GOVERNMENT OF INDIA
MINISTRY OF
PARLIAMENTARY AFFAIRS

Azadi Ka Amrit Mahotsav

mygov मेरी सरकार

PREAMBLE TO THE CONSTITUTION

# PREAMBLE

**WE, THE PEOPLE OF INDIA,**

having solemnly resolved to constitute India into a SOVEREIGN SOCIALIST SECULAR DEMOCRATIC **REPUBLIC** and to secure to all its citizens:

**JUSTICE**, social, economic and political;

**LIBERTY** of thought, expression, belief, faith and worship;

**EQUALITY** of status and of opportunity;

and to promote among them all

**FRATERNITY** assuring the dignity of the individual and the unity and integrity of the Nation;

IN OUR CONSTITUENT ASSEMBLY this 26th day of November, 1949, do HEREBY ADOPT, ENACT AND GIVE TO OURSELVES THIS CONSTITUTION.

I have read the Preamble

[redacted]

Signature

23-01-2022

# SRI SIDDHARTHA ACADEMY OF HIGHER EDUCATION

*("Deemed to be University u/s 3 of the UGC Act, 1956")*
Accredited 'A+' Grade by NAAC
**Agalakote, B.H.Road, Tumkur – 572 107.KARNATAKA, INDIA.**

No. SSAHE/ACA-S&C/30/UG(BE)/2024 Date: 15/07/2024

## NOTIFICATION

Sub: - Ordinance pertaining to Curriculum of Undergraduate Programme Bachelor of Engineering (3rd Year Electronics and Telecommunication Engineering)

Ref: Proceedings of the Academic Council meeting held on 10/07/2024 vide agenda No. SSAHE/AC/XXVIII-12/2024

In exercise of the powers vested under section 6 of 6.05 of MoA / Rules of SSAHE, the Revised Ordinance pertaining to Curriculum of Undergraduate Programme Bachelor of Engineering (3rd Year Electronics and Telecommunication Engineering) is notified herewith as per Annexure.

By Order,

REGISTRAR

REGISTRAR
Sri Siddhartha Academy of Higher Education
TUMKUR - 572 107, Karnataka.

To,
Dean / Principal, Sri Siddhartha Institute of Technology,

Copy to
1) Office of the Chancellor, SSAHE, for kind information,
2) PA to Vice-Chancellor / PA to Registrar / Controller of Examinations / Finance Officer, SSAHE
3) All Officers of the Academy Examination Branch / Academic Section
4) Guard File / Office copy.

S.S.A.H.E TUMKUR

## DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERINGVISION

**To produce quality technocrats with human values and emphasis on the social needs and professional ethics in the domain of Electronics and Telecommunication Engineering.**

### MISSION

- **To provide academic environment**
- **Exposure to modern communication processes Minimize**
- **the impact on environment**
- **To be Ethically and socially Responsible**
- **Inculcate self-learning capabilities and prepare for pursuing higher education**

### PROGRAM OUTCOMES

**Engineering Graduates will be able to:**

**PO1:Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.**

**PO2:Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.**

**PO3:Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmentalconsiderations.**

**PO4:Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.**

**PO5:Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.**

**PO6:The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.**

**PO7:Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmentalcontexts, and demonstrate the knowledge of, and need for sustainable development.**

**PO8:Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.**

**PO9:Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.**

**PO10:Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give andreceive clear instructions.**

**PO11:Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.**

**PO12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.**

## PROGRAM EDUCATIONAL OBJECTIVES (PEOS)

**PEO1:Provide strong basics in the field of Telecommunication Engineering.**

**PEO2:Design, Develop and Analyze the solutions using suitable mathematical models and implement them using both software and hardware engineering practices.**

**PEO3:Instill Professional Ethics, Teamwork, Managerial skills and continuous learning capabilities to generate new knowledge.**

**PEO4:Develop skills in Telecommunication related technologies and knowledge-based systems to build solutions that cater the needsof industries and the societal problems or to become entrepreneur.**

## PROGRAM SPECIFIC OUTCOMES (PSOS)

**PSO1: Apply Science, Engineering and Mathematics (through differential and integral calculus) to solve complex Electronics and Telecommunication Engineering problems.**

**PSO2: Demonstrate proficiency in the use of software and hardware required to practice Electronics and Telecommunication Engineering profession**

**SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY- TUMAKURU**

**(A constituent College of Siddhartha Academy of Higher Education, Tumakuru)**

**Accredited by NAAC with 'A+' Grade**

## Electronics and Telecommunication Engineering

5th Semester (NEP Scheme) Academic year 2024-25

| Sl No. | Course and Course Code | | Course Title | Teaching dept. | L | T | P | Credits | CIE Marks | SEE Marks | Total Marks | Exam Hrs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **01** | PC | 22ET501 | Information Theory and Error control coding | ETE | 3 | - | - | 3 | 50 | 50 | 100 | 3 |
| **02** | PC | 22ET502 | Digital Signal Processing & its application | ETE | 3 | - | 2 | 4 | 50 | 50 | 100 | 3 |
| **03** | PC | 22ET503 | Microwaves and Antennas | ETE | 3 | - | 2 | 4 | 50 | 50 | 100 | 3 |
| **04** | PE | 22ET5PE4X | Professional Elective-I | ETE | 3 | - | - | 3 | 50 | 50 | 100 | 3 |
| **05** | OE | 22ET5OE5X | Open Elective-I | ETE | 3 | - | - | 3 | 50 | 50 | 100 | 3 |
| **06** | HS | 22IE56X | Institutional elective 561: Research methodology, 562: Management & entrepreneurship, 563: Project Management | xx | 2 | - | - | 2 | 50 | 50 | 100 | - |
| **07** | PC | 22ET507 | Department Skill Lab – 3 | ETE | 1 | - | 2 | 2 | 50 | 50 | 100 | 3 |
| **08** | HS | 22SK508 | Skill Development-II (T&P) | T&P | - | - | 2 | 1 | 50 | - | 50 | - |
| **L: Lecture, T-Tutorial, P-Practical/Drawing, CIE: Continuous Internal Evaluation, SEE: Semester End Examination** | | | | Total | 18 | - | 8 | 22 | 400 | 350 | 750 | 18 |
| **Credits Distribution: Basic Science (BS)=08+08+3+3=22, Engineering Science (ES)=10+11=21, Humanities & Social Sciences (HS)=1+2+2+2=7, Program Core (PC)=02+16+16+15=49, Program Elective (PE)=03, Open Elective(OE)=03, Total Credits=20+20+21+21+23=105** | | | | | | | | | | | | |

| **Professional Elective I:** | **Open Elective I:** |
|---|---|
| ET5PE51: Digital Switching Systems ET5PE52: Micro Electro Mechanical Systems | ET5OE61: Principles of Communication Systems |

**Electronics and Telecommunication Engineering**

## Syllabus for the Academic Year – 2024 - 2025

| **Department:** Electronics and Telecommunication Engineering | | | **Semester:** | **V** |
|---|---|---|---|---|
| | | | | |
| **Subject:** Information Theory and Error Control Coding | | | | |
| **Subject Code:** | 22ET501 | | **L – T – P - C:** | 3-0-0-3 |

| **Sl.No** | **Course Objectives** |
|---|---|
| **1** | Analyze the advantages and application of digital communication with source coding and channel coding techniques. |
| **2** | Evaluate different types of source codes and its properties. |
| **3** | Evaluate different types of discrete channels and measure channel capacity. |
| **4** | Analyze various Error control coding techniques. |

| **UNIT** | **Description** | **Hours** |
|---|---|---|
| I | **Introduction to Information Theory:** Introduction, Measure of information, Average information content of symbols in long independent, Source Coding: Shannon's encoding algorithm, Shannon Fano coding, Huffman Coding. ( TEXT 1: 4.1,4.2 to 4.2.2,4.3, 4.3) | **8** |
| II | **Communication Channels:** Communication channel, Discrete communication channels, Discrete channels with memory, Capacity of a discrete memory less channels, Rate of information transmission over a discrete channel. (TEXT 1: 4.4, 4.5.1,4.5.2) | **7** |
| III | **Linear Block Codes:** Introduction, Examples of error control codes, Types of errors, Types of codes, Methods of controlling error, Introduction to linear block codes, Matrix description of linear block codes, Error detection and Correction, Capabilities of linear block codes, Look up table and Standard array for decoding. (TEXT1: 9.1, 9.2.1, 9.2.2, 9.2.4) | **8** |
| IV | **Cyclic and BCH Codes:** Algebraic structure of cyclic codes, Properties of cyclic codes, encoding using (n-k) bit shift register, BCH Codes. (TEXT 1:9.3,9.3.1,9.3.2,9.3.3) ( TEXT 2: 8.4 section 5) | **8** |
| V | **Convolution Codes:** Encoding using time domain approach and transform domain approach, state diagrams. Code tree, trellis and state diagram of convolutional codes. (TEXT 2: 8.5) | **8** |

**Course Outcomes**

| Course Outcome | Descriptions |
|---|---|
| CO1 | Apply knowledge of mathematics to understand concepts of Information theory, communication channel & source codes. |
| CO2 | Analyze different source codes for its efficiency used withcommunication channels. |
| CO3 | Design coding schemes for a given specifications and evaluatefor their error correcting capability. |
| CO4 | Design the encoding and decoding circuits for Linear Block codes,cyclic codes, convolutional codes and BCH codes. |

