



**“EMPOWERMENT THROUGH TECHNOLOGICAL EXCELLENCE”**

**GENBA SOPANRAO MOZE TRUST'S**

**GENBA SOPANRAO MOZE COLLEGE OF ENGINEERING**

(Recognized by AICTE, New Delhi; Approved by Govt. of Maharashtra; Affiliated to Pune University)

25/1/3, Balewadi, Pune – 411045. Ph: 020-27390500

Website: [www.gsmozecoe.co.in](http://www.gsmozecoe.co.in) Email: [gsmoze@yahoo.co.in](mailto:gsmoze@yahoo.co.in)

### **Department of ENTC**

#### **PROGRAM EDUCATION OUTCOME**

1. **Core Competency:** To prepare the students with strong base of science and mathematics, subject domain knowledge that will enable them successful career in core electronics and allied industries
2. **Technical Proficiency:** To prepare the students to improve analytical, creative, innovative skills for higher education, research and industrial development.
3. **Managerial Skills:** To prepare the students to work in group using moral, ethical practice, managerial, entrepreneurial skills for the welfare of the society.

#### **PROGRAM SPECIFIC OUTCOME**

- 1) Students will be able to apply subject knowledge to design and develop electronics circuits for the industrial need.
- 2) Students will be able to design and analyse various types of communication systems.
- 3) Students will be able to apply concepts of signal processing and various algorithms for development of diversified application for industrial needs

#### **PROGRAM OUTCOME**

Programme Outcomes describe what students are expected to know or be able to do by the time of graduation from the programme. The POs for Under Graduate Course in Electronics and Telecommunication Engineering are able to

1. Apply the knowledge of technical fundamentals, mathematics and applied science for solving the domain problems.
2. Identify, Analyse complex engineering problems and review the literature for the same.



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3. Design the processes, implement the system for the welfare, safety, and environmental need of the society.
4. Perform experiment, and interpret results
5. Use technical skills and tools for electronic system development.
6. Understand the importance of electronics and telecommunication in modern era.
7. Identify the needs of society for development, growth and human values
8. Understand the legal, professional, ethical responsibilities
9. Work effectively in diversified, multidisciplinary environment to achieve common goal
10. Ability to communicate effectively and possess soft skills
11. Engage themselves in continuous educational, professional and entrepreneurship development
12. Apply effectively electronics and telecommunication engineering and management skills and act as a team leader to solve industrial and social problem.

**Department of ENTC**

**Course Outcomes**

**SE**

<b>Course Code</b>	<b>Subject:</b>
204181	Signals & Systems
204182	Electronic Devices & Circuits
204183	Electrical Circuits and Machines
204184	Data Structures and Algorithms

204185	Digital Electronics
204186	Electronic Measuring Instruments & Tools
207005	Engineering Mathematics III
204187	Integrated Circuits
204188	Control Systems
204189	Analog Communication
204190	Object Oriented Programming
204191	EMPLOYABILITY SKILL DEVELOPMENT

## Signal and Systems (204181)

**Course code:**204181

**Teaching Scheme:**

Lecture : 03 hr/week

Tutorial : 01 Hr /Week

**Examination Scheme:**

Paper : 50 Marks

Online : 50 Marks

Term work : 25 Marks

**Course Outcomes:**

On completion of the course, student will be able to:

**CO-1:** Understand mathematical description and representation of continuous and discrete time signals and systems.

**CO-2:** Develop input output relationship for linear shift invariant system and understand the Convolution operator for continuous and discrete time system.

**CO-3:** Use transform domain technique for analysis of linear shift invariant System

**CO-4:** Understand and resolve the signals in frequency domain using Fourier series and Fourier transforms.

**CO-5:** Understand the limitations of Fourier transform and need for Laplace transform. Develop the ability to analyze the system in s- domain.

