	1	1	1
410252(C)	**Embedded & Real Time Operating System**															
410252(C).1	Recognize and classify embedded and real-time systems.	3	2	3	2	2	2	2	1	1	1	1	1	1	1	1
410252(C).2	Explain communication bus protocols used for embedded and real-time systems.	2	3	3	1	1	1	2	2	1	1	2	1	1	1	1
410252(C).3	Classify and exemplify scheduling algorithms.	3	2	3	3	3	2	1	1	1	1	1	1	1	1	1
410252(C).4	Apply software development process to a given RTOS application.	3	2	3	3	2	1	2	1	1	1	1	3	1	1	1

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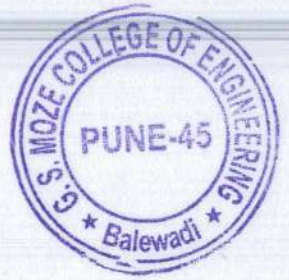
410252(C).5	Design a given RTOS based application.	3	3	3	3	1	1	2	3	1	3	1	1	1	1	1
410253	**Cloud Computing**															
410253.1	To install cloud computing environments.	3	2	3	2	2	2	2	2	2	2	1	2	1	1	1
410253.2	To develop any one type of cloud.	3	3	3	2	1	1	3	2	1	1	2	1	1	1	1
410253.3	To explore future trends of cloud computing.	3	2	2	3	3	3	1	1	2	3	1	2	1	1	1



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" EMPOWERMENT THROUGH TECHNOLOGICAL EXCELLENCE "

GENBA SOPANRAO MOZE COLLEGE OF ENGINEERING

Department of Computer Engineering

Academic Year 2020-21

Sr. No.	Course Code	Course Name
		Semester - III
1	210241	Discrete Mathematics
2	210242	Fundamentals of Data Structures
3	210243	Object Oriented Programming(OOP)
4	210244	Computer Graphics
5	210245	Digital Electronics and Logic Design
		Semester - IV
6	207003	Engineering Mathematics III
7	210252	Data Structures and Algorithms
8	210253	Software Engineering
9	210254	Microprocessor
10	210255	Principles of Programming Languages
		Semester - V
11	310241	Theory of Computation
12	310242	Database Management Systems
13	310243	Software Engineering and Project Management
14	310244	Information Systems and Engineering Economics
15	310245	Computer Networks
		Semester - VI
16	310250	Design and Analysis of Algorithms
17	310251	Systems Programming and Operating System
18	310252	Embedded Systems and Internet of Things
19	310253	Software Modeling and Design
20	310254	Web Technology
		Semester – VII
20	410241	High Performance Computing
21	410242	Artificial Intelligence and Robotics
22	410243	Data Analytics
23	410244(C)	Pervasive & Ubiquitous Computing
24	410245(B)	Software Testing and Quality Assurance
		Semester – VIII
25	410250	Machine Learning
26	410251	Information and Cyber Security
27	410252(C)	Embedded & Real Time Operating System
28	410253(C)	Cloud Computing

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Academic Year 2020-21

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Course Code	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
210241	**Discrete Mathematics**															
210241.1	Design and analyze real world engineering problems by applying set theory, propositional logic and mathematical induction	1	1	2	1	-	-	-	-	-	-	-	-	1	1	1
210241.2	Develop skill in expressing mathematical properties of relation and function	1	2	-	2	-	-	-	-	-	-	-	-	1	1	1
210241.3	Identify number of logical possibilities of events to design professional engineering Solutions	2	1	2	1	-	-	-	-	-	-	-	-	-	2	1
210241.4	Model and solve computing problem using tree and graph Analyze the properties of binary operations and evaluate the algebraic structure	1	2	-	2	-	-	-	-	-	-	-	-	1	1	1
210241.5	Apply abstract algebra in combinatorics, coding theory and questions regarding geometric constructions	-	-	2	-	-	-	-	-	-	-	-	-	1	1	-
210241.6	Analysis concept of Algebric structures	-	2	1	2	-	-	-	-	-	-	-	-	1	2	1
210242	**Fundamentals of Data Structures**															
210242.1	Design the algorithms to solve the programming problems, identify appropriate algorithmic strategy for specific application, and analyze the time and space complexity.	2	2	1	2	-	-	-	-	-	-	-	-	1	1	1
210242.2	Discriminate the usage of various structures, Design/Program/Implement the appropriate data structures; use them in implementations of abstract data types and Identity the appropriate data structure in approaching the problem solution.	1	2	2	1	-	-	-	-	-	-	-	-	1	1	1
210242.3	Demonstrate use of sequential data structures- Array and Linked lists to store and process data.	1	1	1	-	-	-	-	-	-	-	-	-	1	1	1
210242.4	Understand the computational efficiency of the principal algorithms for searching and sorting and choose the most efficient one for the application.	1		1	-	-	-	-	-	-	-	-	-	1	1	1
210242.5	Compare and contrast different implementations of data structures (dynamic and static).	1	1		1	-	-	-	-	-	-	-	-	1	1	1
210242.6	Understand, Implement and apply principles of data structures-stack and queue to solve computational problems.	1	1	1	1	1	-	-	-	-	-	-	-	1	1	1

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210243	**Object Oriented Programming(OOP)**																
210243.1	Apply constructs- sequence, selection and iteration; classes and objects, inheritance, use of predefined classes from libraries while developing software	2	1	1	1	-	-	-	-	-	-	-		1	1	1	
210243.2	Design object-oriented solutions for small systems involving multiple objects	1	2	1	1	-	-	-	-	-	-	-	1	1	1	1	
210243.3	Use virtual and pure virtual function and complex programming situations.	2	1	2	2	-	-	-	-	-	-	-		1	1	1	
210243.4	Apply object-oriented software principles in problem solving.	2	1	2	1	-	-	-	-	-	-	-	1	1	1	1	
210243.5	Analyze the strengths of object-oriented programming.	-	1	-	1	-	-	-	-	-	-	-		1	1	1	
210243.6	Develop the application using object oriented programming language(C++).	-	-	1	-	-	-	-	-	-	-	-	1	1	1	1	
210244	**Computer Graphics**																
210244.1	Identify the basic terminologies of Computer Graphics and interpret the mathematical foundation of the concepts of computer graphics.	2	1	1	-	-	-	-	-	-	-	-	-	1	1	1	
210244.2	Apply mathematics to develop Computer programs for elementary graphic operations structure in approaching the problem solution.	3	-	1	1	-	-	-	-	-	-	-	-	1	1	1	
210244.3	Illustrate the concepts of windowing and clipping and apply various algorithms to fill and clip polygons.	1	2	-	1	-	-	-	-	-	-	-	-	1	1	1	
210244.4	Understand and apply the core concepts of computer graphics, including transformation in two and three dimensions, viewing and projection.	2	1	1	1	-	-	-	-	-	-	-	-	1	1	1	
210244.5	Understand the concepts of color models, lighting, shading models and hidden surface elimination.	1	-	1		-	-	-	-	-	-	-	-	1	1	1	
210244.6	Create effective programs using concepts of curves, fractals, animation and gaming.	-	2	2	1	-	-	-	-	-	-	-	-	1	1	1	

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210245	**Digital Electronics and Logic Design**															
210245.1	Simplify Boolean Expressions using K Map.	2	-	2	-	-	-	-	-	-	-	-	-	1	1	1
210245.2	Design and implement combinational circuits.	2	1	2	-	-	-	-	-	-	-	-	-	1	1	1
210245.3	Design and implement sequential circuits	2	1	2	-	-	-	-	-	-	-	-	-	1	1	1
210245.4	Develop simple real-world application using ASM and PLD	2	-	2	1	-	-	-	-	-	-	-	-	1	1	1
210245.5	Differentiate and Choose appropriate logic families IC packages as per the given design specifications.	2	2	-	-	-	-	-	-	-	-	-	-	1	1	1
210245.6	Explain organization and architecture of computer system	2	-	-	-	-	-	-	-	-	-	-	-	1	1	1
207003	**Engineering Mathematics III**															
207003.1	Solve Linear differential equations, essential in modelling and design of computer-based systems.	3	2	3	2	2	2	2	-	-	-	-	-	1	1	1
207003.2	Apply concept of Fourier transform and Z-transform and its applications to continuous and discrete systems and image processing.	2	3	3	1	1	1	1	-	-	-	-	-	1	1	1
207003.3	Apply Statistical methods like correlation and regression analysis and probability theory for data analysis and predictions in machine learning.	3	2	3	3	3	1	1	-	-	-	-	-	1	1	1
207003.4	Solve Algebraic and Transcendental equations and System of linear equations using numerical techniques.	3	3	3	1	1	1	2	-	-	-	-	-	1	1	1
207003.5	Obtain Interpolating polynomials, numerical differentiation and integration, numerical solutions of ordinary differential equations used in modern scientific computing.	2	3	2	3	1	1	1	-	-	-	-	-	1	1	1
210252.6	Use appropriate modern tools to understand and analyze the functionalities confined to the secondary storage.	3	1	3	1	3	1	1	-	-	-	-	-	1	1	1
210252	**Data Structures and Algorithms**															
210252.1	Identify and articulate the complexity goals and benefits of a good hashing scheme for real- world applications.	2	1	2	1	-	-	-	-	-	-	-	-	1	1	1
210252.2	Apply non-linear data structures for solving problems of various domain.	1	2	-	-	-	-	-	-	-	-	-	-	1	1	1
210252.3	Design and specify the operations of a nonlinear-based abstract data type and implement them in a high-level programming language.	2	-	-	-	-	-	-	-	-	-	-	-	1	1	1
210252.4	Analyze the algorithmic solutions for resource requirements and optimization		2	-	1	-	-	-	-	-	-	-	-	1	1	1
210252.5	Use efficient indexing methods and multiway search techniques to store and maintain data.	1		1	1	-	-	-	-	-	-	-	-	1	1	1
210252.6	Use appropriate modern tools to understand and analyze the functionalities confined to the secondary storage.	2	1	1	1	-	-					-	-	1	1	1