**Course Articulation Matrix**

| PO/CO | Po1 | Po2 | Po3 | Po4 | Po5 | Po6 | Po7 | Po8 | Po9 | Po10 | Po11 | Po12 | PSO 1 | PSO 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | | | | | | | | | 1 | | | | |
| CO2 | 1 | 2 | | | | | | | 1 | | | | 1 | |
| CO3 | 1 | | | | | | | | | | | | | |
| CO4 | | | | 2 | | | | | | 1 | | | | |

**Text Books:**

| Sl. No. | Author | Text Book title | Publisher | Volume Issue | Year of Edition |
|---|---|---|---|---|---|
| 1 | K. Sam Shanmugam | Digital and analog Communicationsystems | John Wiley | - | 2012 |
| 2 | Simon Haykin | Digital communication | John Wiley India Pvt. Ltd | 3rd Edition | 2008 |

**Reference Books:**

| Sl. No. | Author | Text Book title | Publisher | Volume /Issue | Year of Edition |
|---|---|---|---|---|---|
| 1 | Shu Lin & Daniel.J | Error Control Coding | Pearson Prentice Hall | 2nd Edition | 2004 |
| 2 | Bernard Skylar | Digital Communication fundamentals andapplications | Pearson Education | 2nd Edition | 2002 |

**Signature of the course coordinator** **Signature of the HoD** **Signature of the Dean (Academic Affairs)**

**Syllabus for the Academic Year – 2024 – 2025**

| | | | | |
|---|---|---|---|---|
| **Department:** Electronics and Telecommunication Engineering | | | **Semester:** | **V** |
| | | | | |
| **Subject:** Digital Signal Processing & its Applications | | | | |
| **Subject Code:** | 22ET502 | | **L – T – P - C:** | **3– 0 –2 – 4** |

| Sl. No | Course Objectives |
|---|---|
| 1 | Analyze the time domain and frequency domain representation of discrete-time signals. |
| 2 | Apply efficient method for calculating the DFT & IDFT |
| 3 | Design and implement IIR and FIR filters |
| 4 | Perform frequency transformation in Analog and Digital domain |

| Unit | Description | Hrs |
|---|---|---|
| I | **Discrete Fourier Transform:** Introduction, Advantages of DSP over ASP, Applications of DSP, Frequency domain Sampling and Reconstruction of discrete time signals, Properties of DFT, Linear Convolution using DFT, Computation of Circular convolution, Filtering of long sequences: Overlap-save and Overlap-add method.<br>(Text1: 1.1.2, 7.1.1, 7.1.2, 7.1.3, 7.2, 7.2.1, 7.2.2, 7.3) | **8** |
| II | **Fast-Fourier Transform (FFT) Algorithms:** Radix-2 FFT algorithm for the computation of DFT and IDFT: Decimation-in-time and Decimation-in-frequency FFT algorithms, Inverse FFT.<br>(Text1: 8.1, 8.1.1, 8.1.2, 8.1.3,8.2) | **7** |
| III | **Analog filter and Digital IIR filter design:** Characteristics of Analog filters- Butterworth and Chebyshev filter, Digital IIR filter design from analog filters using Bilinear Transformation, Structure for IIR systems- Direct form I, Direct form II and cascade.<br>(Text1: 10.3.4, 10.3, 10.3.3, 9.3, 9.3.1, 9.3.3) | **8** |
| IV | **Design and Realization of Digital FIR filter:** Introduction, FIR filter design using Rectangular, Hamming and Kaiser Window, Basic FIR filters structures, Linear Phase FIR filter Structures.<br>(Text1: 9, 9.2.1, 9.2.2, 10.2, 10.2.1, 10.2.2) | **8** |
| V | **Applications of DSP:** ADPCM Speech encoder and decoder using DSP, Musical Sound Processing, Block diagram of Digital Radio, Block diagram of DSP based video signal processing system, DSP in DTMF detection and generation, DSP in Radar (Qualitative discussion).<br>(Text 2: 12.1, 12.2.1, 12.3, 12.4, 12.5, 12.6, 12.7) | **8** |

**LAB CONTENT**

| Sl. No | Experiment Description |
|---|---|
| 1 | Verification of sampling theorem |
| 2 | Linear convolution of two given sequences. |
| 3 | Circular convolution of two given sequences |
| 4 | Autocorrelation of a given sequence and verification of its properties. |
| 5 | Cross correlation of given sequences and verification of its properties. |
| 6 | Computation of N point DFT of a given sequence and to plot magnitude and phase spectrum. |
| 7 | Linear convolution of two given sequences using DFT and IDFT. |
| 8 | Circular convolution of two given sequences using DFT and IDFT |
| 9 | Design and simulate IIR filter to meet given specifications. |
| 10 | Design and simulate FIR filter to meet given specifications. |

**Course Outcomes**

| Course Outcome | Descriptions |
|---|---|
| **CO1** | Understand the fundamental concepts of Digital Signal Processing using DFT, FFT, IIR & FIR filters and its applications. |
| **CO2** | Analyze the properties of DFT, FFT, Analog and Digital filters. |
| **CO3** | Design analog and digital filters for the required applications. |
| **CO4** | Evaluate IIR and FIR filters using Direct form I, II, cascade and interpret the importance of DSP in various applications. |

**Course Articulation Matrix**

| PO/PSO / CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 2 | 1 | | | 1 | | | | | | | 2 | | |
| **CO2** | 3 | 2 | | 2 | 1 | | | | | 1 | | | | |
| **CO3** | | | | 2 | 2 | | | | | | | 1 | | |
| **CO4** | 3 | 1 | | 1 | 2 | | | | | | | 1 | | |

**Text Books:**

| Sl. No. | Text Book title | Author | Volume and Year ofEdition |
|---|---|---|---|
| 1 | Digital Signal Processing: Principles, Algorithm and Applications | J G Proakis and D G Manolakis | 4th edition, 2012 |
| 2 | Digital Signal Processing | A Nagnoor Kani | 2nd edition, 2012 |

**Reference Books:**

| Sl. No. | Text Book title | Author | Volume and Year ofEdition |
|---|---|---|---|
| 1 | Discrete Time signal Processing | A V Oppenheim and RW Shafer | 3rd Edition, 2014 |
| 2 | Digital Signal Processing: A computer Based Approach | S K Mitra | 4th Edition, 2013 |

**Signature of the course coordinator** **Signature of the HoD** **Signature of the Dean (Academic Affairs)**

## Syllabus for the Academic Year – 2024 - 2025

| | | | | |
|---|---|---|---|---|
| **Department:** Electronics and Telecommunication Engineering | | | **Semester:** | **V** |
| | | | | |
| **Subject:** Microwaves and Antennas | | | | |
| **Subject Code:** | 22ET503 | | **L – T – P - C:** | 3-0-2-4 |

| Sl. No | Course Objectives |
|---|---|
| 1 | Concept of Electromagnetic field theory and network analysis toanalyze microwave transmission line and Waveguides |
| 2 | Design an impedance matching circuit at microwave frequency andantenna array system |
| 3 | Analyze the characteristics of Microwave passive devices, active devicesand Vacuum tube devices. |
| 4 | Important concepts of Antennas and the design of practical antennas |

| UNIT | Description | Hours |
|---|---|---|
| I | **Microwave Transmission Lines and Microwave Network Theory:** Introduction, Planar Transmission Lines: Strip lines, Micro strip lines, Advantages and Disadvantages of Planar Transmission Lines, Rectangular Waveguides, TE Waves Solution and TM Waves Solution, S-Matrix representation of Multiport Network, Microwave Passive Devices- Rectangular Waveguide Section, Matched Terminations, Attenuators, Phase Shifters, Waveguide Tees, Isolators, Circulators and Directional Couplers. Problems. **(Text1:3.9 to 3.11.2, 6.3, 6.3.1, 6.4.3,6.4.7, 6.4.14, 6.4.15, 6.4.16, 6.4.17, 6.4.18 )** | **8** |
| II | **Microwave Generation and Applications of Microwaves: -** Introduction, Microwave Vacuum Tube Devices Construction and Operation Reflex Klystron Oscillator, Two Cavity Klystron Amplifier, Travelling Wave Tube Amplifier, Magnetrons Oscillator Microwave Solid State Devices Diodes, Gunn diodes, Tunnel Diode, Varactor Diodes. Applications of Microwaves: Microwave Radar Systems, Industrial Applications of Microwaves. Problems. **(Text 1: 9.2.1, 9.2.2, 9.3, 9.5.1, 10.2, 10.3, 10.5, 10.6, 11.2, 11.4)** | **7** |
| III | **Antenna Basics:** Introduction, Basic Antenna Parameters, Patterns, Beam Area, Radiation Intensity, Beam Efficiency, Directivity and Gain, Antenna Apertures, Effective Height, Antenna Field Zones. Arrays: Linear Arrays of n Isotropic Point Sources of equal Amplitude and Spacing Linear Broadside array of point sources, End fire array of point sources, Directions of Nulls and Maxima for arrays of n isotropic point | **8** |

| | | |
|---|---|---|
| | sources of equal amplitude and spacing. Problems. **(Text 2:1,1.2,6.1 to 6.6)** | |
| **IV** | **Practical Antennas:** Short Electric Dipole, Radiation Resistance of a Short Dipole, Loop Antennas, Helical Antenna, Slot and Micro-strip Antennas, Horn antennas, The Parabolic Reflector and Cassegrain antenna. Log Periodic Antennas, Lens Antennas, TV-Receiving antennas.**(Text 2: 3.1,3.3,7.1 to 7.4, 8.1 to 8.3,9.1 to 9.3, 9.9 to 9.12,10.1 to 10.3,11.3,11.6,12.1, 2.3,12.4,14.3,16.6)** | **8** |
| **V** | **Radio Wave Propagation:** Transmission ratio in free space, Propagation within line of sight, Surface and Space Wave Plane –Earth, Tropospheric propagation, Ionospheric Propagation, Noise **(Text 2: 18.1 to 18.6)** | **8** |

| SI NO | List of Experiments |
|---|---|
| **1** | Study of Reflex klystron |
| **2** | Study of Slotted linecarriage. |
| **3** | Study of Tees- E plane Tee, H plane |
| **4** | Study of Magic Tee. |
| **5** | Study of Directional Coupler |
| **6** | Study of Circulator characteristics |
| **7** | Study of Isolator characteristics |
| **8** | Sketch the Radiation pattern of Horn antenna. |
| **9** | Sketch the Radiation pattern of parabolic antenna |
| **10** | Study of micro-strip antennas. |