**CO-6:** Understand the basic concept of probability, random variables and random signals.

## Electronic Devices and Circuits (204182)

**Credits: Th – 04, Pr -02**

**Course Code:** 204182

**Teaching Scheme:**

Lectures: 4Hrs/ Week

Practical :2Hr/Week

Total Teaching Hours :44

**Examination Scheme:**

In-Sem (Online): 50 Marks

End-Sem(Theory): 50Marks

Practical : 50 Marks

**Outcomes:** After successfully completing the course student should be able to:

1. Comply and verify parameters after exciting devices by any stated method.
2. Implement circuit and test the performance.
3. Analyze small signal model of FET
4. Explain behavior of FET at low frequency.
5. Analyze small signal model MOSFET.
6. Design an adjustable voltage regulator circuits

<b>Electrical Circuits and Machines (204183)</b>	
<b>Credits: Th – 03, Pr -02</b>	
<b>Course Code: 204183</b> <b>Teaching Scheme:</b> Lectures: 3Hrs/ Week Practical :2Hr/Week Total Teaching Hours :36	<b>Examination Scheme:</b> In-Sem (Online): 50 Marks End-Sem(Theory): 50Marks TW : 25 Marks
<p><b>Outcomes:</b> After successfully completing the course student should be able to:</p> <ol style="list-style-type: none"> <li>1. Analyze basic AC &amp; DC circuit for voltage, current and power by using KVL, KCL, and network theorems.</li> <li>2. Explain the working principle of different electrical machines.</li> <li>3. Select proper electrical motor for given application.</li> <li>4. Design and analyz transformers.</li> </ol>	

<b>Data Structures and Algorithms (204184)</b>	
<b>Credits: Th – 04, Pr -02</b>	
<b>Course Code: 204184</b> <b>Teaching Scheme:</b> Lectures: 4Hrs/ Week Practical :2Hr/Week Total Teaching Hours :44	<b>Examination Scheme:</b> In-Sem (Online): 50 Marks End-Sem(Theory): 50Marks Oral : 50 Marks
<p><b>Outcomes:</b> After successfully completing the course student should be able to:</p> <ol style="list-style-type: none"> <li>1. Discuss the computational efficiency of the principal algorithms such as sorting &amp; searching.</li> <li>2. Write and understand the programs that use arrays &amp; pointers in C</li> <li>3. Describe how arrays, records, linked structures are represented in memory and use them in algorithms.</li> <li>4. Implement stacks &amp; queues for various applications.</li> <li>5. Understand various terminologies and traversals of trees and use them for various applications.</li> <li>6. Understand various terminologies and traversals of graphs and use them for various applications.</li> </ol>	

## Digital Electronics (204185)

<b>Course Code: 204185</b>		
<b>Teaching Scheme:</b> Theory: 04 hrs/week Practical: 02 hrs/week		Examination Scheme: <b>In-Sem(Online): 50 Marks</b> <b>End-Sem (Theory):50 Marks</b> <b>Practical : 50 Marks</b>

**Outcomes:** At the end of the course, the students should be able to

**CO-1:** Use the basic logic gates and various reduction techniques of digital logic circuit in detail and design of combinational circuits

**CO-2 :** Design sequential circuits and use of application

**CO-3 :** Conceptualize the State Machine

**CO-4:** Design Logic families and use of it

**CO-5:** Design PLD and implement hardware circuit to test performance and application

**CO-6 :** Understand the architecture and use of microcontrollers for basic operations and Simulate using simulation software

## Electronic Measuring Instruments and Tools (204186)

<b>Course Code: 204186</b>		
<b>Teaching Scheme:</b> Theory: 01 hrs/week Practical: 02 hrs/week		Examination Scheme: <b>TW: 50 Marks</b>

**Outcomes:** At the end of the course, the students should be able to

1. Understand fundamental of various electrical measurements.
2. Understand and describe specifications, features and capabilities of electronic instruments.
3. Finalize the specifications of instrument and select an appropriate instrument for given measurement.
4. Carry out required measurement using various instruments under different setups.
5. Able to compare measuring instruments for performance parameters
6. Select appropriate instrument for the measurement of electrical parameter professionally .

## Engineering Mathematics -III (207005 )

<b>Course Code: 207005</b>		
<b>Teaching Scheme:</b> Theory: 04 hrs/week Tutorial: 01 hrs/week		Examination Scheme: <b>In-Sem(Online): 50 Marks</b> <b>End-Sem (Theory):50 Marks</b> <b>TW : 25 Marks</b>
<b>Outcomes:</b> At the end of the course, the students should be able to		
<ol style="list-style-type: none"><li>1. Solve higher order linear differential equation using appropriate techniques for modeling and analyzing electrical circuits.</li><li>2. Solve problems related to Fourier transform, Z-transform and applications to Communication systems and Signal processing.</li><li>3. Obtain Interpolating polynomials, numerically differentiate and integrate functions, numerical solutions of differential equations using single step and multi-step iterative methods used in modern scientific computing.</li><li>4. Perform vector differentiation and integration, analyze the vector fields and apply to Electro-Magnetic fields.</li><li>5. Analyze conformal mappings, transformations and perform contour integration of complex functions in the study of electrostatics and signal processing.</li></ol>		