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210253	Software Engineering															
210253.1	Analyze software requirements and formulate design solution for a software.	-	2	-	-	-	-	-	-	-	-	-	-	1	1	1
210253.2	Design applicable solutions in one or more application domains using software engineering approaches that integrate ethical, social, legal and economic concerns.	1	-	-	-	-	2	2	2	-	-	-	-	1	1	1
210253.3	Apply new software models, techniques and technologies to bring out innovative and novelistic solutions for the growth of the society in all aspects and evolving into their continuous professional development.	-	-	2	-	-	-	-	-	-	-	-	-	1	1	1
210253.4	Model and design User interface and component-level.	-	2	2	-	-	-	-	-	-	-	-	-	1	1	1
210253.5	Identify and handle risk management and software configuration management.	-	2	2	-	-	-	-	-	-	-	-	-	1	1	1
210253.6	Utilize knowledge of software testing approaches, approaches to verification and validation.	-	2	2	-	-	-	-	-	-	-	-	-	1	1	1
210253.7	Construct software of high quality – software that is reliable and that is reasonably easy to understand, modify and maintain efficient, reliable, robust and cost-effective software solutions.	1	-	1	1	-	-	-	-	-	-	-	-	1	1	1
210254	**Microprocessor**															
210254.1	Exhibit skill of assembly language programming for the application.	2	2	2	2	-	-	-	-	-	-	-	-	1	1	1
210254.2	Classify Processor architectures.	2	-	1	-	-	-	-	-	-	-	-	-	1	1	1
210254.3	Illustrate advanced features of 80386 Microprocessor.	2	-	2	-	-	-	-	-	-	-	-	-	1	1	1
210254.4	Compare and contrast different processor modes.	2	-	2	-	-	-	-	-	-	-	-	-	1	1	1
210254.5	Use interrupts mechanism in applications	2	-	2	-	-	-	-	-	-	-	-	-	1	1	1
210254.6	Differentiate between Microprocessors and Microcontrollers.	2	1	-	-	-	-	-	-	-	-	-	-	1	1	1
210254.7	Identify and analyze the tools and techniques used to design, implement, and debug microprocessor-based systems.	2	1	1	1	-	-	-	-	-	-	-	-	1	1	1
210255	**Principles of Programming Languages**															
210255.1	Describe project life cycle and the domains of Project ManagementDescribe project life cycle and the domains of Project Management	2	2	2	2	-	-	-	-	-	-	-	-	1	1	1
210255.2	Explain networking methods and their applications in planning and management	2	-	1	-	-	-	-	-	-	-	-	-	1	1	1
210255.3	Categorize the materials as per their annual usage and also Calculate production rate of construction equipment	2	-	2	-	-	-	-	-	-	-	-	-	1	1	1
210255.4	Demonstrates resource allocation techniques and apply it for manpower planning.	2	-	2	-	-	-	-	-	-	-	-	-	1	1	1
210255.5	Understand economical terms and different laws associated with project management	2	-	2	-	-	-	-	-	-	-	-	-	1	1	1
210255.6	Apply the methods of project selection and recommend the best economical project	2	1	-	-	-	-	-	-	-	-	-	-	1	1	1

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Course Code	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
310241	**Theory of Computation**															
310241.1	Design deterministic Turing machine for all inputs and all outputs	2	2	3	1	-	-	-	1	-	-	-	3	1	1	-
310241.2	Subdivide problem space based on input subdivision using constraints	-	2	3	-	-	2	-	-	-	-	-	3	1	1	1
310241.3	Apply linguistic theory	-	2	3	-	1	-	-	-	-	-	-	3	-	1	1
310241.4	Apply Turing machine to propose computation solutions	1	-	-	-	-	-	-	-	-	-	-	2	1	1	1
310241.5	Interpret whether a problem is decidable or not	1	-	-	-	-	-	-	-	-	-	-	2	1	-	1
310241.6	Interpret NP class problems	1	-	-	-	-	-	-	-	-	-	-	2	1	1	1
310242	**Database Management Systems**															
310242.1	Design E-R Model for given requirements and convert the same into database tables.	3	3	2	2	1	-	-	-	-	-	-	2	1	1	-
310242.2	Use database techniques such as SQL & PL/SQL.	3	3	2	2	1	-	-	-	-	-	-	1	1	1	1
310242.3	Use modern database techniques such as NOSQL.	2	2	3	2	2	-	-	-	-	-	-	1	-	1	1
310242.4	Explain transaction Management in relational database System.	3	3	2	3	1	-	-	-	-	-	-	1	1	1	1
310242.5	Describe different database architecture and analyses the use of appropriate architecture in real time environment.	2	3	3	2	1	-	-	-	-	-	-	2	1	-	1
310242.6	Use advanced database Programming concepts	3	3	3	3	1	-	-	-	-	-	-	1	1	1	1
310243	**Software Engineering and Project Management**															
310243.1	Decide on a process model for a developing a software project	2	2	2	1	-	-	-	-	-	-	-	-	1	-	1
310243.2	Classify software applications and Identify unique features of various domains	3	2	1	2	-	-	-	-	-	-	-	-	1	1	1
310243.3	Design test cases of a software system.	2	2	1	1	-	-	-	-	-	-	-	-	1	1	1
310243.4	Understand basics of IT Project management.	2	1	2	1	-	-	-	-	-	-	-	-	-	1	1
310243.5	Plan, schedule and execute a project considering the risk management.	3	2	1	2	-	-	-	-	-	-	-	-	1	1	1
310243.6	Apply quality attributes in software development life cycle.	2	1	2	1	-	-	-	-	-	-	-	-	1	1	-

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310244	**Information Systems and Engineering Economics**															
310244.1	Understand the need, usage and importance of an Information System to an organization.	1	-	1	2	2	1	-	-	-	-	1	1	1	1	1
310244.2	Understand the activities that are undertaken while managing, designing, planning, implementation, and deployment of computerized information system in an organization.	1	1	1	1	1	-	1			1	-	-	-	1	-
310244.3	Further the student would be aware of various Information System solutions like ERP, CRM, Data warehouses and the issues in successful implementation of these technology solutions in any organizations	3	1	2	1	2	-	-	-	-	-	-	1	1	1	1
310244.4	Outline the past history, present position and expected performance of a company engaged in engineering practice or in the computer industry.	1	2	1	2	2	-	-	-	-	-	1	1	1	-	1
310244.5	Perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives.	1	3	-	-	1	-	1	1	-	-	-	-	1	1	1
310244.6	Be able to carry out and evaluate benefit/cost, life cycle and breakeven analyses on one or more economic alternatives.	1	-	2	1	-	1	-	-	-	-	-	1	1	1	1
310245	**Computer Networks**															
310245.1	Analyze the requirements for a given organizational structure to select the most appropriate networking architecture, topologies, transmission mediums, and technologies	3	1	1	2	-	-	-	-	1	-	1	-	1	1	-
310245.2	Demonstrate design issues, flow control and error control	3	2	1	2	1	-	-	-	-	-	-	-	1	1	1
310245.3	Analyze data flow between TCP/IP model using Application, Transport and Network Layer Protocols.	2	3	3	3	2	3	-	-	2	-	1	-	-	1	1
310245.4	Illustrate applications of Computer Network capabilities, selection and usage for various sectors of user community.	1	2	2	2	3	3	-	-	2	1	2	2	1	1	1
310245.5	Illustrate Client-Server architectures and prototypes by the means of correct standards and technology.	2	2	2	3	3	3	-	-	2	1	2	2	1	-	1
310245.6	Demonstrate different routing and switching algorithms	2	2	1	2	2	2	-	1	1	-	1	1	1	1	1
310250	**Design and Analysis of Algorithms**															
310250.1	Formulate the problem	1	3	2	1	-	-	-	1	1	-	-	1	1	1	1
310250.2	Analyze the asymptotic performance of algorithms.	1	2	1	2	-	1	-	-	1	-	-	1	1	1	-
310250.3	Decide and apply algorithmic strategies to solve given problem	2	1	2	1	-	1	-	-	1	-	-	1	-	1	1
310250.4	Find optimal solution by applying various methods	1	2	2	2	2	-	-	-	1	1	-	1	1	1	1
310250.5	Analyze the performance of merge sort and quick sort algorithms using divide and conquer technique.	1	1	2	1	-	-	-	-	-	-	-	1	1	1	1
310250.6	Design algorithms using dynamic programming and back tracking methods.	1	2	2	2	-	-	-	-	-	-	-	1	1	-	1