**Course Outcomes**

| Course Outcome | Descriptions |
|---|---|
| CO1 | Understand the basic terminology in microwave- transmission lines, microwaves components andantennas. |
| CO2 | Analyze wave propagation through waveguides, operation of microwave active & passive devices and antennas. |
| CO3 | Design array of antennas and antennas for practical applications. |
| CO4 | Discuss the applications of microwaves and antennas. |

**Course Articulation Matrix**

| PO/CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO1 0 | PO1 1 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | | | 1 | | | | | | | | | 2 |
| CO2 | 2 | | | | 2 | | | | | | | | 1 | |
| CO3 | | | 1 | | | | | | | | | | 1 | |
| CO4 | | | 1 | | | | | | | | 2 | | | |

**Text Books:**

| Sl. No. | Author | Text Book title | Publisher | Volume / Issue | Year of Edition |
|---|---|---|---|---|---|
| 1 | Annapurna Das, Sisir K das | Microwave Engineering | Tata McGraw-Hill | 18th Reprint | 2007 |
| 2 | Rajeswari Chatarjee | Antenna Theoryand Practice | New Age International (P)Limited Publishers | 2nd Edition | 2004 |

**Reference Books:**

| Sl. No. | Author | Text Book title | Publisher | Volume / Issue | Year of Edition |
|---|---|---|---|---|---|
| 1 | David M Pozar | Microwave Engineering | John Wiley | 2nd Edition | 2009 |
| 2 | John D Kraus and Ronald JMarhefka | Antennas | Tata McGraw-Hill | 3rd Edition | 2004 |

**Signature of the course coordinator** **Signature of the HoD** **Signature of the Dean (Academic Affairs)**


**Syllabus for the Academic Year – 2024 - 2025**

| | | | | |
|---|---|---|---|---|
| **Department:** Electronics and Telecommunication Engineering | | | **Semester:** | **V** |
| | | | | |
| **Subject:** Digital Switching Systems | | | | |
| **Subject Code:** | 22ET5PE41 | | **L – T – P - C:** | 3-0-0-3 |

| Sl. No | Course Objectives |
|---|---|
| 1 | To study the importance of switching over wired and wireless channels |
| 2 | Layout the foundation for switching, signaling, traffic and standards in telecommunication networks |
| 3 | Analyze how a telecommunication network handles traffic |
| 4 | Understand important telecommunication networks. |

| UNIT | Description | Hours |
|---|---|---|
| I | **DEVELOPMENT OF TELECOMMUNICATIONS & EVOLUTION:** Network structure, Network services, terminology, Regulation, Standards. Introduction to telecommunications transmission, Power levels, Four wire circuits, Digital transmission, FDM, TDM, PDH and SDH. **(Text 1: 1.2 to 1.6,2.1,2.2,2.3,2.42.5,2.6)** **EVOLUTION OF SWITCHING SYSTEMS:** Introduction, Message switching, Circuit switching, Functions of switching systems, Distribution systems, Basics of crossbar systems, Electronic switching. **(Text1: 3.1, 3.2, 3.3, 3.5, 3.8,3.9,3.11)** | **8** |
| II | **TELECOMMUNICATIONS TRAFFIC:** Introduction, Unit of traffic, Congestion, Traffic measurement, Mathematical model, lost cal systems.[**Text1: 4.1,4.2,4.3,4.4,4.5,4.6**] **SWITCHING SYSTEMS:** Introduction, Single stage networks, Grading, Link Systems, GOS of Linked systems, application of graph theory to linksystems. **[Text 1:5.1 to 5.6]** | **8** |
| III | **TIME DIVISION SWITCHING:** Introduction, space and time switching, Time switching networks, Synchronization. **[Text 1:6.1,6.2,6.3,6.6]** **SWITCHING SYSTEM SOFTWARE:** Introduction, Basic software architecture, Software architecture for level 1to 3 control, Digital switching system software classification, Call models, Software linkages during call, Feature flow diagram, Feature | **8** |

| | | |
|---|---|---|
| | interaction.<br>**[Text2:5.1,5.3 ,5.3.1,5.3.4,5.3.5,5.3.6,5.3.7, 5.4,5.5]** | |
| **IV** | **CONTROL OF SWITCHING SYSTEMS:**<br>Introduction, Call-processing functions. Sequence of operations, Signal exchanges. State transition diagrams, Common controls, reliability. Availability and security. Stored program control, Processor architecture, distributor processing software over load control. Networks: Analog networks. Integrated digital networks. Integrated services digital networks.<br>**(Text1:7.1 to 7.5,10.2 to 10.4)** | **7** |
| **V** | **MAINTENANCE OF DIGITAL SWITCHING SYSTEM:**<br>Introduction , Software maintenance, Interface of a typical digital switching system central office, System outage and its impact on digital switching system reliability, Impact of software patches on digital switching system maintainability, A methodology for Reporting and correction of Field problems,[Text 2: 7.1,7.2,7.3,7.5,7.6]<br>**A GENERIC DIGITAL SWITCHING SYSTEM MODEL:** Introduction, Hardware architecture, Software architecture, Recovery strategy, Simple call through a digital system.<br>**[Text 2: 9.1,9.3,9.4,9.5,9.6]** | **8** |

**Course Outcomes**

| Course Outcome | Descriptions |
|---|---|
| **CO1** | Describe the electromechanical switching systems and its comparison with the digital switching. |
| **CO2** | Determine the telecommunication traffic and its measurements |
| **CO3** | Define the technologies associated with the data switching operations. |
| **CO4** | Describe the software aspects of switching systems and its maintenance. |

**Course Articulation Matrix**

| PO/CO | Po1 | Po2 | Po3 | Po4 | Po5 | Po6 | Po7 | Po8 | Po9 | Po10 | Po11 | Po12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 1 | | | | 2 | | | | | | 2 | | 1 | |
| **CO2** | 3 | | | | 2 | | | | 1 | | | | | 1 |
| **CO3** | | | 2 | | | | | | 2 | | 2 | | | |
| **CO4** | | | 3 | | | | | | 2 | | 2 | | | |

**Text Books:**

| Sl. No. | Author | Text Book title | Publisher | Volume | Yearof Edition |
|---|---|---|---|---|---|
| 1 | J.E flood | Telecommunication and Switching, Traffic and Networks | Pearson Education | 1 st Volume | 2012 |
| 2 | Syed R. Ali | Digital Switching Systems | TMH Ed | 2 nd Edition | 2004 |

**Reference Books:**

| Sl. No. | Author | Text Book title | Publisher | Volume / Issue | Year of Edition |
|---|---|---|---|---|---|
| 1 | John C Bellamy | Digital Telephony | Wiley India Pvt. Ltd | 3rd Ed | 2008 |