## Integrated Circuits (204187)

<b>Course Code: 204187</b>		
<b>Teaching Scheme:</b> Theory: 04 hrs/week Tutorial: 02 hrs/week		Examination Scheme: <b>In-Sem(Online): 50 Marks</b> <b>End-Sem (Theory):50 Marks</b> <b>Practical : 50 Marks</b> <b>TW : 25 Marks</b>
<b>Outcomes:</b> At the end of the course, the students should be able to		
<ol style="list-style-type: none"><li>1. Understand the characteristics of IC and Op-Amp and identify the internal structure.</li><li>2. Understand and identify various manufacturing techniques.</li><li>3. Derive and determine various performances based parameters and their significance for Op-Amp.</li><li>4. Comply and verify parameters after exciting IC by any stated method.</li><li>5. Analyze and identify the closed loop stability considerations and I/O limitations.</li><li>6. Analyze and identify linear and nonlinear applications of Op-Amp.</li><li>7. Understand and verify results (levels of V &amp; I) with hardware implementation.</li><li>8. Implement hardwired circuit to test performance and application for what it is being designed.</li><li>9. Understand and apply the functionalities of PLL to Frequency synthesizer, multiplier, FM, and AM demodulators</li></ol>		

<b>Control Systems (204188)</b>		
<b>Course Code: 204188</b> <b>Teaching Scheme:</b> Lectures: 3 Hrs/ Week Total Teaching Hours:36		Examination Scheme: <b>In-Sem(Online): 50 Marks</b> <b>End-Sem (Theory):50 Marks</b>
<p><b>Outcomes:</b> At the end of the course, the students should be able to</p> <p><b>CO-1:</b> Determine and use models of physical systems in forms suitable for use in the analysis and design of control systems</p> <p><b>CO-2 :</b> Determine the (absolute) stability of a closed-loop control system</p> <p><b>CO-3:</b> Perform time domain and frequency domain analysis of control systems required for stability analysis</p> <p><b>CO-4 :</b> Perform time domain and frequency domain correlation analysis</p> <p><b>CO-5:</b> Apply root-locus, Frequency Plots technique to analyze control systems</p> <p><b>CO-6 :</b> Express and solve system equations in state variable form</p>		

<b>Analog Communications (204189)</b>		
<b>Credits: Th – 03, Pr -02</b>		
<b>Course Code:204189</b> <b>Teaching Scheme:</b> Lectures: 3Hrs/ Week Practical :2Hr/Week Total Teaching Hours :36		<b>Examination Scheme:</b> In-Sem (Online): 50 Marks End-Sem(Theory): 50Marks Practical : 50 Marks
<p><b>Outcomes:</b> After successfully completing the course student should be able to:</p> <ol style="list-style-type: none"> <li>1. Understand and identify the fundamental concepts and various components of analog communication systems.</li> <li>2. Describe analog pulse modulation techniques</li> <li>3. Digital modulation technique.</li> <li>4. Explain signal to noise ratio, noise figure and noise temperature for single and cascaded stages in a communication system</li> <li>5. Develop the ability to compare and contrast the strengths and weaknesses of various communication systems.</li> </ol>		



<b>Object Oriented Programming (204190)</b>		
<b>Credits: Th – 03, Pr -02</b>		
<b>Course Code:204190</b> <b>Teaching Scheme:</b> Lectures: 3Hrs/ Week Practical :4Hr/Week Total Teaching Hours :36		<b>Examination Scheme:</b> In-Sem (Online): 50 Marks End-Sem(Theory): 50Marks Oral : 50 Marks
<b>Outcomes:</b> After successfully completing the course student should be able to:		
<ol style="list-style-type: none"> <li>1. Describe the principles of object oriented programming.</li> <li>2. Apply the concepts of data encapsulation, inheritance in C++.</li> <li>3. Understand basic program constructs in Java</li> <li>4. Apply the concepts of classes, methods and inheritance to write programs Java.</li> <li>5. Use arrays, vectors and strings concepts and interfaces to write programs in Java.</li> <li>6. Describe and use the concepts in Java to develop user friendly program</li> </ol>		