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310251	**Systems Programming and Operating System**																
310251.1	Analyze and synthesize system software	1	1	2	1	1	-	-	-	-	-	-	-	1	1	1	
310251.2	Use tools like LEX & YACC.	-	2	1	3	1	-	-	-	1	-	-	-	-	1	-	
310251.3	Implement operating system functions.	2	-	2	1	-	1	-	-	-	-	1	-	1	1	1	
310251.4	Understand the concepts related to deadlock and memory management.	1	1	-	-	-	-	-	-	-	-	-	2	1	1	1	
310251.5	Understand the concepts of virtual memory management, file system	1	1	-	-	-	-	-	-	-	-	-	2	1	1	1	
310251.6	Understand the concepts of secondary storage structure, protection and case study of Linux operating system.	1	1	-	-	-	-	-	-	-	-	-	2	1	-	1	
310252	**Embedded Systems and Internet of Things**																
310252.1	Implement an architectural design for IoT for specified requirement	1	2	2	1	-	-	1	3	-	2	-	-	1	-	1	
310252.2	Solve the given societal challenge using IoT	1	3	3	2	3	1	-	3	1	2	-	-	1	1	1	
310252.3	Choose between available technologies and devices for stated IoT challenge	3	2	2	2	1	1	1	-	-	2	-	-	-	1	1	
310252.4	Understand device drivers and interrupt service mechanism.	2	-	-	-	-	-	-	-	-	-	-	2	1	1	1	
310252.5	Apply threads, tasks, process, semaphores and RPC for IPC.	2	-	-	-	-	-	-	-	-	-	-	2	1	1	1	
310252.6	Develop embedded systems modules using RTOS	2	-	-	-	-	-	-	-	-	-	-	-	1	1	-	
310253	**Software Modeling and Design**																
310253.1	Analyze the problem statement (SRS) and choose proper design	3	2	1	-	-	-	-	-	-	-	-	-	1	1	1	
310253.2	Design and analyze an application using UML modeling as	1	2	1	-	-	-	-	-	-	-	-	-	-	1	-	
310253.3	Apply design patterns to understand reusability in OO design	1	2	1	-	2	-	-	-	-	-	-	-	1	1	1	
310253.4	Decide and apply appropriate modern tool for designing and	3	3	2	1	-	-	-	-	-	-	-	-	1	1	1	
310253.5	Decide and apply appropriate modern testing tool for testing web-	1	2	2	-	-	-	-	-	-	-	-	-	1	1	1	
310253.6	Apply their knowledge of modelling and design to solve	1	2	2	-	-	-	-	-	-	-	-	-	1	-	1	
310254	**Web Technology**																
310254.1	Analyze given assignment to select sustainable web development	1	2	2	1	-	-	1	3	-	2	-	-	1	1	1	
310254.2	Develop web based application using suitable client side and	1	3	3	2	3	1	-	3	1	2	-	-	1	-	1	
310254.3	Develop solution to complex problems using appropriate method, technologies, frameworks, web services and content management	3	2	2	2	1	1	1	-	-	2	-	-	1	1	1	
310254.4	Develop Client-Side programs using JavaScript and Server-Side	1	-	2	-	-	-	-	-	-	-	-	2	-	1	1	
	[illegible]	3	-	1	-	-	-	-	-	-	-	-	2	1	1	1	
	[illegible]	1	-	2	-	-	-	-	-	-	-	-	2	1	1	-	

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Course Code	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
410241	**High Performance Computing**															
410241.1	Describe different parallel architectures, inter-connect networks, programming models	3	2	3	2	2	2	2	1	1	1	1	1	1	1	1
410241.2	Develop an efficient parallel algorithm to solve given problem	2	3	3	1	1	1	1	1	1	1	1	1	1	1	1
410241.3	Analyze and measure performance of modern parallel computing systems	3	2	3	3	3	1	1	1	1	1	1	1	1	1	1
410241.4	Build the logic to parallelize the programming task	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
410242	**Artificial Intelligence and Robotics**															
410242.1	Identify and apply suitable Intelligent agents for various AI applications	2	3	2	3	3	2	2	1	1	1	1	1	1	1	1
410242.2	Design smart system using different informed search / uninformed search or heuristic approaches.	3	3	2	2	1	3	1	1	1	1	1	1	1	1	1
410242.3	Identify knowledge associated and represent it by ontological engineering to plan a strategy to solve given problem.	3	3	2	2	2	1	1	1	1	1	1	2	1	1	1
410242.4	Apply the suitable algorithms to solve AI problems	2	2	3	1	2	1	2	1	1	1	1	1	1	1	2
410243	**Data Analytics**															
410243.1	Write case studies in Business Analytic and Intelligence using mathematical models	3	2	2	3	1	2	2	1	3	1	1	2	1	1	1
410243.2	Present a survey on applications for Business Analytic and Intelligence	3	3	2	2	1	3	1	2	1	1	1	1	2	1	1
410243.3	Provide problem solutions for multi-core or distributed, concurrent/Parallel environments	1	3	2	2	2	1	1	2	1	2	1	2	2	1	1
410244(C)	**Pervasive & Ubiquitous Computing**															
410244(C).1	Design and implement primitive pervasive applications	3	3	2	3	3	2	2	3	1	1	1	1	2	1	1
410244(C).2	Analyze and estimate the impact of pervasive computing on future computing applications and society	2	2	2	2	1	3	1	1	2	2	1	1	1	1	1
410244(C).3	Develop skill sets to propose solutions for problems related to pervasive computing system	3	3	2	2	2	1	1	1	1	1	1	2	1	1	1

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410244(C).4	Design a preliminary system to meet desired needs within the constraints of a particular problem space	1	1	3	1	2	3	2	2	1	1	1	3	1	1	2
410245(B)	**Software Testing and Quality Assurance**															
410245(B).1	Describe fundamental concepts in software testing such as manual testing, automation testing and software quality	2	3	2	3	3	2	2	3	1	1	1	1	1	1	1
410245(B).2	Design and develop project test plan, design test cases, test data, and conduct test operations	2	2	2	2	1	3	1	1	2	2	1	2	1	1	1
410245(B).3	Apply recent automation tool for various software testing for	3	3	2	2	2	1	3	2	1	1	3	2	1	1	1
410245(B).4	Apply different approaches of quality management, assurance, and quality standard to software system	3	1	3	1	3	3	2	2	1	1	1	3	1	1	1
410245(B).5	Apply and analyze effectiveness Software Quality Tools	2	3	2	3	2	1	1	1	1	2	1	1	1	1	1
410250	**Machine Learning**															
410250.1	Distinguish different learning based applications	3	2	3	2	2	2	2	1	1	1	1	1	1	1	1
410250.2	Apply different preprocessing methods to prepare training data set for machine learning.	2	3	3	1	1	1	1	1	1	1	1	1	1	1	1
410250.3	Design and implement supervised and unsupervised machine	3	2	3	3	3	1	1	1	1	1	1	1	1	1	1
410250.4	Implement different learning models	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1
410250.5	Learn Meta classifiers and deep learning concepts	2	3	3	3	1	1	2	1	1	1	1	1	1	1	1
410251	**Information and Cyber Security**															
410251.1	Gauge the security protections and limitations provided by today's	3	2	3	2	2	2	**2**	1	2	1	2	1	2	1	1
410251.2	Identify information security and cyber security threats.	2	3	3	2	1	1	1	1	1	1	1	1	1	1	1
410251.3	Analyze threats in order to protect or defend it in cyberspace from	3	3	3	3	3	1	2	1	1	1	2	1	2	1	1
410251.4	Build appropriate security solutions against cyber-attacks.	3	3	3	1	1	1	3	2	1	2	1	2	1	1	1
410252(C)	**Embedded & Real Time Operating System**															
410252(C).1	Recognize and classify embedded and real-time systems.	3	2	3	2	2	2	2	1	1	1	1	1	1	1	2
410252(C).2	Explain communication bus protocols used for embedded and real-time systems.	2	3	3	1	1	1	2	2	1	1	2	1	1	1	1
410252(C).3	Classify and exemplify scheduling algorithms.	3	2	3	3	3	2	1	1	1	1	1	1	1	2	1
410252(C).4	Apply software development process to a given RTOS application.	3	2	3	2	2	1	2	1	1	1	1	3	1	1	1

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410252(C).5	Design a given RTOS based application.	3	3	3	3	1	1	2	3	1	3	1	1	1	1	1
410253	**Cloud Computing**															
410253.1	To install cloud computing environments.	3	2	3	2	2	2	2	2	2	2	1	2	1	1	2
410253.2	To develop any one type of cloud.	3	3	3	2	1	1	3	2	1	1	2	1	3	2	1
410253.3	To explore future trends of cloud computing.	3	2	2	3	3	3	1	1	2	3	1	2	1	2	2

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" EMPOWERMENT THROUGH TECHNOLOGICAL EXCELLENCE "
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Department of Computer Engineering
Academic Year 2021-22

Sr. No.	Course Code	Course Name
Semester - III		
1	210241	DiscreteMathematics
2	210242	Fundamentals of Data Structures
3	210243	Object Oriented Programming (OOP)
4	210244	Computer Graphics
5	210245	Digital Electronics and Logic Design
Semester - IV		
6	207003	Engineering Mathematics III
7	210252	Data Structures and Algorithms
8	210253	Software Engineering
9	210254	Microprocessor
10	210255	Principlesof Programming Languages
Semester - V		
11	310241	Database Management Systems
12	310242	Theory of Computation
13	310243	Systems Programming and Operating System
14	310244	Computer Networks and Security
15	310245(A)	Internet of Things and Embedded Systems
Semester - VI		
31	310251	Data Science and Big Data Analytics
17	310252	Web Technology
18	310253	Artificial Intelligence
19	310254(C)	Cloud Computing
Semester - VII 2015 pattern		
20	410241	High Performance Computing
21	410242	Artificial Intelligence
22	410243	Data Analytic
23	410244(C)	Pervasive & Ubiquitous Computing
24	410245(B)	Software Testing and Quality Assurance
Semester - VIII 2015 pattern		
25	410250	Machine Learning
26	410251	Information and Cyber Security
27	410252(C)	Embedded & Real Time Operating System
28	410253	Cloud Computing

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Course Code	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
210241	**Discrete Mathematics**															
210241.1	Design and analyze real world engineering problems by applying set theory, propositional logic and mathematical induction	3	3	3	2	-	-	-	-	-	-	-	-	1	1	1
210241.2	Develop skill in expressing mathematical properties of relation and function	3	3	3	2	-	-	-	-	-	-	-	-	1	1	1
210241.3	Identify number of logical possibilities of events to design professional engineering Solutions	3	3	3	2	-	-	-	-	-	-	-	-	1	1	1
210241.4	Model and solve computing problem using tree and graph Analyze the properties of binary operations and evaluate the algebraic structure	3	3	3	2	-	-	-	-	-	-	-	-	1	1	1
210241.5	Apply abstract algebra in combinatorics, coding theory and questions regarding geometric constructions	3	3	3	2	-	-	-	-	-	-	-	-	1	1	1
210241.6	Analysis concept of Algebric structures	3	3	3	2	-	-	-	-	-	-	-	-	1	1	1
210242	**Fundamentals of Data Structures**															
210242.1	Design the algorithms to solve the programming problems, identify appropriate algorithmic strategy for specific application, and analyze the time and space complexity.	2	2	1	2	-	-	-	-	-	-	-	-	1	1	1
210242.2	Discriminate the usage of various structures, Design/Program/Implement the appropriate data structures; use them in implementations of abstract data types and Identity the appropriate data structure in approaching the problem solution.	1	2	2	1	-	-	-	-	-	-	-	-	1	1	1
210242.3	Demonstrate use of sequential data structures- Array and Linked lists to store and process data.	1	1	1	-	-	-	-	-	-	-	-	-	1	1	1
210242.4	Understand the computational efficiency of the principal algorithms for searching and sorting and choose the most efficient one for the application.	1	-	1	-	-	-	-	-	-	-	-	-	1	1	1
210242.5	Compare and contrast different implementations of data structures (dynamic and static).	1	1	-	1	-	-	-	-	-	-	-	-	1	1	1
210242.6	Understand, Implement and apply principles of data structures-stack and queue to solve computational problems.	1	1	1	1	1	-	-	-	-	-	-	-	1	1	1