**Signature of the course coordinator** **Signature of the HoD** **Signature of the Dean (Academic Affairs)**

| | | | | |
|---|---|---|---|---|
| **Department:** Electronics and Telecommunication Engineering | | | **Semester:** | **V** |
| | | | | |
| **Subject:** ARM Processor | | | | |
| **Subject Code:** | 22ET5PE42 | | **L – T – P - C:** | 3-0-0-3 |

| Sl. No | Course Objectives |
|---|---|
| 1 | To understand need of microcontrollers in embedded system. |
| 2 | To describes the architecture and features of LPC 2148 Microcontroller. |
| 3 | To understand architecture and features of ARM Cortex m3 and m4 Processor |
| 4 | Study various hardware and software tools for developing applications. |

| Unit | Description | Hrs |
|---|---|---|
| I | **ARM7TDMI** processor block diagram, ARM7TDMI Features, programmer's model, pipelined Architecture, Memory Formats and Instruction Length.<br>Operation and Addressing modes of Data Transfer.<br>**ARM Instruction Set:** Data Processing Instructions, Branch Instructions, Load-Store Instructions, Software Interrupt Instructions, Program Status Register Instructions, Loading Constants Simple programs.<br>**[Text1: chapter 3.1 to 3.8]** | **7** |
| II | **Thumb Instruction Set:** Thumb register usage, ARM-THUMB inter working, other branch instructions, Data processing instructions, singleLoad-Store Instructions, multiple Load-Store, Instructions, stack instructions and software interrupt instructions. Simple programs<br>[**Text: 1 chapter 4.1 to 4.7]** | **8** |
| III | **LPC 2148 ARM-based microcontroller**: Features of LP2148, LPC 2148 block diagram –Features, GPIO register, and description register.<br>**[Text 1 chapter 4.1 to 4.10]**<br>Theory and programming using Embedded C on LCD, ADC, UART, Timer, SPP,I2C, Bluetooth.<br>**Github link:https://github.com/Adarsh2425/ARM-7-LPC2148-programs-lib-tools /tree/main/programs** | **8** |
| IV | **Exception and Interrupt Handling:** Exception Handling-ARM Processor Exceptions and Modes, Vector Table, Exception Priorities, Link Register Offset.<br>**Interrupts-** Assigning Interrupt, Interrupt Latency, IRQ and FIQ Exceptions, Enabling and disabling IRQ and FIQ, Basic InterruptStack design, and implementation, Interrupt Handling Schemes.<br>**[Text 1: Chapter : 9 9.1 to 9.4]** | **8** |

| | | |
|---|---|---|
| V | **Cortex -M3 and Cortex-M4:** Introduction, General information about the Cortex -M3 and Cortex-M4 processors Processor type Processor architecture Instruction set ,<br>Block diagram, Memory system, Interrupt and exception support, Features of the Cortex -M3 and Cortex-M4 processors, Low power, Scalability, Performance, Code density, Cortex -M4 specific features.<br>**[Text 2: Chapter3: 3.1.1 to 3.1.7 and 3.2.1 to 3.2.8]** | **8** |

**Course Outcomes:**

| | Course outcome |
|---|---|
| **CO1** | Describe the architecture of LPC 2148 ARM-based microcontroller, ARM CORTEX M3<br>and M4 and its applications. |
| **CO2** | Analyze and understand the instructions of ARM and THUMB mode. |
| **CO3** | Apply the knowledge gained for Programming ARM . |
| **CO4** | Understand the exception, interrupts and interrupt handling schemes interfacing of hardware<br>components |

**Course Articulation Matrix**

| PO/PSO / CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO1 | PO1 | PO1 | PSO 1 | PSO 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 1 | 1 | | | | | | | | 1 | | | 1 |
| **CO2** | 2 | 3 | 1 | | | | | | | | 1 | | | 1 |
| **CO3** | 2 | 1 | 2 | | | | | | | | 1 | | | 1 |
| **CO4** | 3 | 2 | 2 | | | | | | | | 1 | | | 1 |

**Text Books:**

| Sl No | Text Book title | Author | Volume and Year of Edition |
|---|---|---|---|
| 1 | ARM System Developer's Guide | Andrew N. Sloss, Dominic Symes and Chris Wright | 2ND Edition.2007 |
| 2 | The Definitive Guide to ARM Cortex -M3 and Cortex-M4 Processors | Joseph Yiu | Third Edition Cambridge, UK |

**Reference Books:**

| Sl No | Text Book title | Author | Volume and Year of Edition |
|---|---|---|---|
| 1 | ARM7TDMI -Technical Reference Manual | | |
| 2 | ARM7TDMI-Instruction Set Reference Manual. | | |
| 3 | Philips Semiconductors -LPC2148/2149/2194/2292/2294 user manual | | |

**Signature of the course coordinator** **Signature of the HoD** **Signature of the Dean (Academic Affairs)**

**Syllabus for the Academic Year – 2024 - 2025**

| | | | | |
|---|---|---|---|---|
| **Department:** Electronics and Telecommunication Engineering | | | **Semester:** | **V** |
| | | | | |
| **Subject :**Principles of Communication Systems | | | | |
| **Subject Code:** | 22ET5OE51 | | **L – T – P - C:** | 3-0-0-3 |

| Sl.No | Course Objectives |
|---|---|
| 1 | Understand the concepts in Amplitude modulation & Angle modulation for the design of communication systems |
| 2 | Analyze sampling techniques, Transmitters & receivers of ASK, FSK and PSK. |
| 3 | Study of subsystems associated with a satellite and antennas. |
| 4 | Learn radar fundamentals & various radars like MTI, Doppler and tracking radars and their comparison. |

| UNIT | Description | Hours |
|---|---|---|
| I | **Analog Communication Systems:** communications, signals and their classifications, elements of a communication system, Transmission of message signals, limitations of resources of communication systems. Amplitude modulation, Comparison of Amplitude modulation techniques, Application: Radio Broadcasting. (**TEXT 1: 1.1,1.2,1.4,1.5,1.6,7.1,7.6, 7.9)** | **8** |
| II | **Frequency Modulation:** Basic Definitions, Frequency Modulation: Narrow band FM and Wide band FM, Generation of FM waves: Indirect FM & Direct FM, Demodulation of FM waves using phase locked loop (Quantitative discussion), Comparison of AM and FM, Application: FM radio. **(TEXT 1: 7.10, 7.11, 7.12, 7.14.)** | **8** |
| III | **Introduction to Digital Communication:** Sampling theorem, PCM block diagram, Digital Modulation techniques: Transmitters & receivers of ASK and FSK. **(TEXT 2: 4.1, 5.1, 7.2)** | **8** |
| IV | **Introduction to Radar:** Introduction, Block diagram, radar range equation, application of radar, MTI radar. **(TEXT 3: 1.1, 1.2, 1.3, 4.1)** | **7** |
| V | **Introduction to Satellite Communication:** Introduction, Satellite subsystems, altitude and orbit control systems (AOCS), Telemetry tracking, command and monitoring, satellite antennas. **(TEXT 4: 3.1, 3.2, 3.3, 3.6.)** | **8** |

**Course Outcomes**

| Course Outcome | Descriptions |
|---|---|
| **CO1** | Define the different types of communication systems. |
| **CO2** | Describe the working principle of communication systems. |
| **CO3** | Analyze modulation and demodulation techniques in analog and digital communication systems. |
| **CO4** | Interpret the applications of communication systems. |

**Course Articulation Matrix**

| PO/CO | Po1 | Po2 | Po3 | Po4 | Po5 | Po6 | Po7 | Po8 | Po9 | Po10 | Po11 | Po12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | | 2 | | 2 | | | | 2 | | | 1 | |
| **CO2** | 3 | 1 | 2 | 2 | | 2 | | | | 1 | | | | 1 |
| **CO3** | 2 | 1 | 2 | 1 | | 1 | | | | | | | | |
| **CO4** | 1 | | | | | | | | | 1 | | | | |

**Text Books:**

| Sl. No. | Author | Text Book title | Publisher | Volume / Issue | Year of Edition |
|---|---|---|---|---|---|
| **1** | Simon Haykin | An Introduction to Analog & Digital Communication | John Willey &Sons | - | 2009 |
| **2** | Simon Haykin | Digital Communication | John Willey India Pvt. Ltd | 2nd Edition | 2006 |
| **3** | Merrill I Skolnik | Introduction to Radar systems | TMH | 3rd Edition | 2001 |
| **4** | Timothy Pratt, Charles Bostian, Jeremy Allnutt | Satellite Communication | John Willey &Sons | 2nd Edition | - |

**Signature of the course coordinator** **Signature of the HoD** **Signature of the Dean (Academic Affairs)**

## Syllabus for the Academic Year – 2024 - 2025

| | | | | |
|---|---|---|---|---|
| **Department:** Electronics and Telecommunication Engineering | | | **Semester:** | V |
| | | | | |
| **Subject:** Management and Entrepreneurship | | | | |
| **Subject Code:** | 22IE562 | | **L – T – P - C:** | 2-0-0-2 |

| Sl. No | Course Objectives |
|---|---|
| 1 | Acquire necessary knowledge and skills required for organizing and carryout entrepreneurial activities. |
| 2 | Develop the ability of analyzing and understanding business situations in which entrepreneurs act. |
| 3 | To master the knowledge necessary to plan entrepreneurial activities. |
| 4 | To make the students understand acquiring patents and copyrights |

| Unit | Description | Hrs |
|---|---|---|
| I | **BASICS OF MANAGEMENT**: Introduction - Meaning - nature and characteristics of Management, Scope and functional areas of management - Management as a science, art or profession Management & Administration - Roles of Management, Levels of Management, Development of Management Thought early management approaches - Modern management approaches. **(Text 1: Chapters 1 and 2)** | 7 |
| II | **PLANNING, ORGANIZING AND STAFFING**: Nature, importance and purpose of planning process Objectives - Types of plans (Meaning only) - Decision making – Importance of planning - steps in planning & planning premises- Hierarchy of plans.: Nature and purpose of organization Principles of organization Types of organization - Depart mentation Committees – Centralization Vs Decentralization of authority and responsibility - Span of control - MBO and MBE (Meaning only) Nature and importance of Staffing - Process of Selection & Recruitment (in brief) **(Text 1: Chapters 4,7, 11**) | 9 |
| III | **DIRECTING & CONTROLLING:** Meaning and nature of directing - Leadership styles, Motivation Theories, Communication - Meaning and importance – Coordination, meaning and importance and Techniques of Co - ordination. Meaning and steps in controlling - Essentials of a sound control system -Methods of establishing control (in brief). **(Text 1: Chapters 9, 16 and 18)** | 8 |
| IV | **ENTREPRENEURSHIP**: Meaning of Entrepreneur, Evolution of the Concept, Functions of an Entrepreneur, Types of Entrepreneur. Concept of Entrepreneurship - Development of Entrepreneurship, Stages in entrepreneurial process, Role of entrepreneurs in Economic Development; Entrepreneurship in India . **(Text 2: Chapters 1,2,10 and 11)** | 7 |

| | | |
|---|---|---|
| V | **SMALL SCALE INDUSTRY:** Definition, Characteristics, Need and rationale: Objectives, Scope, role of SSI in Economic Development. Advantages of SSI Steps to start an SSI - Government policy towards SSI.<br>**PROJECT REPORT:** Need, Significance and contents in the project report. Brief Introduction to PERT and CPM, simple problems to determine critical path. Definition of IPR and types with examples, case studies of the following entrepreneurs:**Azim premji (WIPRO), Schin Bansal &Binny Bansal (Flipkart)** and Roshini Nadar Malhotra (HCLTECH) (Text 2: Chapters 12 and 13) | 8 |