<b>EMPLOYABILITY SKILL DEVELOPMENT (204191)</b>		
<b>Course code: 204191</b> <b>Teaching Scheme:</b> Lecture : 02 hr/week Practical : 02 hr/week		<b>Examination Scheme:</b> TW: 50 Marks
<b>Course Outcomes:</b> On completion of the course, student will be able to:		
<ol style="list-style-type: none"> <li>1. Have skills and preparedness for aptitude tests.</li> <li>2. Be equipped with essential communication skills (writing, verbal and non-verbal)</li> <li>3. Master the presentation skill and be ready for facing interviews.</li> <li>4. Build team and lead it for problem solving.</li> </ol>		

**Department of ENTC**

**Course Outcomes**

**TE**

<b>Course Code</b>	<b>Subject:</b>
304181	Digital Communication
304182	Digital Signal Processing
304183	Electromagnetics
304184	Microcontrollers
304185	Mechatronics
304193	Electronics System Design
304186	Power Electronics
304187	Information Theory, Coding and Communication Networks
304188	Business Management
304189	Advanced Processors
304190	System Programming and Operating Systems
304196	Employability Skills and Mini Project

<b>Digital Communication(304181)</b>		
Course Code:304181 <b>Teaching Scheme:</b> Lectures: 4 Hrs/ Week Total Teaching Hours :46		<b>Examination Scheme:</b> In Semester Assessment: Phase I : 30 End Semester Examination: Phase II: 70
<p><b>Outcomes:</b> After successfully completing the course student should be able to:</p> <p><b>CO-1:</b>Understand working of waveform coding techniques and analyse their performance.</p> <p><b>CO-2:</b>Analyze the performance of a baseband and pass band digital communication system in terms of error rate and spectral efficiency.</p> <p><b>CO-3:</b>Perform the time and frequency domain analysis of the signals in a digital communication system.</p> <p><b>CO-4:</b> Study of signal space representation.</p> <p><b>CO-5:</b> Design of digital communication system.</p> <p><b>CO-6:</b>Understand working of spread spectrum communication system and analyze its performance</p>		

<b>Digital Signal Processing(304182)</b>		
<b>Course code:</b> 304182 <b>Teaching Scheme:</b> Lecture : 04 hr/week Total Teaching Hours:40		<b>Examination Scheme:</b> In-Sem :30 Marks End-Sem :70 Marks
<p><b>Course Outcomes:</b>            On completion of the course, student will be able to:</p> <p><b>CO-1:</b> Analyze the discrete time signals and concept of sampling theorem in time domain.</p> <p><b>CO-2:</b> Analyze fourier transform in discrete domain and concepts of linear and circular convolution.</p> <p><b>CO-3:</b> Analyze the need of Z transform and relation between with different transforms.</p> <p><b>CO-4:</b> Design and implement the IIR filter for filtering different real world signals.</p> <p><b>CO-5:</b> Design and implement the FIR filter for filtering different real world signals.</p> <p><b>CO-6:</b> Develop different signal processing applications using DSP processor.</p>		

## Electromagnetics (304183)

**Course Code:**304183

**Teaching Scheme:**

Lectures: 3Hrs/ Week

Tutorial:1Hr/Week

Total Teaching Hours :49

**Examination Scheme:**

In Semester Assessment: 30

End Semester Examination: 70

**Outcomes:** After successfully completing the course student should be able to:

1. Understand the basic mathematical concepts related to electromagnetic vector fields.
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. Apply the principles of magnetostatics to the solutions of problems relating to magnetic field and magnetic potential, boundary conditions and magnetic energy density.
4. Understand the concepts related to Faraday's law, induced emf and Maxwell's equations.
5. Apply Maxwell's equations to solutions of problems relating to transmission lines
6. Apply Maxwell's equations to solutions of problems relating to uniform plane wave propagation.

## Microcontrollers (304184)

**Course Code:**304184

**Teaching Scheme:**

Lectures: 3Hrs/ Week

Total Teaching Hours :36

**Examination Scheme:**

In Semester Assessment: 30

End Semester Examination: 70

**Outcomes:** After successfully completing the course student should be able to:

CO-1: Learn importance of microcontroller in designing embedded application.