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210243	**Object Oriented Programming(OOP)**																
210243.1	Apply constructs- sequence, selection and iteration; classes and objects, inheritance, use of predefined classes from libraries while developing software	2	1	1	1	-	-	-	-	-	-	-	-	1	1	1	
210243.2	Design object-oriented solutions for small systems involving multiple objects	1	2	1	1	-	-	-	-	-	-	-	1	1	1	1	
210243.3	Use virtual and pure virtual function and complex programming situations.	2	1	2	2	-	-	-	-	-	-	-	-	1	1	1	
210243.4	Apply object-oriented software principles in problem solving.	2	1	2	1	-	-	-	-	-	-	-	1	1	1	1	
210243.5	Analyze the strengths of object-oriented programming.	-	1	-	1	-	-	-	-	-	-	-	-	1	1	1	
210243.6	Develop the application using object oriented programming language(C++).	-	-	1	-	-	-	-	-	-	-	-	1	1	1	1	
210244	**Computer Graphics**																
210244.1	Identify the basic terminologies of Computer Graphics and interpret the mathematical foundation of the concepts of computer graphics.	2	1	1	-	-	-	-	-	-	-	-	-	1	1	1	
210244.2	Apply mathematics to develop Computer programs for elementary graphic operations.structure in approaching the problem solution.	3	-	1	1	-	-	-	-	-	-	-	-	1	1	1	
210244.3	Illustrate the concepts of windowing and clipping and apply various algorithms to fill and clip polygons.	1	2		1	-	-	-	-	-	-	-	-	1	1	1	
210244.4	Understand and apply the core concepts of computer graphics, including transformation in two and three dimensions, viewing and projection.	2	1	1	1	-	-	-	-	-	-	-	-	1	1	1	
210244.5	Understand the concepts of color models, lighting, shading models and hidden surface elimination.	1	-	1	-	-	-	-	-	-	-	-	-	1	1	1	
210244.6	Create effective programs using concepts of curves, fractals, animation and gaming.	-	2	2	1	-	-	-	-	-	-	-	-	1	1	1	

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210245	**Digital Electronics and Logic Design**	2	-	2	-	-	-	-	-	-	-	-	-	1	-	-	
210245.1	Simplify Boolean Expressions using K Map.	2	1	2	-	-	-	-	-	-	-	-	-	1	-	-	
210245.2	Design and implement combinational circuits.	2	1	2	-	-	-	-	-	-	-	-	-	1	-	-	
210245.3	Design and implement sequential circuits	2	-	2	1	-	-	-	-	-	-	-	-	1	-	-	
210245.4	Develop simple real-world application using ASM and PLD	2	2	-	-	-	-	-	-	-	-	-	-	1	-	-	
210245.5	Differentiate and Choose appropriate logic families IC packages as per the given design specifications.	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-	
210245.6	Explain organization and architecture of computer system																
207003	**Engineering Mathematics III**	3	2	3	2	2	2	2	1	1	1	1	1	1	1	1	
207003.1	Solve Linear differential equations, essential in modelling and design of computer-based systems.	2	3	3	1	1	1	1	1	1	1	1	1	1	1	1	
207003.2	Apply concept of Fourier transform and Z-transform and its applications to continuous and discrete systems and image processing.	3	2	3	3	3	1	1	1	1	1	1	1	1	1	1	
207003.3	Apply Statistical methods like correlation and regression analysis and probability theory for data analysis and predictions in machine learning.	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1	
207003.4	Solve Algebraic and Transcendental equations and System of linear equations using numerical techniques.	2	3	2	3	1	1	1	1	1	1	1	1	1	1	1	
207003.5	Obtain Interpolating polynomials, numerical differentiation and integration, numerical solutions of ordinary differential equations used in modern scientific computing.	3	1	3	1	3	1	1	1	1	1	1	1	1	1	1	
210252.6	Use appropriate modern tools to understand and analyze the functionalities confined to the secondary storage.																
210252	**Data Structures and Algorithms**	2	1	2	1	-	-	-	-	-	-	-	-	1	1	1	
210252.1	Identify and articulate the complexity goals and benefits of a good hashing scheme for real- world applications.	1	2	-	-	-	-	-	-	-	-	-	-	1	1	1	
210252.2	Apply non-linear data structures for solving problems of various domain.	2	-	-	-	-	-	-	-	-	-	-	-	1	1	1	
210252.3	Design and specify the operations of a nonlinear-based abstract data type and implement them in a high-level programming language.	-	2	-	1	-	-	-	-	-	-	-	-	1	1	1	
210252.4	Analyze the algorithmic solutions for resource requirements and optimization	1	-	1	1	-	-	-	-	-	-	-	-	1	1	1	
210252.5	Use efficient indexing methods and multiway search techniques to store and maintain data.	2	1	1	1	-	-	-	-	-	-	-	-	1	1	1	
210252.6	Use appropriate modern tools to understand and analyze the functionalities confined to the secondary storage.																

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210253	**Software Engineering**	-	2	-	-	-	-	-	-	-	-	-	-	-	1	1	1
210253.1	Analyze software requirements and formulate design solution for a software.	1	-	-	-	-	2	2	2	-	-	-	-	-	1	1	1
210253.2	Design applicable solutions in one or more application domains using software engineering approaches that integrate ethical, social, legal and economic concerns.	-	-	2	-	-	2	-	-	-	-	-	-	-	1	1	1
210253.3	Apply new software models, techniques and technologies to bring out innovative and novelistic solutions for the growth of the society in all aspects and evolving into their continuous professional development.	-	2	2	-	-	-	-	-	-	-	-	-	-	1	1	1
210253.4	Model and design User interface and component-level.	-	2	2	-	-	-	-	-	-	-	-	-	-	1	1	1
210253.5	Identify and handle risk management and software configuration management.	-	2	2	-	-	-	-	-	-	-	-	-	-	1	1	1
210253.6	Utilize knowledge of software testing approaches, approaches to verification and validation.	1	-	1	1	-	-	-	-	-	-	-	-	-	1	1	1
210253.7	Construct software of high quality – software that is reliable and that is reasonably easy to understand, modify and maintain efficient, reliable, robust and cost-effective software solutions.																
210254	**Microprocessor**	2	2	2	2	-	-	-	-	-	-	-	-	-	1	1	-
210254.1	Exhibit skill of assembly language programming for the application.	2	-	1	-	-	-	-	-	-	-	-	-	-	1	1	-
210254.2	Classify Processor architectures.	2	-	2	-	-	-	-	-	-	-	-	-	-	1	1	-
210254.3	Illustrate advanced features of 80386 Microprocessor.	2	-	2	-	-	-	-	-	-	-	-	-	-	1	1	-
210254.4	Compare and contrast different processor modes.	2	-	2	-	-	-	-	-	-	-	-	-	-	1	1	-
210254.5	Use interrupts mechanism in applications	2	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-
210254.6	Differentiate between Microprocessors and Microcontrollers.	2	1	1	1	-	-	-	-	-	-	-	-	-	1	1	-
210254.7	Identify and analyze the tools and techniques used to design, implement, and debug microprocessor-based systems.																
210255	**Principles of Programming Languages**	2	2	2	2	-	-	-	-	-	-	-	-	-	1	1	1
210255.1	Describe project life cycle and the domains of Project ManagementDescribe project life cycle and the domains of Project Management	2	-	1	-	-	-	-	-	-	-	-	-	-	1	1	1
210255.2	Explain networking methods and their applications in planning and management	2	-	2	-	-	-	-	-	-	-	-	-	-	1	1	1
210255.3	Categorize the materials as per their annual usage and also Calculate production rate of construction equipment	2	-	2	-	-	-	-	-	-	-	-	-	-	1	1	1
210255.4	Demonstrates resource allocation techniques and apply it for manpower planning.	2	-	2	-	-	-	-	-	-	-	-	-	-	1	1	1
210255.5	Understand economical terms and different laws associated with project management	2	1	-	-	-	-	-	-	-	-	-	-	-	1	1	1
210255.6	Apply the methods of project selection and recommend the best economical project	2	1	-	-	-	-	-	-	-	-	-	-	-	1	1	1