**Course Outcomes:**

| Course outcome | Descriptions |
|---|---|
| **CO1** | Describe the basic principles and concepts of management. |
| **CO2** | Distinguish different plans and list steps in planning. |
| **CO3** | Demonstrate the meaning, functions, types and roles of an entrepreneurial describe various institutional support. |
| **CO4** | Explain in detail about the small scale industries, preparation of project report and intellectual property rights. |

**Course Articulation Matrix**

| PO/PSO CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 1 | | | | | | | | 1 | | | 1 | | |
| **CO2** | 1 | | | | | 1 | | | 2 | | | 1 | | |
| **CO3** | 1 | | | | | 1 | | | 2 | 1 | | 1 | | |
| **CO4** | 1 | | | | | 1 | | | 2 | 2 | 1 | 1 | | |

**Text Books:**

| Sl No | Text Book title | Author | Volume and Year of Edition |
|---|---|---|---|
| 1 | Principles of Management | P.C. Tripathi, P.N.Reddy | 2007 |
| 2 | EntrepreneurshipDevelopment | S S Khanka | 2007 |

**Reference Books:**

| Sl No | Text Book title | Author | Volume and Year of Edition |
|---|---|---|---|
| 1 | Management Fundamentals - Concepts, Application, SkillDevelopment | Robert Lusier, Thomson Eshraghian | 2007 |

**Signature of the course coordinator** **Signature of the HoD** **Signature of the Dean (Academic Affairs)**

## Syllabus for the Academic Year – 2024 - 2025

| | | | | |
|---|---|---|---|---|
| **Department:** Electronics and Telecommunication Engineering | | | **Semester:** | **V** |
| | | | | |
| **Subject:** Department Skill Lab 3 | | | | |
| **Subject Code:** | 22ET507 | | **L – T – P - C:** | 1-0-2-2 |

| Sl.No | Course Objectives |
|---|---|
| 1 | Study the digital communication modules |
| 2 | Understand the base band transmission of digital communication systems. |
| 3 | Study the digital communication techniques using USRP kit. |

| SI NO | List of Experiments |
|---|---|
| 1. | Develop a LabVIEW code of transmitter of communication system to demonstrate theuse of pulse – shaping filters in baseband transmission of a digital modulated signal with signal points located at zero and √E |
| 2. | Develop a LabVIEW code of communication system to demonstrate the effect of channel noise in baseband transmission of a digital modulated signal with signal points located at √E and -√E. |
| 3. | Demonstrate the pulse filter effects in a digital communication system with four orthogonal signal points placed one on each quadrant of I-Q plane |
| 4. | Demonstrate the pulse filter effects in a digital communication system with eight signal points with different amplitude and phase on I-Q plane. |
| 5 | Design and develop a LabVIEW code to demonstrate the difficulty in fixing the decision boundary in M-ASK system with M= __ |
| 6. | Design and develop a LabVIEW code to demonstrate the effect of passband bandwidth in a digital communication system with signaling points placed 180 degree out of phasewith each other |
| 7. | Design and develop a LabVIEW code to demonstrate the effect of passband bandwidth in a digital communication system with signaling points placed 180 degree out of phasewith each other. |
| 8. | Design and develop a LabVIEW code to demonstrate the method to fix the decision boundary in M-PSK system with M=_____ |
| 9. | Demonstrate the pulse filter effects in a digital communication system with four orthogonal signal points placed one on each quadrant of I-Q plane using USRP hardware |
| 10. | Demonstrate the pulse filter effects in a digital communication system with twosignal points placed at zero and √E on I-Q plane using USRP hardware. |

| | |
|---|---|
| 11. | Demonstrate the wireless transmission of M=_signaling points withdifferent amplitude and phase in a digital communication system using USRP KIT. |
| 12. | Demonstrate the pulse filter effects in a digital communication system with eight signal points placed with different amplitude and phase on I-Q plane using USRP hardware. |

**Course Outcomes**

| Course Outcome | Descriptions |
|---|---|
| **CO1** | Understand the basics of virtual instrumentation concept and dataflow programming |
| **CO2** | Understand various functions available in Lab VIEW for engineering applications |
| **CO3** | Understand the interfacing of DAQ devices and customized user designed hardware with Lab VIEW |

**Signature of the course coordinator** **Signature of the HoD** **Signature of the Dean (Academic Affairs)**

**SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY- TUMAKURU**
**(A constituent College of Siddhartha Academy of Higher Education, Tumakuru)**
**Accredited by NAAC with 'A+'**

## Electronics and Telecommunication Engineering

6th Semester (NEP Scheme) Academic year 2024-25

| Sl No. | Course and CourseCode | | Course Title | Teaching dept. | L | T | P | Credits | CIE Marks | SEE Marks | Total Marks | Exam Hrs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **01** | PC | 22ET601 | Wireless and Mobile Communication | ETE | 3 | - | - | 3 | 50 | 50 | 100 | 3 |
| **02** | PC | 22ET602 | CMOS VLSI Design | ETE | 3 | - | 2 | 4 | 50 | 50 | 100 | 3 |
| **03** | PC | 22ET603 | Internet of Things (IoT) | ETE | 3 | - | 2 | 4 | 50 | 50 | 100 | 3 |
| **04** | PE | 22ET6PE4X | Professional Elective-II | ETE | 3 | - | - | 3 | 50 | 50 | 100 | 3 |
| **05** | OE | 22ET6OE5X | Open Elective-I | ETE | 3 | - | - | 3 | 50 | 50 | 100 | 3 |
| **06** | PC | 22ET66X | Online course 561:NPTEL/MOOC/SWAYAM 22NP661:NPTEL, 22MO662:MOOC, 22SW663:SWAYAM | xx | 2 | - | - | 2 | 50 | - | 50 | - |
| **07** | PW | 22ETMP607 | Mini Project | ETE | - | - | 4 | 2 | 50 | 50 | 100 | 3 |
| **08** | HS | 22SK608 | PrePlacement Training | T&P | - | - | 2 | 1 | 50 | - | 50 | - |
| **L: Lecture, T-Tutorial, P-Practical/Drawing, CIE: Continuous Internal Evaluation, SEE: Semester End Examination** | | | | Total | 17 | - | 10 | 22 | 400 | 300 | 700 | 18 |

**Credits Distribution: Basic Science (BS)=08+08+3+3=22, Engineering Science (ES)=10+11=21, Humanities & Social Sciences (HS)=1+2+2+1+3=09, Program Core (PC)=02+16+16+15+11=58, Program Elective (PE)=03+03=06, Open Elective(OE)=03+03=06, Project work (PW)=02, Total Credits=20+20+21+21+23+22=127 . Total 80 AICTE Activity points need to earn by each regular student and Total 55 AICTE Activity points need to earn by each Lateral entry student at the end of 3rd Year BE.**

| **Professional Elective I:** | **Open Elective I:** |
|---|---|
| 22ET6PE41: Radar Systems<br>22ET6PE42: DSP Algorithms & Applications | 22ET6OE51: Mobile Communication |