CO-2: Learn use of hardware and software tools.

CO-3: Develop interfacing to real world devices.

## Mechatronics (304185)

**Course Code:**304185

**Teaching Scheme:**

Lectures: 3Hrs/ Week

Total Teaching Hours :36

**Examination Scheme:**

In Semester Assessment: 30

End Semester Examination: 70

**Outcomes:** After successfully completing the course student should be able to:

CO-1: Identification of key elements of mechatronics system and its representation in terms of block diagram

CO-2: Understanding basic principal of Sensors and Transducer.

CO-3: Able to prepare case study of the system given.

## Electronic System Design (304193)

**Course code:** 304193

**Teaching Scheme:**

Lecture : 02 hr/week

Practical : 02 hr/week

**Examination Scheme:**

Oral : 50 marks

**Course Outcomes:**

On completion of the course, student will be able to:

**CO-1:**Apply the fundamental concepts and working principles of electronics devices to design electronics systems

**CO-2:**Shall be able to interpret datasheets and thus select appropriate components and devices

**CO-3:**Select appropriate transducer and signal conditioning circuit to design prototype of Data Acquisition system.

**CO-4:**Design an electronic system/sub-system and validate its performance by simulating the same.

**CO-5:**Shall be able to use an EDA tool for circuit schematic and simulation.

**CO-6:**Create, manage the database and query handling using suitable tools.

## Power Electronics(304186)

**Course code:** 304186  
**Teaching Scheme:**  
Lecture : 04 hr/week  
Total Teaching Hours:48

**Examination Scheme:**  
In-Sem Assessment:  
Phase I:30 Marks  
End-Sem Assessment:  
Phase II:70 Marks

### **Course Outcomes:**

On completion of the course, student will be able to:

- CO-1:** Design and implement a triggering /gate drive circuit for a power device.
- CO-2:** Perform & analyze different AC to DC power converters.
- CO-3:** Perform & analyze different DC to A C power converters.
- CO-4:** Perform & analyze DC-DC converters & AC Voltage Controller.
- CO-5:** Design & implement over voltage / over current protection circuit.
- CO-6.** Evaluate battery backup time & design a battery charger.

## Information Theory and Coding Techniques(304187)

Course Code:304187  
**Teaching Scheme:**  
Lectures: 4 Hrs/ Week  
Total Teaching Hours :44

**Examination Scheme:**  
In Semester Assessment:  
Phase I : 30  
End Semester Examination:  
Phase II: 70

**Outcomes:** After successfully completing the course student should be able to:

- CO-1:**Perform information theoretic analysis of communication system.
- CO-2:** Design a data compression scheme using suitable source coding technique.
- CO-3:** Design a channel coding scheme for a communication system.
- CO-4:** Design of different coding & decoding techniques.
- CO5:** Understand and apply fundamental principles of data communication and networking.
- CO-6:** Apply flow and error control techniques in communication networks.

## 304188 Business Management

**Course code: 304188**

**Teaching Scheme:**

Lecture : 03 hr/week

Total Teaching Hours:36

**Examination Scheme:**

In-Sem Assessment:

Phase I:30 Marks

End-Sem Assessment:

Phase II:70 Marks

### **Course Outcomes:**

On completion of the course, student will be able to:

1. Get overview of Management Science aspects useful in business.
2. Get motivation for Entrepreneurship
3. Get Quality Aspects for Systematically Running the Business
4. To Develop Project Management aspect and Entrepreneurship Skills.

## 304189 Advanced Processors

**Course code: 304189**

**Teaching Scheme:**

Lecture : 04 hr/week

Total Teaching Hours:44

**Examination Scheme:**

In-Sem :30 Marks

End-Sem:70 Marks

### **Course Outcomes:**

On completion of the course, student will be able to:

1. Describe the ARM microprocessor architectures and its feature.
2. Interface the advanced peripherals to ARM based microcontroller
3. Design embedded system with available resources.
4. Use of DSP Processors and resources for signal processing applications