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310241	**Database Management Systems**															
310241.1	Analyze and design Database Management System using ER model	2	2	3	1	-	-	-	1	-	-	-	3	1	1	1
310241.2	Implement database queries using database languages	-	2	3	-	-	2	-	-	1	-	-	3	1	1	1
310241.3	Normalize the database design using normal forms deadlock.	-	2	3	-	1	-	-	-	-	-	-	1	1	1	1
310241.4	Apply Transaction Management concepts in real-time situations	2	-	2	2	-	-	-	1	-	1	-	3	1	1	1
310241.5	Use NoSQL databases for processing unstructured data	-	2	3	-	-	2	-	-	-	-	-	3	1	1	1
310241.6	Differentiate between Complex Data Types and analyze the use of appropriate data types	2	2	-	-	-	-	-	-	1	-	1	3	1	1	1
310242	**Theory of Computation**															
310242.1	Understand formal language, translation logic, essentials of translation, alphabets, language representation and apply it to design Finite Automata and its variants	3	3	2	2	1	-	-	-	-	-	-	2	1	1	1
310242.2	Construct regular expression to present regular language and understand pumping lemma for RE	3	2	2	2	1	-	-	-	-	-	-	1	1	1	1
310242.3	Design Context Free Grammars and learn to simplify the grammar	3	3	2	2	1	2	-	-	-	1	-	1	1	1	1
310242.4	Construct Pushdown Automaton model for the Context Free Language	3	2	-	2	1	-	-	2	1	-	-	1	1	1	1
310242.5	Devise Turing Machine for the different requirements outlined by theoretical computer science	2	3	3	2	1	-	1	-	-	-	2	2	1	1	1
310242.6	Analyze different classes of problems, and study concepts of NP completeness	3	3	3	3	1	-	-	-	-	-	-	1	1	1	1
310243	**Systems Programming and Operating System**															
310243.1	Analyze and synthesize basic System Software and its functionality.	2	2	2	1	-	-	-	-	-	-	-	-	1	1	1
310243.2	Identify suitable data structures and Design & Implement various System Software	2	2	1	2	-	-	-	-	-	-	-	-	1	1	1
310243.3	Compare different loading schemes and analyze the performance of linker and loader	1	2	1	1	-	-	-	-	1	-	1	-	1	-	-

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310243.4	Implement and Analyze the performance of process scheduling algorithms	2	1	2	1	-	1	-	1	-	-	-	1	1	1	1	
310243.5	Identify the mechanism to deal with deadlock and concurrency issues	2	2	1	2	-	-	-	-	-	1	-	-	-	1	1	
310243.6	Demonstrate memory organization and memory management policies	2	1	2	1	-	-	-	-	-	-	-	-	1	1	1	
310244	**Computer Networks and Security**																
310244.1	Summarize fundamental concepts of Computer Networks, architectures, protocols and technologies	1	-	1	2	2	1	-	-	-	-	1	1	1	-	1	
310244.2	Illustrate the working and functions of data link layer	1	1	1	1	1	-	1			1	-	-	1	1	1	
310244.3	Analyze the working of different routing protocols and mechanisms	3	1	2	1	2	-	-	-	-	-	-	1	1	1	1	
310244.4	Implement client-server applications using sockets	1	2	1	2	2	-	-	-	-	-	1	1	-	1	-	
310244.5	Illustrate role of application layer with its protocols, client-server architectures	1	3	-	-	1	-	1	1	-	-	-	-	1	1	1	
310244.6	Comprehend the basics of Network Security	1	-	2	1	-	1	-	-	-	-	-	1	1	1	1	
310245(A)	**Internet of Things and Embedded Systems**																
310245(A).1	Understand the fundamentals and need of Embedded Systems for the Internet of Things	3	1	1	2	-	-	-	-	1	-	1	-	1	1	1	
310245(A).2	systems	3	2	1	2	1	-	-	-	-	-	-	-	1	1	1	
310245(A).3	Apply design methodology for designing and implementing IoT applications	2	3	3	3	2	3	-	-	2	-	1	-	1	1	1	
310245(A).4	CO4: Analyze IoT protocols for making IoT devices communication	1	2	2	2	3	3	-	-	2	1	2	2	1	1	1	
310245(A).5	Design cloud based IoT systems	2	2	2	3	3	3	-	-	2	1	2	2	1	1	1	
310245(A).6	Design and Develop secured IoT applications	2	2	1	2	2	2	-	1	1	-	1	1	1	1	1	
310251	**Data Science and Big Data Analytics**																
310251.1	Analyze needs and challenges for Data Science Big Data Analytics	1	3	2	1	-	-	-	1	1	-	-	1	1	1	1	
310251.2	Apply statistics for Big Data Analytics	1	2	1	2	-	1	-	-	1	-	-	1	1	1	1	
310251.3	Apply the lifecycle of Big Data analytics to real world	2	1	2	1	-	1	-	-	1	-	-	1	1	1	1	
310251.4	Implement Big Data Analytics using Python programming	1	2	2	2	2	-	-	-	1	1	-	1	1	1	1	
310251.5	Implement data visualization using visualization tools in Python programming	1	2	2	1	-	-	-	1	-	1	1	1	1	1	1	

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310251.6	Design and implement Big Databases using the Hadoop ecosystem	1	2	1	2	2	-	1		1	-	1	1	1	1	1	
310252	**Web Technology**																
310252.1	Implement and analyze behavior of web pages using HTML and CSS	1	1	2	1	1	-	-	-	-	-	-	-	1	1	1	
310252.2	Apply the client side technologies for web development	-	2	1	3	1	-	-	-	1	-	-	-	1	1	1	
310252.3	Analyze the concepts of Servlet and JSP	2	-	2	1	-	1	-	-	-	-	1	-	1	1	1	
310252.4	Analyze the Web services and frameworks	1	3	1	2	2	1	-	1	-	-	-	1	1	1	1	
310252.5	Apply the server side technologies for web development	1	1	2	-	3	-	1	1	-	1	-	-	1	1	1	
310252.6	Create the effective web applications for business functionalities using latest web development platforms	2	1	-	2	1	1	-	1	-	-	-	-	1	1	1	
310253	**Artificial Intelligence**								-	-							
310253.1	Identify and apply suitable Intelligent agents for various AI applications	1	2	2	1	-	-	1	3	-	2	-	-	1	1	1	
310253.2	Build smart system using different informed search / uninformed search or heuristic approaches	1	3	3	2	3	1	-	3	1	2	-	-	1	1	1	
310253.3	Identify knowledge associated and represent it by ontological engineering to plan a strategy to solve given	3	2	2	2	1	1	1	-	-	2	-	-	1	1	1	
310253.4	Apply the suitable algorithms to solve AI problems	1	2	2	1	-	-	2	1	3	2	-	-	1	1	1	
310253.5	systems	1	2	2	1	-	-	2	3	1	2	-	-	1	1	1	
310253.6	Represent complex problems with expressive yet carefully constrained language of representation	1	2	2	1	-	-	1	3	1	2	-	-	1	1	1	
310254(C)	**Cloud Computing**																
310254C.1	Understand the different Cloud Computing environment	1	2	1	-	-	-	-	-	-	-	-	-	1	1	1	
310254C.2	Use appropriate data storage technique on Cloud, based on Cloud application	1	1	1	-	-	-	-	-	-	-	-	-	1	1	1	
310254C.3	Analyze virtualization technology and install virtualization software	1	2	1	-	2	-	-	-	-	-	-	-	1	-	1	
310254C.4	Develop and deploy applications on Cloud	1	2	2	1	-	-	-	-	-	-	-	-	-	1	1	
310254C.5	Apply security in cloud applications	2	1	2	2	-	-	-	-	-	-	-	-	1	1	1	
310254C.6	Use advance techniques in Cloud Computing	1	2	2	1	1								1	1	-	

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410241	**High Performance Computing**															
410241.1	Describe different parallel architectures, inter-connect networks, programming models	3	2	3	2	2	2	2	-	-	-	-	-	1	1	1
410241.2	Develop an efficient parallel algorithm to solve given problem	2	3	2	1	1	1	1	-	-	-	-	-	1	1	1
410241.3	Analyze and measure performance of modern parallel computing systems	3	2	3	3	3	1	1	-	-	-	-	-	1	1	1
410241.4	Build the logic to parallelize the programming task	3	3	1	1	1	1	2	-	-	-	-	-	1	1	1
410242	**Artificial Intelligence and Robotics**															
410242.1	Identify and apply suitable Intelligent agents for various AI applications	2	3	2	3	3	2	2	-	-	-	-	-	1	1	1
410242.2	Design smart system using different informed search / uninformed search or heuristic approaches.	3	3	2	2	1	3	1	-	-	-	-	-	1	-	1
410242.3	Identify knowledge associated and represent it by ontological engineering to plan a strategy to solve given problem.	3	3	2	2	2	1	1	-	-	-	-	-	1	1	1
410242.4	Apply the suitable algorithms to solve AI problems	2	2	3	1	2	1	2	-	-	-	-	-	1	1	2
410243	**Data Analytics**															
410243.1	Write case studies in Business Analytic and Intelligence using mathematical models	3	2	2	3	1	2	2	1	3	1	1	2	1	1	1
410243.2	Present a survey on applications for Business Analytic and Intelligence	3	3	2	2	1	3	1	2	-	1	1	1	2	-	1
410243.3	Provide problem solutions for multi-core or distributed, concurrent/Parallel environments	1	3	2	2	2	1	1	2	-	2	1	2	2	1	1
410244(C)	**Pervasive & Ubiquitous Computing**															
410244(C).1	Design and implement primitive pervasive applications	3	3	-	3	3	2	2	3	1	1	1	1	2	-	1
410244(C).2	Analyze and estimate the impact of pervasive computing on future computing applications and society	2	2	2	2	1	3	1	-	2	2	1	1	1	1	1
410244(C).3	Develop skill sets to propose solutions for problems related to pervasive computing system	3	3	2	2	2	1	-	1	1	1	-	2	1	-	1