## Syllabus for the Academic Year 2024 - 2025

| | | | | |
|---|---|---|---|---|
| **Department:** Electronics and Telecommunication Engineering | | | **Semester:** | **VI** |
| | | | | |
| **Subject:** Wireless & Mobile Communication | | | | |
| **Subject Code:** | 22ET601 | | **L – T – P - C:** | 3-0-0-3 |

| Sl. No | Course Objectives |
|---|---|
| 1 | The course has been introduced to make the students understand the principles and architecture of different wireless communication systems and technologies |
| 2 | To enable them to identify the tradeoff between frequency responses, signal to Interference ratio, and spectral efficiency, capacity enhancement techniques. |
| 3 | The Course aims to expose students to characterize different types of large scale and small scale path losses. |
| 4 | To make them understand Mobile cellular Telephony operations. |

| UNIT | Description | Hrs |
|---|---|---|
| I | **Introduction to Wireless communication System:** The History and Evolution of wireless Radio Systems, overview of Existing Network Infrastructure, 1G cellular systems (AMPS), Second Generation (2G), Third Generation (3G),Fourth Generation(4G),5G Principles. **(Text 2: Chapter 1:1.1,1.3 ,2.1, 2.2, 2.4, 2.5,2.6)** | 8 |
| II | **The Cellular Concept-System Design Fundamentals:** Introduction,Frequency Reuse, Channel Assignment Strategies, Handoff Strategies, Interference and System Capacity, Improving Coverage & Capacity in cellular Systems, Common cellular network components, Hardware and Software Views of the cellular Network, 3G Cellular Components, cellularComponent Identification. **(Text1:3.1,3.2,3.3,3.4,3.5,3.6 Text2: 3.2,3.3,3.4,)** | 8 |
| III | **Wireless network architecture and operations:** Call Establishment. Cellular concept, Cell fundamentals, Capacity expansion techniques, Cellular backhaul networks, Mobility management, Radio resources and power management, Wireless network security. **(Text 2:3.5 and Chapter 4: 4.1 to 4.7)** | 8 |
| IV | **Mobile Radio Propagation: Large- Scale Path loss:** Introduction to Radio Wave Propagation, Free Space Propagation Model, The Three Basic Propagation Mechanisms, Ground Reflection Model, Diffraction ( Fresnel Zone Geometry, knife edge diffraction model), Scattering, Outdoor Propagation Models: Longley-Rice, Okumura, Hata, Indoor Propagation Models. **(Text 1: 4.1, 4.2, 4.4, 4.6, 4.7 (4.7to 4.7.2), 4.8, 4.10(4.10.1,4.10.3, 4.10.4,4.11 to 4.11.2)** | 8 |

| | | |
|---|---|---|
| **V** | **Equalization:** Introduction, Fundamentals of Equalization, classification of equalizers, Equalizers in a communication receiver, linear equalizers, nonlinear equalizers. **Diversity:** Space diversity, RAKE receiver. **Speech coding:** Introduction, characteristics of speech signals, quantization techniques, ADPCM, Frequency domain coding of speech, vocoders. **(Text 1: Chapter 7: 7.1, 7.2,7.6, 7.7,7.1.1 & Chapter 8: 8.1,8.4,8.5,8.6,8.6.1, Text 2: 8.7)** | **7** |

**Course Outcomes**

| Course Outcome | Descriptions |
|---|---|
| **CO1** | Understand the wireless cellular system and technical aspects of mobileand wireless propagation. |
| **CO2** | Understand Principles of wireless models, equalizers and receivers. |
| **CO3** | Acquire the knowledge of cell capacity and radio resource and speech coding. |
| **CO4** | Analyze mobile operations and cellular design. |

**Course Articulation Matrix**

| | Po 1 | Po 2 | Po3 | Po 4 | Po 5 | Po6 | Po7 | Po8 | Po9 | Po10 | Po11 | Po12 | PSO 1 | PSO 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | | 1 | 2 | | | | | | | | 1 | |
| **CO2** | 3 | 1 | | 2 | | | | | | | | 1 | | 1 |
| **CO3** | | 2 | | 1 | 2 | | | | | | | | | |
| **CO4** | 3 | 1 | | 1 | | | | | | | | | | |

**Text Books:**

| Sl. No. | Author | Text Book title | Publisher | Volume / Issue | Year of Edition |
|---|---|---|---|---|---|
| 1 | Theodore S Rappaport | Wireless Communication | Pearson Education | 2nd Edition | 2003 |
| 2 | Mullet | Introduction to Wireless Telecommunications Systems and networks | Thomson Learning | - | 2010 |

**Reference Books:**

| Sl. No. | Author | Text Book title | Publisher | Volume | Year of Edition |
|---|---|---|---|---|---|
| 1 | Jorg E, H J Vogel,Christian B, Christian H | GSM Architecture, Protocols and Services | Wiley | 3rd Edition | 2009 |
| 2 | Gary J Mullet | Introduction To Wireless Telecommunications Systems and Networks | Cengage Learning | 2nd Edition | - |

**Signature of the course coordinator** **Signature of the HoD** **Signature of the Dean (Academic Affairs)**

## Syllabus for the Academic Year – 2024 - 2025

| | | | | |
|---|---|---|---|---|
| **Department:** Electronics and Telecommunication Engineering | | | **Semester:** | **VI** |
| | | | | |
| **Subject:** CMOS VLSI Design | | | | |
| **Subject Code:** | 22ET602 | | **L – T – P - C:** | 3-0-2-4 |

| Sl. No | Course Objectives |
|---|---|
| 1 | Review basic MOS transistor and understand VLSI fabrication process. |
| 2 | Establish the basic characteristics of MOS transistor and examine various possibilities for configuring inverter circuits. |
| 3 | Study basic circuit concepts to set out appropriate circuit parameters and understand scaling models. |
| 4 | Understand subsystem design process. |

| Unit | Description | Hrs |
|---|---|---|
| I | **INTRODUCTION TO CMOS CIRCUITS:** Brief History, MOS transistors, MOS transistor switches, CMOS logic, Circuit and system representations. Basic CMOS Technology: n-well, p-well processes, Twin Tub process Layout design rules-Layer representations, CMOS N-well rules. **(Text1) - 1.1, 1.3 to 1.6, 3.2, 3.4** | **8** |
| II | **MOS TRANSISTOR THEORY: Introduction, MOS Device Design** Equations, Ids versus voltage $V_{DS}$ relationships, The n-MOS inverter ,The Complementary CMOS Inverter – DC Characteristics, static load MOS inverters, The Transmission gate. (**Text1) - 2.1 to2.6** | **7** |
| III | **CIRCUIT CHARACTERISTICS AND POWER ESTIMATION:** Resistance Estimation, Capacitance estimation-MOS Capacitor Characteristics, MOS Device Capacitances, and Standard Capacitance. Switching Characteristics- Analytic delay models, CMOS-Gate transistor sizing, Power dissipation, Sizing routing conductors, Charge sharing, Scaling of MOS Transistor. (**Text1) - 4.2, 4.3.1, 4.3.2, 4.5.1, 4.6, 4.7, 4.8, 4.9, 4.13** | **8** |
| IV | **CMOS CIRCUIT AND LOGIC DESIGN:** Basic physical design of simple logic gates, CMOS logic structure, Clocked systems, Latches and registers, system timing, setup and hold time, Single-phase memory structures. **(Text1) - 5.3, 5.4, 5.5.1, 5.5.2, 5.5.3, 5.5.5.4, 5.5.5** | **8** |

| | | |
|---|---|---|
| V | **CMOS SUBSYSTEM DESIGN:** Data path operations- Addition/subtraction, parity generators, comparator, Binary counters, ALU, multiplication and Shifter, Memory elements. CMOS SYSTEM CASE STUDY: Core RISC Microcontroller.<br>**(Text1) - 8.2.1.1, 8.2.1.2, 8.2.1.4, 8.2.1.5, 8.2.1.6,8.2.2,8.2.3, 8.2.4, 8.2.5, 8.2.6, 8.2.7, 8.2.8, 8.3, 9.2.** | **8** |

**List of Experiments**

| | |
|---|---|
| 01 | Draw a circuit for an Inverter using schematic and for the same draw the layout using a specified technology. Also calculate Noise Margin. |
| 02 | Draw a circuit for buffer using schematic and for the same draw the layout using a specified technology. |
| 03 | Realize a two input NAND and NOR gate using CMOS logic and verify its truth table in both schematic and in the layout for specified technology. |
| 04 | Implement a two input XOR Gate with transmission gates and verify its timing diagram |
| 05 | Implement Full Adder circuit in CMOS logic. Make Verilog file of the schematic and generate the layout. Verify its timing diagram in both schematic and layout. |
| 06 | Draw a circuit for an Inverter using schematic and for the same draw the layout using a specified technology. Also calculate Noise Margin. |
| 07 | Draw a circuit for buffer using schematic and for the same draw the layout using a specified technology. |
| 08 | Realize a two input NAND and NOR gate using CMOS logic and verify its truth table in both schematic and in the layout for specified technology. |
| 09 | Implement a two input XOR Gate with transmission gates and verify its timing diagram |
| 10 | Implement Full Adder circuit in CMOS logic. Make Verilog file of the schematic and generate the layout. Verify its timing diagram in both schematic and layout. |
| 11 | Implement a 4-Bit Parallel adder circuit. Make Verilog file of the schematic and generate the layout. Verify its timing diagram in both schematic and layout. |
| 12 | Implement transmission gate in CMOS logic and verify its truth table in both schematic and in the layout. Create the symbol of the same. |
| 13 | Implement a 4:1 Multiplexer using Transmission Gate symbol. Verify the truth table in the schematic editor. Make a Verilog file |

| | |
|---|---|
| 14 | Implement SR, D, T and JK flip flop with Clock, Preset and Clear. Make a verilog file of the schematic and generate the layout. Verify its timing diagram in both schematic and layout. Show the 3D and 2D view for the layout. |
| 15 | Design a 4 bit Asynchronous and synchronous Counter using D flip flop in schematic editor. Make a Verilog file of the schematic and generate the layout. Verify the timing diagram in the schematic and layout. |

**Course Outcomes:**

| Course outcome | Descriptions |
|---|---|
| **CO1** | Understand of MOS transistor theory, CMOS fabrication flow and technology scaling. |
| **CO2** | Draw the stick diagrams and monochrome layout of MOS technology and CMOS logic structures and subsystems. |
| **CO3** | Analyze MOS active devices and CMOS subsystems |
| **CO4** | Design the data path and memory elements of CMOS Subsystem design. |