## System Programming and Operating Systems (304190)

**Course Code: 304190**

**Teaching Scheme:**

Lectures: 3Hrs/ Week

Practical: 2Hr/Week

Total Teaching Hours :40

**Examination Scheme:**

In Semester Assessment: 30

End Semester Examination: 70

**Outcomes:** After successfully completing the course student should be able to:

1. Demonstrate the knowledge of Systems Programming
2. Formulate the Problem and develop the solution for same.
3. Compare and analyze the different implementation approach of system programming abstractions.
4. Demonstrate the knowledge of Operating Systems
5. Formulate the Problem and develop the solution for same.
6. Compare and analyze the different implementation approach operating system abstractions. Interpret various OS functions used in Linux / Ubuntu

## Employability Skills and Mini Project (304196)

**Course code:** 304196

**Teaching Scheme:**

**Lecture : 2 Hrs/Week**

Practical: Hrs/Week

**Examination Scheme:**

Oral Examination: 50 marks

**Course Outcomes:**

On completion of the course, student will be able to:

**CO-1:** Understand, plan and execute a Mini Project with team.

**CO-2:** Implement electronic hardware by learning PCB artwork design, soldering techniques, trouble shooting etc.

**CO-3:** Prepare a technical report based on the Mini project.

**CO-4:** Deliver technical seminar based on the Mini Project work carried out.

**CO-5:** Face Technical interviews.

**CO-6:** Participate in Technical Paper presentation.



**Department of ENTC**

**Course Outcomes**

**BE**

<b>Course Code</b>	<b>Subject:</b>
404181	VLSI Design & Technology
404182	Computer Networks & Security
404183	Radiation & Microwave Techniques
404184	Elective I (Digital Image and Video Processing)
404185	Elective II (Electronics Product Design)
404189	Mobile Communication
404190	Broadband Communication Systems
404191	Elective III (Audio Video Engineering)
404192	Elective IV (Wireless Sensor Networks)

## VLSI Design & Technology(404181)

**Course Code:**E&TC181

**Teaching Scheme:**

Lectures: 3 Hrs/ Week

Total Teaching Hours:40

**Examination Scheme:**

In Semester Assessment:

Phase I : 30

End Semester Examination:

Phase II: 70

**Outcomes:** At the end of the course, the students should be able to

**CO-1:** Identify various system requirement and model digital circuit with HDL, simulate, synthesis and prototype in PLDs

**CO-2 :** Conceptualize the system through design of PLD architecture

**CO-3:** Analyze different factors of chip level issues and their interconnect

**CO-4 :** Design CMOS based digital circuits and understand the design rules

**CO-5:** Design analog CMOS circuits for specified applications

**CO-6 :** Need of testability and detect fault on circuit

## Computer Networks & Security (404182)

**Course Code:** 404182

**Teaching Scheme:**

Lectures: 3Hrs/ Week

Total Teaching Hours :36

**Examination Scheme:**

In Semester: 30

End Semeste: 70

**Outcomes:** After successfully completing the course student should be able to:

1. Understand fundamental underlying principles of computer networking
2. Describe and analyze the hardware, software, components of a network and the interrelations.
3. Analyze the requirements for a given organizational structure and select the most appropriate Networking architecture and technologies;
4. Have a basic knowledge of the use of cryptography and network security;
5. Have a basic knowledge of installing and configuring networking applications.
6. Specify and identify deficiencies in existing protocols, and then go onto select new and better protocols.

<b>Radiation &amp; Microwave Techniques (404183)</b>		
<b>Course Code: 404183</b> <b>Teaching Scheme:</b> Lectures: 3Hrs/ Week Total Teaching Hours :36		<b>Examination Scheme:</b> In Semester Assessment: Phase I : 30 End Semester Examination: Phase II: 70
<p><b>Outcomes:</b> After successfully completing the course student should be able to:</p> <p><b>CO-1:</b> Differentiate various performance parameters of radiating elements.  <b>CO-2</b> Analyze various radiating elements and arrays.  <b>CO-3</b> Apply the knowledge of waveguide fundamentals in design of transmission lines.  <b>CO-4</b> Design and set up a system consisting of various passive microwave components.  <b>CO-5</b> Analyze tube based and solid state active devices along with their applications.  <b>CO-6</b> Measure various performance parameters of microwave components.</p>		