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410244(C).4	Design a preliminary system to meet desired needs within the constraints of a particular problem space	1	1	3	1	2	3	2	2	1	-	1	3	1	1	2
410245(B)	**Software Testing and Quality Assurance**															
410245(B).1	Describe fundamental concepts in software testing such as manual testing, automation testing and software quality	2	3	2	3	3	2	2	3	-	-	-	-	1	-	-
410245(B).2	Design and develop project test plan, design test cases, test data, and conduct test operations	2	2	2	2	1	3	1	1	2	2	1	2	1	1	1
410245(B).3	Apply recent automation tool for various software testing for	3	3	2	2	2	1	3	2	1	1	3	2	-	-	-
410245(B).4	Apply different approaches of quality management, assurance, and quality standard to software system	3	1	3	-	3	3	2	2	-	-	-	-	1	1	1
410245(B).5	Apply and analyze effectiveness Software Quality Tools	2	3	2	3	2	-	-	1	1	2	1	1	1	-	1
410250	**Machine Learning**															
410250.1	Distinguish different learning based applications	3	2	3	2	2	2	2	1	1	1	1	1	1	1	1
410250.2	Apply different preprocessing methods to prepare training data set for machine learning.	2	3	3	1	1	1	1	1	1	1	1	1	1	1	1
410250.3	Design and implement supervised and unsupervised machine	3	2	3	3	3	-	-	-	-	-	-	-	1	1	1
410250.4	Implement different learning models	3	3	3	-	-	-	-	-	-	-	-	-	1	1	1
410250.5	Learn Meta classifiers and deep learning concepts	2	3	3	-	-	-	-	-	-	-	-	-	1	1	1
410251	**Information and Cyber Security**															
410251.1	Gauge the security protections and limitations provided by today's	3	2	3	2	2	2	2	1	2	1	2	1	2	1	1
410251.2	Identify information security and cyber security threats.	2	3	3	2	1	1	1	1	1	1	1	1	1	1	1
410251.3	Analyze threats in order to protect or defend it in cyberspace from	3	3	3	3	3	1	2	1	1	1	2	1	2	1	1
410251.4	Build appropriate security solutions against cyber-attacks.	3	3	3	1	1	1	3	2	1	2	1	2	1	1	1
410252(C)	**Embedded & Real Time Operating System**															
410252(C).1	Recognize and classify embedded and real-time systems.	3	2	3	2	2	2	2	1	-	-	1	-	1	-	2
410252(C).2	Explain communication bus protocols used for embedded and real-time systems.	2	3	3	1	-	-	2	2	-	-	2	-	1	1	-
410252(C).3	Classify and exemplify scheduling algorithms.	3	2	3	3	3	2	1	-	-	-	1	-	1	2	-
410252(C).4	Apply software development process to a given RTOS application.	3	2	3	-	2	1	-	-	-	-	1	-	1	-	1

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410252(C).5	Design a given RTOS based application.	3	3	3	3	1	1	-	3	1	3	1	-	1	1	-
410253	**Cloud Computing**															
410253.1	To install cloud computing environments.	3	2	3	2	2	2	2	2	2	2	-	2	-	-	2
410253.2	To develop any one type of cloud.	3	3	3	-	1	1	3	2	-	-	2	-	3	2	-
410253.3	To explore future trends of cloud computing.	3	2	2	3	3	3	1	1	2	3	-	2	-	2	2

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" EMPOWERMENT THROUGH TECHNOLOGICAL EXCELLENCE "

GENBA SOPANRAO MOZE COLLEGE OF ENGINEERING

Department of Computer Engineering

Academic Year 2022-23

Sr. No.	Course Code	Course Name
		Semester - III
1	210241	Discrete Mathematics
2	210242	Fundamentals of Data Structures
3	210243	Object Oriented Programming(OOP)
4	210244	Computer Graphics
5	210245	Digital Electronics and Logic Design
		Semester - IV
6	207003	Engineering Mathematics III
7	210252	Data Structures and Algorithms
8	210253	Software Engineering
9	210254	Microprocessor
10	210255	Principles of Programming Languages
		Semester - V
11	310241	Database Management Systems
12	310242	Theory of Computation
13	310243	Systems Programming and Operating System
14	310244	Computer Networks and Security
15	310245(A)	Internet of Things and Embedded Systems
		Semester - VI
16	310251	Data Science and Big Data Analytics
17	310252	Web Technology
18	310253	Artificial Intelligence
19	310254(C)	Cloud Computing
		Semester - VII
20	410241	Design and Analysis of Algorithms
21	410242	Machine Learning
22	410243	Blockchain Technology
23	410244(A)	Pervasive Computing
24	410245(D)	Software Testing and Quality Assurance
		Semester - VIII
25	410250	High Performance Computing
26	410251	Deep Learning
27	410252(A)	Natural Language Processing
28	410253(C)	Business Intelligence

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Academic Year 2022-23

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Course Code	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
210241	**Discrete Mathematics**															
210241.1	Design and analyze real world engineering problems by applying set theory, propositional logic and mathematical induction	3	3	3	2	-	-	-	-	-	-	-	-	1	1	1
210241.2	Develop skill in expressing mathematical properties of relation and function	3	3	3	2	-	-	-	-	-	-	-	-	1	1	1
210241.3	Identify number of logical possibilities of events to design professional engineering Solutions	3	3	3	2	-	-	-	-	-	-	-	-	1	1	1
210241.4	Model and solve computing problem using tree and graph Analyze the properties of binary operations and evaluate the algebraic structure	3	3	3	2	-	-	-	-	-	-	-	-	1	1	1
210241.5	Apply abstract algebra in combinatorics, coding theory and questions regarding geometric constructions	3	3	3	2	-	-	-	-	-	-	-	-	1	1	1
210241.6	Analysis concept of Algebric structures	3	3	3	2	-	-	-	-	-	-	-	-	1	1	1
210242	**Fundamentals of Data Structures**															
210242.1	Design the algorithms to solve the programming problems, identify appropriate algorithmic strategy for specific application, and analyze the time and space complexity.	2	2	1	2	-	-	-	-	-	-	-	-	1	1	1
210242.2	Discriminate the usage of various structures, Design/Program/Implement the appropriate data structures; use them in implementations of abstract data types and Identity the appropriate data structure in approaching the problem solution.	1	2	2	1	-	-	-	-	-	-	-	-	1	1	1
210242.3	Demonstrate use of sequential data structures- Array and Linked lists to store and process data.	1	1	1	-	-	-	-	-	-	-	-	-	1	1	1
210242.4	Understand the computational efficiency of the principal algorithms for searching and sorting and choose the most efficient one for the application	1	-	1	-	-	-	-	-	-	-	-	-	1	1	1
210242.5	Compare and contrast different implementations of data structures (dynamic and static).	1	1	-	1	-	-	-	-	-	-	-	-	1	1	1
210242.6	Understand, Implement and apply principles of data structures-stack and queue to solve computational problems.	1	1	1	1	1	-	-	-	-	-	-	-	1	1	1

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210243	**Object Oriented Programming(OOP)**																
210243.1	Apply constructs- sequence, selection and iteration; classes and objects, inheritance, use of predefined classes from libraries while developing software	2	1	1	1	-	-	-	-	-	-	-	-	1	1	1	
210243.2	Design object-oriented solutions for small systems involving multiple objects	1	2	1	1	-	-	-	-	-	-	-	1	1	1	1	
210243.3	Use virtual and pure virtual function and complex programming situations.	2	1	2	2	-	-	-	-	-	-	-	-	1	1	1	
210243.4	Apply object-oriented software principles in problem solving.	2	1	2	1	-	-	-	-	-	-	-	1	1	1	1	
210243.5	Analyze the strengths of object-oriented programming.	-	1	-	1	-	-	-	-	-	-	-	-	1	1	1	
210243.6	Develop the application using object oriented programming language(C++).	-	-	1	-	-	-	-	-	-	-	-	1	1	1	1	
210244	**Computer Graphics**																
210244.1	Identify the basic terminologies of Computer Graphics and interpret the mathematical foundation of the concepts of computer graphics.	2	1	1	-	-	-	-	-	-	-	-	-	1	1	1	
210244.2	Apply mathematics to develop Computer programs for elementary graphic operations.structure in approaching the problem solution.	3	-	1	1	-	-	-	-	-	-	-	-	1	1	1	
210244.3	Illustrate the concepts of windowing and clipping and apply various algorithms to fill and clip polygons.	1	2		1	-	-	-	-	-	-	-	-	1	1	1	
210244.4	Understand and apply the core concepts of computer graphics, including transformation in two and three dimensions, viewing and projection.	2	1	1	1	-	-	-	-	-	-	-	-	1	1	1	
210244.5	Understand the concepts of color models, lighting, shading models and hidden surface elimination.	1	-	1	-	-	-	-	-	-	-	-	-	1	1	1	
210244.6	Create effective programs using concepts of curves, fractals, animation and gaming.	-	2	2	1	-	-	-	-	-	-	-	-	1	1	1	

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210245	**Digital Electronics and Logic Design**	2	-	2	-	-	-	-	-	-	-	-	-	1	-	-	
210245.1	Simplify Boolean Expressions using K Map.	2	1	2	-	-	-	-	-	-	-	-	-	1	-	-	
210245.2	Design and implement combinational circuits.	2	1	2	-	-	-	-	-	-	-	-	-	1	-	-	
210245.3	Design and implement sequential circuits	2	-	2	1	-	-	-	-	-	-	-	-	1	-	-	
210245.4	Develop simple real-world application using ASM and PLD	2	2	-	-	-	-	-	-	-	-	-	-	1	-	-	
210245.5	Differentiate and Choose appropriate logic families IC packages as per the given design specifications.	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-	
210245.6	Explain organization and architecture of computer system																
207003	**Engineering Mathematics III**	3	2	3	2	2	2	2	1	1	1	1	1	1	1	1	
207003.1	Solve Linear differential equations, essential in modelling and design of computer-based systems.	2	3	3	1	1	1	1	1	1	1	1	1	1	1	1	
207003.2	Apply concept of Fourier transform and Z-transform and its applications to continuous and discrete systems and image processing.	3	2	3	3	3	1	1	1	1	1	1	1	1	1	1	
207003.3	Apply Statistical methods like correlation and regression analysis and probability theory for data analysis and predictions in machine learning.	3	3	3	1	1	1	2	1	1	1	1	1	1	1	1	
207003.4	Solve Algebraic and Transcendental equations and System of linear equations using numerical techniques.	2	3	2	3	1	1	1	1	1	1	1	1	1	1	1	
207003.5	Obtain Interpolating polynomials, numerical differentiation and integration, numerical solutions of ordinary differential equations used in modern scientific computing.	3	1	3	1	3	1	1	1	1	1	1	1	1	1	1	
210252.6	Use appropriate modern tools to understand and analyze the functionalities confined to the secondary storage.																
210252	**Data Structures and Algorithms**	2	1	2	1	-	-	-	-	-	-	-	-	1	1	1	
210252.1	Identify and articulate the complexity goals and benefits of a good hashing scheme for real- world applications.	1	2	-	-	-	-	-	-	-	-	-	-	1	1	1	
210252.2	Apply non-linear data structures for solving problems of various domain.	2	-	-	-	-	-	-	-	-	-	-	-	1	1	1	
210252.3	Design and specify the operations of a nonlinear-based abstract data type and implement them in a high-level programming language.	-	2	-	1	-	-	-	-	-	-	-	-	1	1	1	
210252.4	Analyze the algorithmic solutions for resource requirements and optimization	1	-	1	1	-	-	-	-	-	-	-	-	1	1	1	
210252.5	Use efficient indexing methods and multiway search techniques to store and maintain data.	2	1	1	1	-	-	-	-	-	-	-	-	1	1	1	
210252.6	Use appropriate modern tools to understand and analyze the functionalities confined to the secondary storage.																