**Course Articulation Matrix**

| PO/PSO / CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | | | | | | | | | | 1 | | 2 |
| **CO2** | 3 | 2 | 2 | | | | | | | | | | | 1 |
| **CO3** | 2 | 2 | 2 | | | | | | | | | | | 1 |
| **CO4** | 2 | | | | | | | | | | 1 | 1 | | |

**Text Books:**

| Sl No | Text Book title | Author | Volume and Year of Edition |
|---|---|---|---|
| 1 | Principles of CMOS VLSI Design: A Systems Perspective | Neil H. E. Westeand K. Eshragian | Addison-Wesley publishin gCompany, 2nd Edition,2012 |

**Reference Books:**

| Sl No | Text Book title | Auth or | Volume and Year of Edition |
|---|---|---|---|
| 1 | Basic VLSI Design | Douglas.A.Pucknell & Kamran Eshraghian | PHI, rd Edition,20013 |
| 2 | CMOS Digital Integrated Circuits: Analysis and Design | Sung-Mo Kang &Yusuf Leblebici | Tata McGraw-Hill Publishing Company Ltd. New Delhi, 3rd Edition,2007 |

**Signature of the course coordinator** **Signature of the HoD** **Signature of the Dean (Academic Affairs)**

## Syllabus for the Academic Year – 2024 - 2025

| | | | | |
|---|---|---|---|---|
| **Department:** Electronics and Telecommunication Engineering | | | **Semester:** | **VI** |
| | | | | |
| **Subject: Internet of Things (IoT)** | | | | |
| **Subject Code:** | 22ET603 | | **L – T – P - C:** | 3-0-2-4 |

| Sl. No | Course Objectives |
|---|---|
| 1 | Introduce to the basic concepts and Architectures of IoT |
| 2 | Design and Integrate devices for IoT environment |
| 3 | Configure Arduino, Node MCU & Raspberry PI as IoT end-devices |
| 4 | Case study on popular topics like Agriculture, Vehicular and Healthcare Applications |

| Unit | Description | Hrs |
|---|---|---|
| I | **Basics of Networking & Security:** Basics of Networking**:** Introduction, Network Types, Layered network models, Basics of network security, network confidentiality **Emergence of IoT:** Introduction, Evolution of IoT, Enabling IoT and the Complex Interdependence of Technologies, IoT Networking Components.<br>**Textbook 1: Chapter 1-1.1 to 1.3, Chapter 2-2.1 to 2.3, Chapter 4 –4.1 to 4.4** | **7** |
| II | **IoT Sensing and Actuation and smart devices:** Introduction, Sensors, Sensor Characteristics, Sensorial Deviations, Sensing Types, Sensing Considerations, Actuators, Actuator Types, Actuator Characteristics. Introduction to Arduino boards, Writing an Arduino sketch, Hands-on Experiments with Arduino, Introduction to Raspberry pi boards.<br>**Textbook 1: Chapter 5 –5.1 to 5.9, chapter 16, 16.1-16.3, 16.4.1-16.5** | **8** |
| III | **IoT Processing and Connectivity Technologies**: **IoT Processing:** Data Format, Importance of Processing in IoT, Processing Topologies, ProcessingOffloading.<br>**Connectivity Technologies**: Introduction, IEEE 802.15.4, Zigbee, RFID, NFC ,LoRA, Wi-Fi, Bluetooth.<br>**Textbook 1: Chapter 6 –6.1 to 6.5 & Chapter 7 –7.1 to 7.3,7.7, 7.8, 7.13, 7.15 & 7.16.** | **08** |
| IV | **IoT Protocols & Cloud Computing: IoT Protocols:** Introduction, Data protocols: MQTT, MQTT-SN, CoAP, AMQP,XMPP,SOAP, REST & Web-socket<br>**Cloud Computing:** Introduction, Virtualization, Cloud Models, Service-Level, Sensor-Cloud: Sensors-as-a-Service.<br>**Textbook 1: Chapter 8.1 & 8.4 & Chapter 10–10.1 to 10.6.** | **08** |

| | | |
|---|---|---|
| V | **IOT CASE STUDIES: Agricultural IoT:** Introduction, Components of an agricultural IoT, Advantages of IoT in agriculture, Case Studies: In-situ assessment of leaf area index using IoT-based agricultural system, Smart irrigation management system, Smart irrigation management system.<br>**Vehicular IoT:** Introduction, Components of vehicular IoT, Advantages of vehicular IoT, Crime assistance in a smart IoT transportation system **Healthcare IoT:** Introduction, Components of healthcare IoT, Advantages and risk of healthcare IoT, AmbuSens system.<br>**Textbook 1: Chapter 12-12.1-12.2, Chapter 13–13.1; Chapter 14-14.1-14.2; Chapter 17-17.1** | **08** |

**Lab Content**

| Sl No | Experiment Description |
|---|---|
| **1** | Interfacing DHT sensor to Node MCU/Raspberry pi |
| **2** | Interfacing Mq Sensors to NodeMcu/Raspberry Pi |
| **3** | Interfacing GSM module to NodeMcu/Raspberry Pi |
| **4** | Interfacing GPS module to NodeMcu/Raspberry Pi |
| **5** | Interfacing Ultrasonic sensor to NodeMCU/Raspberry pi |
| **6** | Controlling Servo motor using IoT |
| **7** | Interfacing Ultrasonic sensor to NodeMCU/Raspberry pi |
| **8** | Controlling LEDs/Relay using IoT |
| **9** | Design and implement Industrial Monitoring system using IoT |
| **10** | Demonstration of smart agriculture application using IoT. |

**Course Outcomes:**

| Course outcome | Descriptions |
|---|---|
| CO1 | Understand the fundamentals and applications of Internet of Things. |
| CO2 | Exposure to the aspects of communication and protocols associated with IOT. |
| CO3 | Study the various methodologies and tools involved in the design of IoT |
| CO4 | Implement the Various real time IoT applications |

## Course Articulation Matrix

| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | | 3 | 1 | | 1 | | | | | | | | 1 |
| **CO2** | | 3 | 2 | 3 | | | | | | | | | | 1 |
| **CO3** | | 3 | 3 | 3 | | | | | | | | | | 1 |
| **CO4** | 1 | 2 | 2 | | | | | | | | | | | 1 |

## Text Books:

| Sl No | Text Book title | Author | Volume and Year of Edition |
|---|---|---|---|
| 1 | Introduction to IoT | Sudip Misra, Anandarup Mukherjee, Arijit Roy | Cambridge University Press 2021 |
| 2 | Introduction to Industrial Internet of Things and Industry 4.0 | S. Misra, C. Roy, and A. Mukherjee | CRC Press., 2020 |
| 3 | Internet of Things (A Hands-on-Approach) | Vijay Madisetti and Arshdeep Bahga | 1st Edition, VPT, 2014. |

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## Syllabus for the Academic Year – 2024 - 2025

| | | | | |
|---|---|---|---|---|
| **Department:** Electronics and Telecommunication Engineering | | | **Semester:** | **VI** |
| | | | | |
| **Subject:** Radar Systems | | | | |
| **Subject Code:** | 22ET6PE41 | | **L – T – P - C:** | 3-0-0-3 |

| Sl. No | Course Objectives |
|---|---|
| 1 | Understand the Radar fundamentals and analyze the radar signals. |
| 2 | Understand various technologies involved in the design of radartransmitters and receivers. |
| 3 | Learn various radars like MTI, Doppler and tracking radars and their comparison |
| 4 | Understand the Radar fundamentals and analyze the radar signals. |

| UNIT | Description | Hrs |
|---|---|---|
| I | **Basics of Radar:** Introduction, Maximum Unambiguous Range, Radar Waveforms, Definitions with respect to pulse waveform - PRF, PRI, Duty Cycle, Peak Transmitter Power, Average transmitter Power. Simple form of the Radar Equation, Radar Block Diagram and Operation, Radar Frequencies, Applications of Radar, The Origins of Radar, Illustrative Problems. **(Chapter 1 of Text)** | 8 |
| II | **The Radar Equation:** Prediction of Range Performance, Detection of signal in Noise, Minimum Detectable Signal, Receiver Noise, SNR, Modified Radar Range Equation, Envelope Detector — False Alarm Time and Probability, Probability of Detection. Radar Cross Section of Targets: simple targets – sphere, cone-sphere, Transmitter Power, PRF and Range Ambiguities, System Losses (qualitative treatment), Illustrative Problems. **(Chapter 2 : 2.1,2.2,2.3,2.5,2.7,2.9,2.10,2.12 of Text)** | 8 |
| III | **MTI and Pulse Doppler Radar:** Introduction, Principle, Doppler Frequency Shift, Simple CW Radar, Sweep to Sweep subtraction and Delay Line Canceler, MTI Radar with – Power Amplifier Transmitter, Delay Line Cancelers — Frequency Response of Single Delay- Line Canceler, Blind Speeds, Clutter Attenuation, MTI Improvement Factor,N- Pulse Delay-Line Canceler, Digital MTI Processing – Blind phases, I and Q Channels, Digital MTI Doppler signal processor, Moving Target Detector- Original MTD. **(Chapter 3: 3.1, 3.2, 3.5, 3.6 of Text)** | 8 |
| IV | **Tracking with Radar-** Types of Tracking Radar Systems, MonopulseTracking Amplitude Comparison Monopulse(one- and two- Coordinates Tracking Radar), Phase Comparison Monopulse. Sequential Lobing, Conical Scan Tracking, Block Diagram of Conical Scan L1, L2, L3Tracking Radar, Tracking in Range, Comparison of Trackers. **(Chapter 4: 4.1, 4.2, 4.3 of Text)** | 7 |

| | | |
|---|---|---|
| **V** | **The Radar Antenna:** Functions of The Radar Antenna, Antenna Parameters, Reflector Antennas and Electronically Steered Phased array Antennas. (Chapter9: 9.1, 9.2 9.4, 9.5 of Text)<br>The Radar Receiver, Receiver Noise Figure, Super Radar Receiver: Heterodyne Receiver, Duplexers and Receivers Protectors, Radar Displays. (**Chapter 11 of Text)** | **8** |