<b>Digital Image and Video Processing (404184)</b>		
<b>Course code: 404184</b> <b>Teaching Scheme:</b> Lecture : 04 hr/week Practical :02 hr/week		<b>Examination Scheme:</b> In Semester Assessment: Phase I:30 End Semester Examination: Phase II:70
<p><b>Course Outcomes:</b>            On completion of the course, student will be able to:</p> <p><b>CO-1:</b>Develop and implement algorithms for digital image processing.</p> <p><b>CO-2:</b> Examine various types of images, intensity transformations and spatial filtering.</p> <p><b>CO-3:</b>Develop Fourier transform for image processing in frequency domain.</p> <p><b>CO-4:</b>Evaluate the methodologies for image segmentation, restoration etc.</p> <p><b>CO-5:</b> Implement image process and analysis algorithms.</p> <p><b>CO-6:</b>Apply image processing algorithms for practical object recognition applications</p>		

## Electronic Product Design (404185)

**Course Code: 404185**  
**Teaching Scheme:**  
Lectures: 3 Hrs/ Week  
Total Teaching Hours:36

Examination Scheme:  
In Semester Assessment:  
Phase I : 30  
End Semester Examination:  
Phase II: 70

**Outcomes:** After successfully completing the course students will be able to

- CO-1 :** Understand various stages of hardware, software and PCB design
- CO-2 :** Analyze the requirement of hardware design & test specifications
- CO-3 :** Requirement and importance of software design & test specifications
- CO-4 :** Need of PCB design in electronics
- CO-5 :** Importance of product debugging and testing
- CO-6 :** Special design considerations and importance of documentation

## Mobile Communication(404189)

**Course Code: 404189**  
**Teaching Scheme:**  
Lectures: 3 Hrs/ Week  
Total Teaching Hours:36

Examination Scheme:  
In Semester Assessment:  
Phase I : 30  
End Semester Examination:  
Phase II: 70

**Outcomes:** After successfully completing the course student should be able to:

- CO-1:** Explain and apply the concepts telecommunication switching, traffic and networks
- CO-2:** Analyze the telecommunication traffic.
- CO-3:** Analyze radio channel and cellular capacity.
- CO-4:** Comparative study of different generation of Mobile system like 1G,2G,3G
- CO-5:** Explain and apply concepts of GSM .
- CO-6:** Explain and apply concepts of CDMA system.

## Broadband Communication Systems(404190)

**Course code:** 404190

**Teaching Scheme:**

Lecture : 04hr/week

Practical : 02 hr/week

Total Teaching Hours:44

**Examination Scheme:**

In Semester Assessment:

Phase I:30

End Semester Examination:

Phase II:70

**Course Outcomes:**

On completion of the course, student will be able to:

**CO-1:** Understand the basic elements of optical fiber transmission link, fiber modes configurations, different kind of losses, optical sources and detectors

**CO-2:** Carry out Link power budget and Rise Time Budget

**CO-3:** Learn the fiber optical network components and optical amplifiers.

**CO-4:** Understand the basic principle & terminologies of Satellite communication systems

**CO-5:** Explain the principles, concepts and operation of satellite communication systems

**CO-6:** Analyze the design requirements and the performance of satellite communication systems

## Audio Video Engineering (Elective-III)

**Course Code:** 404191

**Teaching Scheme:**

Lectures: 3Hrs/ Week

Total Teaching Hours :40

**Examination Scheme:**

In Sem: 30

End Sem: 70

**Outcomes:** After successfully completing the course student should be able to:

1. To study the analysis and synthesis of TV Pictures, Composite Video Signal, Receiver, Picture Tubes and Television Camera Tubes.
2. To study the various Colour Television systems .
3. Greater emphasis on television standards.
4. To study the advanced topics in Digital Television and High Definition Television.
5. To study audio recording systems such CD/DVD recording, Audio Standards,
6. To Study Acoustics principles. application

## 404192 C Wireless Sensor Networks (Elective-IV)

**Course Code:** 404192 C  
**Teaching Scheme:**  
Lectures: 3Hrs/ Week  
Total Teaching Hours :36

**Examination Scheme:**  
In Semester Assessment:  
Phase I : 30  
End Semester Examination:  
Phase II: 70

**Outcomes:** After successfully completing the course student should be able to:

- 1) Explain various concepts and terminologies used in WSN
- 2) Describe importance and use of radio communication and link management in WSN
- 3) Explain various wireless standards and protocols associated with WSN
- 4) Recognise importance of localisation and routing techniques used in WSN
- 5) Understand techniques of data aggregation and importance of security in WSN
- 6) Examine the issues involved in design and deployment of WSN