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210253	**Software Engineering**	-	2	-	-	-	-	-	-	-	-	-	-	1	1	1
210253.1	Analyze software requirements and formulate design solution for a software.	1	-	-	-	-	2	2	2	-	-	-	-	1	1	1
210253.2	Design applicable solutions in one or more application domains using software engineering approaches that integrate ethical, social, legal and economic concerns.	-	-	2	-	-	2	-	-	-	-	-	-	1	1	1
210253.3	Apply new software models, techniques and technologies to bring out innovative and novelistic solutions for the growth of the society in all aspects and evolving into their continuous professional development.	-	2	2	-	-	-	-	-	-	-	-	-	1	1	1
210253.4	Model and design User interface and component-level.	-	2	2	-	-	-	-	-	-	-	-	-	1	1	1
210253.5	Identify and handle risk management and software configuration management.	-	2	2	-	-	-	-	-	-	-	-	-	1	1	1
210253.6	Utilize knowledge of software testing approaches, approaches to verification and validation.	1	-	1	1	-	-	-	-	-	-	-	-	1	1	1
210253.7	Construct software of high quality – software that is reliable and that is reasonably easy to understand, modify and maintain efficient, reliable, robust and cost-effective software solutions.															
210254	**Microprocessor**	2	2	2	2	-	-	-	-	-	-	-	-	1	1	-
210254.1	Exhibit skill of assembly language programming for the application.	2	-	1	-	-	-	-	-	-	-	-	-	1	1	-
210254.2	Classify Processor architectures.	2	-	2	-	-	-	-	-	-	-	-	-	1	1	-
210254.3	Illustrate advanced features of 80386 Microprocessor.	2	-	2	-	-	-	-	-	-	-	-	-	1	1	-
210254.4	Compare and contrast different processor modes.	2	-	2	-	-	-	-	-	-	-	-	-	1	1	-
210254.5	Use interrupts mechanism in applications	2	-	-	-	-	-	-	-	-	-	-	-	1	1	-
210254.6	Differentiate between Microprocessors and Microcontrollers.	2	1	1	1	-	-	-	-	-	-	-	-	1	1	-
210254.7	Identify and analyze the tools and techniques used to design, implement, and debug microprocessor-based systems.															
210255	**Principles of Programming Languages**	2	2	2	2	-	-	-	-	-	-	-	-	1	1	1
210255.1	Describe project life cycle and the domains of Project ManagementDescribe project life cycle and the domains of Project Management	2	-	1	-	-	-	-	-	-	-	-	-	1	1	1
210255.2	Explain networking methods and their applications in planning and management	2	-	2	-	-	-	-	-	-	-	-	-	1	1	1
210255.3	Categorize the materials as per their annual usage and also Calculate production rate of construction equipment	2	-	2	-	-	-	-	-	-	-	-	-	1	1	1
210255.4	Demonstrates resource allocation techniques and apply it for manpower planning.	2	-	2	-	-	-	-	-	-	-	-	-	1	1	1
210255.5	Understand economical terms and different laws associated with project management	2	1	-	-	-	-	-	-	-	-	-	-	1	1	1
210255.6	Apply the methods of project selection and recommend the best economical project	2	1	-	-	-	-	-	-	-	-	-	-	1	1	1

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Course Code	Name of Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
310241	**Database Management Systems**															
310241.1	Analyze and design Database Management System using ER model	2	2	3	1	-	-	-	1	-	-	-	3	1	1	1
310241.2	Implement database queries using database languages	-	2	3	-	-	2	-	-	1	-	-	3	1	1	1
310241.3	Normalize the database design using normal forms deadlock.	-	2	3	-	1	-	-	-	-	-	-	1	1	1	1
310241.4	Apply Transaction Management concepts in real-time situations	2	-	2	2	-	-	-	1	-	1	-	3	1	1	1
310241.5	Use NoSQL databases for processing unstructured data	-	2	3	-	-	2	-	-	-	-	-	3	1	1	1
310241.6	Differentiate between Complex Data Types and analyze the use of appropriate data types	2	2	-	-	-	-	-	-	1	-	1	3	1	1	1
310242	**Theory of Computation**															
310242.1	Understand formal language, translation logic, essentials of translation, alphabets, language representation and apply it to design Finite Automata and its variants	3	3	2	2	1	-	-	-	-	-	-	2	1	1	1
310242.2	Construct regular expression to present regular language and understand pumping lemma for RE	3	2	2	2	1	-	-	-	-	-	-	1	1	1	1
310242.3	Design Context Free Grammars and learn to simplify the grammar	3	3	2	2	1	2	-	-	-	1	-	1	1	1	1
310242.4	Construct Pushdown Automaton model for the Context Free Language	3	2	-	2	1	-	-	2	1	-	-	1	1	1	1
310242.5	Devise Turing Machine for the different requirements outlined by theoretical computer science	2	3	3	2	1	-	1	-	-	-	2	2	1	1	1
310242.6	Analyze different classes of problems, and study concepts of NP completeness	3	3	3	3	1	-	-	-	-	-	-	1	1	1	1
310243	**Systems Programming and Operating System**															
310243.1	Analyze and synthesize basic System Software and its functionality.	2	2	2	1	-	-	-	-	-	-	-	-	1	1	1
310243.2	Identify suitable data structures and Design & Implement various System Software	2	2	1	2	-	-	-	-	-	-	-	-	1	1	1
310243.3	Compare different loading schemes and analyze the performance of linker and loader	1	2	1	1	-	-	-	-	1	-	1	-	1	-	-

310243.4	Implement and Analyze the performance of process scheduling algorithms	2	1	2	1	-	1	-	1	-	-	-	1	1	1	1	
310243.5	Identify the mechanism to deal with deadlock and concurrency issues	2	2	1	2	-	-	-	-	-	1	-	-	-	1	1	
310243.6	Demonstrate memory organization and memory management policies	2	1	2	1	-	-	-	-	-	-	-	-	1	1	1	
310244	**Computer Networks and Security**																
310244.1	Summarize fundamental concepts of Computer Networks, architectures, protocols and technologies	1	-	1	2	2	1	-	-	-	-	1	1	1	-	1	
310244.2	Illustrate the working and functions of data link layer	1	1	1	1	1	-	1			1	-	-	1	1	1	
310244.3	Analyze the working of different routing protocols and mechanisms	3	1	2	1	2	-	-	-	-	-	-	1	1	1	1	
310244.4	Implement client-server applications using sockets	1	2	1	2	2	-	-	-	-	-	1	1	-	1	-	
310244.5	Illustrate role of application layer with its protocols, client-server architectures	1	3	-	-	1	-	1	1	-	-	-	-	1	1	1	
310244.6	Comprehend the basics of Network Security	1	-	2	1	-	1	-	-	-	-	-	1	1	1	1	
310245(A)	**Internet of Things and Embedded Systems**																
310245(A).1	Understand the fundamentals and need of Embedded Systems for the Internet of Things	3	1	1	2	-	-	-	-	1	-	1	-	1	1	1	
310245(A).2	systems	3	2	1	2	1	-	-	-	-	-	-	-	1	1	1	
310245(A).3	Apply design methodology for designing and implementing IoT applications	2	3	3	3	2	3	-	-	2	-	1	-	1	1	1	
310245(A).4	CO4: Analyze IoT protocols for making IoT devices communication	1	2	2	2	3	3	-	-	2	1	2	2	1	1	1	
310245(A).5	Design cloud based IoT systems	2	2	2	3	3	3	-	-	2	1	2	2	1	1	1	
310245(A).6	Design and Develop secured IoT applications	2	2	1	2	2	2	-	1	1	-	1	1	1	1	1	
310251	**Data Science and Big Data Analytics**																
310251.1	Analyze needs and challenges for Data Science Big Data Analytics	1	3	2	1	-	-	-	1	1	-	-	1	1	1	1	
310251.2	Apply statistics for Big Data Analytics	1	2	1	2	-	1	-	-	1	-	-	1	1	1	1	
310251.3	Apply the lifecycle of Big Data analytics to real world	2	1	2	1	-	1	-	-	1	-	-	1	1	1	1	
310251.4	Implement Big Data Analytics using Python programming	1	2	2	2	2	-	-	-	1	1	-	1	1	1	1	
310251.5	Implement data visualization using visualization tools in Python programming	1	2	2	1	2	-	-	-	1	-	1	1	1	1	1	

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310251.6	Design and implement Big Databases using the Hadoop ecosystem	1	2	1	2	2	-	1		1	-	1	1	1	1	1	
310252	**Web Technology**																
310252.1	Implement and analyze behavior of web pages using HTML and CSS	1	1	2	1	1	-	-	-	-	-	-	-	1	1	1	
310252.2	Apply the client side technologies for web development	-	2	1	3	1	-	-	-	1	-	-	-	1	1	1	
310252.3	Analyze the concepts of Servlet and JSP	2	-	2	1	-	1	-	-	-	-	1	-	1	1	1	
310252.4	Analyze the Web services and frameworks	1	3	1	2	2	1	-	1	-	-	-	1	1	1	1	
310252.5	Apply the server side technologies for web development	1	1	2	-	3	-	1	1	-	1	-	-	1	1	1	
310252.6	Create the effective web applications for business functionalities using latest web development platforms	2	1	-	2	1	1	-	1	-	-	-	-	1	1	1	
									-	-							
310253	**Artificial Intelligence**																
310253.1	Identify and apply suitable Intelligent agents for various AI applications	1	2	2	1	-	-	1	3	-	2	-	-	1	1	1	
310253.2	Build smart system using different informed search / uninformed search or heuristic approaches	1	3	3	2	3	1	-	3	1	2	-	-	1	1	1	
310253.3	Identify knowledge associated and represent it by ontological engineering to plan a strategy to solve given	3	2	2	2	1	1	1	-	-	2	-	-	1	1	1	
310253.4	Apply the suitable algorithms to solve AI problems	1	2	2	1	-	-	2	1	3	2	-	-	1	1	1	
310253.5	systems	1	2	2	1	-	-	2	3	1	2	-	-	1	1	1	
310253.6	Represent complex problems with expressive yet carefully constrained language of representation	1	2	2	1	-	-	1	3	1	2	-	-	1	1	1	
310254(C)	**Cloud Computing**																
310254C.1	Understand the different Cloud Computing environment	1	2	1	-	-	-	-	-	-	-	-	-	1	1	1	
310254C.2	Use appropriate data storage technique on Cloud, based on Cloud application	1	1	1	-	-	-	-	-	-	-	-	-	1	1	1	
310254C.3	Analyze virtualization technology and install virtualization software	1	2	1	-	2	-	-	-	-	-	-	-	1	-	1	
310254C.4	Develop and deploy applications on Cloud	1	2	2	1	-	-	-	-	-	-	-	-	-	1	1	
310254C.5	Apply security in cloud applications	2	1	2	2	-	-	-	-	-	-	-	-	1	1	1	
310254C.6	Use advance techniques in Cloud Computing	1	2	2	1	1								1	1	-	

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410241	**Design and Analysis of Algorithms**															
410241.1	Formulate the problem	1	2	-	-	-	-	-	-	-	-	-	2	1	1	1
410241.2	Analyze the asymptotic performance of algorithms	2	3	-	-	-	-	-	-	-	-	-	2	1	-	-
410241.3	Decide and apply algorithmic strategies to solve given problem	2	3	2		-	-	-	-	-	-	-	3	1	-	1
410241.4	Find optimal solution by applying various methods	2	3	3	2	-	-	-	-	-	-	-	3	1	1	-
410241.5	Analyze and Apply Scheduling and Sorting Algorithms.	2	2	2	2	-	-	-	-	-	-	-	3	1	-	1
410241.6	Solve problems for multi-core or distributed or concurrent environments	2	2	1	2	-	-	-	-	-	-	-	-	1	1	1
410242	**Machine Learning**															-
41024201	Identify the needs and challenges of machine learning for real time applications.	2	-	-	2	-	-	1	1	1	1	1	1	1	1	1
410242.2	Apply various data pre-processing techniques to simplify and speed up machine learning algorithms.	2	1	-	1	1	1	1	1	1	1	1	1	2	1	1
410242.3	Select and apply appropriately supervised machine learning algorithms for real time applications.	2	2	2	1	1	1	1	1	1	1	1	1	1	1	2
410242.4	Implement variants of multi-class classifier and measure its performance.	2	2	2	1	1	1	1	1	1	1	1	1	1	2	1
410242.5	algorithms.	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1
410242.6	Design a neural network for solving engineering problems.	2	-	2	1	1	1	1	1	1	1	1	1	1	1	1
410243	**Blockchain Technology**															
410243.1	Interpret the fundamentals and basic concepts in Blockchain	3	-	-	-	-	-	-	-	-	-	-	-	1	-	-

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PRINCIPA

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410243.2	Compare the working of different blockchain platforms	3	-	-	-	-	-	-	-	-	-	-	-	1	-	-
410243.3	Use Crypto wallet for cryptocurrency based transactions	3	-	2	2	-	-	-	-	-	-	-	-	1	-	-
410243.4	Analyze the importance of blockchain in finding the solution to the real-world problems	3	-	2	-	2	-	-	-	-	-	-	-	1	-	-
410243.5	Illustrate the Ethereum public block chain platform	3	3	2	-	-	-	-	-	-	-	-	2	1	-	-
410243.6	Identify relative application where block chain technology can be effectively used and	2	2	2	2	-	-	-	-	-	-	-	-	2	1	-
410244(A)	**Pervasive Computing**															
410244(A).1	Demonstrate fundamental concepts in pervasive computing.	2	2	-	-	-	-	-	-	-	-	-	-	1	1	1
410244(A).2	Explain pervasive devices and decide appropriate one as per the need of real time applications.	2	3	2	2	-	-	-	-	-	-	-	-	2	1	-
410244(A).3	Classify and analyze context aware systems for their efficiency in different ICT Systems.	3	3	3	3	-	-	-	-	-	-	-	-	1	1	1
410244(A).4	Illustrate intelligent systems and generic intelligent interactive applications.	3	2	3	3	-	-	-	-	-	-	-	-	1	1	-
410244(A).5	Design HCI systems in pervasive computing environment.	3	3	3	3	-	-	-	-	-	-	-	-	1	1	1
410244(A).6	Explore the security challenges and know the role of ethics in the context of pervasive computing.	1	2	-	3	-	-	-	-	-	-	-	-	1	1	-
410245(D)	**Software Testing and Quality Assurance**															
410245(D).1	Describe fundamental concepts in software testing such as manual testing, automation testing and software	3	1	1	2	2	-	-	1	2	1	2	1	2	1	2
410245(D).2	Design and Develop project test plan, design test cases, test data, and conduct test operations.	1	3	3	2	1	-	-	1	2	1	2	-	1	2	1
410245(D).3	Apply recent automation tool for various software testing for testing software.	1	-	1	2	3	-	-		2	1	1	-	1	1	2

410245(D).4	Apply different approaches of quality management, assurance, and quality standard to software system.	1	1	2	3	1	1	1	2	2	2	2	-	2	1	1
410245(D).5	Apply and analyze effectiveness Software Quality Tools.	1	2	1	2	3	1	-	-	1	1	2	-	1	2	1
410245(D).6	Apply tools necessary for efficient testing framework.	1	2	3	2	3	1	-	-	2	1	1	-	2	1	2
410250	**High Performance Computing**															
410250.1	Understand various Parallel Paradigm	2	1	-	-	-	-	-	-	-	-	-	-	1	-	-
410250.2	Design and Develop an efficient parallel algorithm to solve given problem	2	1	-	-	-	-	-	-	-	-	-	-	1	-	-
410250.3	Illustrate data communication operations on various parallel architecture	2	1	-	-	-	-	-	-	-	-	-	-	1	-	-
410250.4	Analyze and measure performance of modern parallel computing systems	1	2	-	2	-	-	-	-	-	-	-	-	1	1	-
410250.5	Apply CUDA architecture for parallel programming	1	2	-	2	-	-	-	-	-	-	-	1	1	-	1
410250.6	Analyze the performance of HPC applications	2	2	-	2	-	-	-	-	-	-	-	1	1	-	-
410251	**Deep Learning**															
410251.1	Understand the basics of Deep Learning and apply the tools to implement deep learningapplications.	3	3	-	-	3	-	-	-	-	-	-	2	1	1	1
410251.2	(e.g., with respect to the bias-variance tradeoff, overfitting and underfitting, estimation of test	3	2	2	2	1	-	-	-	-	-	-	1	1	1	1
410251.3	To apply the technique of Convolution (CNN) and Recurrent Neural Network (RNN) forimplementing	3	2	2	2	2	-	1	-	1	-	-	1	2	1	1
410251.4	To implement and apply deep generative models.	1	2	1	1	2	-	1	-	-	-	1	1	1	2	1
410251.5	Construct and apply on-policy reinforcement learning algorithms.	2	2	3	2	2	-	-	-	-	-		1	1	2	1
410251.6	To Understand Reinforcement Learning Process.	1	2	2	2	2	-	-	-	-	-	2	1	1	1	1

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410252(A)	**Natural Language Processing**															
410252(A).1	Describe the fundamental concepts of NLP, challenges and issues in NLP	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1
410252(A).2	Analyze Natural languages morphologically, syntactical and semantically OR Describe the concepts of morphology, syntax, semantics of natural language	3	3	2	2	2	1	1	1	1	1	1	1	2	1	1
410252(A).3	Illustrate various language modelling techniques	2	3	3	2	2	1	1	1	1	1	1	2	1	2	1
410252(A).4	Integrate the NLP techniques for the information retrieval task	2	2	3	3	3	1	2	2	1	1	1	3	2	1	1
410252(A).5	Demonstrate the use of NLP tools and techniques for text-based processing of natural languages	2	2	3	3	3	1	1	1	1	1	1	3	1	2	1
410252(A).6	Develop real world NLP applications	3	3	3	3	3	2	1	1	1	1	1	3	2	1	1
410253(C)	**Business Intelligence**															
410253(C).1	Differentiate the concepts of Decision Support System & Business Intelligence	1	2	1	1	2	-	-	-	-	-	-	-	1	1	1
410253(C).2	Use Data Warehouse & Business Architecture to design a BI system.	1	1	1	1	1	-	-	-	-	-	-	-	1	1	1
410253(C).3	Build graphical reports	1	2	1	1	1	-	-	-	-	-	-	-	1	1	1
410253(C).4	Apply different data preprocessing techniques on dataset	2	2	2	1	1	-	-	-	-	-	-	-	1	1	1
410253(C).5	Implement machine learning algorithms as per business needs	2	2	2	2	1	-	-	-	-	-	-	-	1	1	1
410253(C).6	Identify role of BI in marketing, logistics, and finance and telecommunication sector	-	1	-	1	1	-	-	-	-	-	-	-	1	1	1