**Course Outcomes**

| Course Outcome | Descriptions |
|---|---|
| **CO1** | Understand the radar fundamentals, principles of MTI radar, concept of tracking, function of radar antennas and receivers |
| **CO2** | Analyze working principle of simple radar, pulse Doppler radars, sequential lobing, duplexes and displays. |
| **CO3** | Determine anambiguous ranges, minimum detectable signal range using radar range equation tracking in range |
| **CO4** | Describe the applications of radar, types of tracking, delay line cancellers, function of antennas and receivers, range parameters of pulse radar system which affect the system performance. |

**Course Articulation Matrix**

| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 1 | 2 | | 2 | | | | | | | | 1 | |
| **CO2** | | 2 | 1 | 1 | 2 | | | | | | | | | 1 |
| **CO3** | | 2 | 1 | 2 | | | | | | | | | | |
| **CO4** | | | 2 | 1 | | | | | | | | | | |

**Text Book:**

| Sl. No. | Author | Text Book title | Publisher | Volume/Issue | Year of Edition |
|---|---|---|---|---|---|
| 1 | Merrill I Skolink | Introduction to Radar Systems | TMH | 3rd Edition | 2001 |

**Reference Book:**

| Sl. No. | Author | Text Book title | Publisher | Volume/Issue | Year of Edition |
|---|---|---|---|---|---|
| 1 | Byron Edde | Radar Principles, Technology, Applications | Pearson Education | - | 2004 |
| 2 | Peebles. Jr | Radar Principles | P.Z. Wiley | - | 1998 |

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**Syllabus for the Academic Year – 2024 - 2025**

| | | | | |
|---|---|---|---|---|
| **Department:** Electronics and Telecommunication Engineering | | | **Semester:** | **VI** |
| | | | | |
| **Subject:** DSP Algorithms and Applications | | | | |
| **Subject Code:** | 22ET6PE42 | | **L – T – P - C:** | 3-0-0-3 |

| Sl. No | Course Objectives |
|---|---|
| 1 | To Know the basic concepts of digital signal processing and building blocks of DSP processor. |
| 2 | To understand the architecture of TMS320C54xx DSP processor. |
| 3 | To study the concepts of basic DSP Algorithms. |

| Unit | Description | Hrs |
|---|---|---|
| I | **Introduction to Digital Signal Processing:** Introduction, A Digital Signal-Processing System, The Sampling Process, Discrete Time Sequences, Discrete Fourier Transform and Fast Fourier Transform Linear Time Invariant Systems, Digital Filters, Decimation and Interpolation. Architectures for Programmable Digital Signal Processing Devices: Introduction, Basic Architectural Features, DSP Computational Building blocks. **Text 1: 2.1 to 2.8, 4.1 to 4.3** | 8 |
| II | **Bus Architecture and Memory**: Data Addressing Capabilities, Address Generation Unit, Programmability and Program Execution, Speed Issues, Features for External Interfacing. Programmable Digital Signal Processors: Introduction, Commercial Digital Signal Processing Devices, Architecture of TMS320C54xx Digital Signal Processors, Data Addressing Modes of TMS320C54xx Processors. **Text 1: 4.4 to 4.9, 5.1 to 5.4** | 8 |
| III | **Memory Space of TMS320C54xx Processor:** Program Control, TMS320C54xx Instructions and Programming, On-Chip peripherals. Interrupts of TMS320C54xx Processors, Pipeline Operation of TMS320C54xx Processors. **Text 1: 5.5 to 5.10** | 9 |
| IV | **Implementations of Basic DSP Algorithms:** Introduction, the Q-notation, FIR Filters, IIR Filters, Implementation of FFT Algorithms, An FFT Algorithm for 8-point DFT Computation, A butterfly Computation, overflow and scaling, Bit-Reversed Index Generation, FFT Implementation on the TMS320C54xx, Computation of the Signal Spectrum**. Text 1: 7.1 to 7.4, 8.1 to 8.7** | 7 |
| V | **Interfacing:** Memory & Parallel I/O Peripherals to programmable DSP devices, Introduction, Memory Space Organization, External Bus Interfacing Signals, parallel I/O Interface, Programmed I/O, Interrupts and I/O, DMA, A Speech Processing System, An Image Processing System. **Text 1: 9.1 to 9.8, 11.4, 11.5** | 7 |

**Course Outcomes:**

| Course outcome | Descriptions |
|---|---|
| CO1 | Relate basic signal processing concepts and acquire knowledge ofDSP computational building blocks. |
| CO2 | Extend the architectural features of TMS320C54XX toprovide efficient design solutions. |
| CO3 | Develop ALP of basic DSP Algorithms using TMS320C54xxDSP processors. |
| CO4 | Design an interfacing circuit to connect DSP processor to memoryand peripherals. |

**Course Articulation Matrix:**

| CO/PO | | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | 2 | 2 | 2 | 3 | 3 | | 2 | | | 1 | 1 | 1 | | |
| CO2 | | 1 | 3 | 1 | 2 | 3 | | | | | 1 | | 1 | | |
| CO3 | | 2 | 3 | 3 | 2 | | | | | | | | | | |
| CO4 | | 1 | 1 | 1 | 1 | 1 | | | | | 1 | | 1 | | |

**Text Books:**

| Sl. No. | Text Book title | Author | Volume and Year of Edition |
|---|---|---|---|
| 1 | Digital Signal Processing Implementations using DSP Microprocessors with examples from TMS320C54xx | Avatar Singh And S Srinivasan | 11th Edition |

**Reference Books:**

| Sl. No. | Text Book title | Author | Volume and Year of Edition |
|---|---|---|---|
| 1 | Digital Signal Processing: APractical Approach | Ifeachor E.C., Jervis B.W. | 2nd Edition, 2002 |
| 2 | Digital signal processors | B Venakataramani and M. Bhaskar. | 2002 |

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## Syllabus for the Academic Year – 2024 - 2025

| | | | | |
|---|---|---|---|---|
| **Department:** Electronics and Telecommunication Engineering | | | **Semester:** | **VI** |
| | | | | |
| **Subject:** Mobile Communication | | | | |
| **Subject Code:** | 22ET6OE51 | | **L – T – P - C:** | 3-0-0-3 |

| Sl. No | Course Objectives |
|---|---|
| 1 | Use the concepts of cells, Learn the applications of wireless Communication and Understand different types of mobile generations 1G, 2G, 3G, 4G |
| 2 | Learn the wireless network architecture and Multiple Access Techniques. |
| 3 | Study the Advanced Wireless Technologies. |

| UNIT | Description | Hrs |
|---|---|---|
| I | **Evolution and development of cellular systems:** History and Evolution of Modern Telecommunication Infrastructure- The Public Data Network, Broadband Cable Systems, Internet, Cellular Telephone Systems, The OSI Model, Introduction of generations of wireless cellular networks 1G, 2G, 3G, 4G networks. **(Text 1: 1.2, 1.4, 2.2, 2.3, 2.4, 2.5, 2.6)** | 7 |
| II | **Common Cellular System components:** Common cellular networks components, Hardware and software views of cellular networks, 3G cellular systems components and Cellular component identification Call establishment. **(Text 1: 3.1, 3.2, 3.3, 3.4, 3.5)** | 8 |
| III | **Wireless Network Architecture and operation:** Cellular concept, Cell fundamentals, Capacity expansion techniques, Mobility management, Radio resources and power management. **(Text 1: 4.1, 4.2, 4.3, 4.5, 4.6)** | 8 |
| IV | **Multiple Access Techniques for Wireless Communications:** Introduction, FDMA, TDMA, SDMA, Packet Radio, Traffic Routing in Wireless Networks, GSM **(Text 2: 9.1, 9.2, 9.3, 9.5, 9.6, 9.6.3, 11.3 to 11.3.2,11.3.4,10.5, to 5.2,** | 8 |
| V | **Advanced Technologies for Wireless Communication:** Diversity techniques, Fundamentals of Satellite Systems, Cognitive radio technology, multiple input and multiple output wireless systems, wireless sensor networks **(Text1: 8.2, 8.6, 8.7, 12.3, 13.2)** | 8 |

**Course Outcomes:**

| Course Outcome | Descriptions |
|---|---|
| CO1 | Understand evolution and development of different generations of wireless Telecommunication systems. |
| CO2 | Acquire knowledge of cellular components, system architecture, channels and resource management techniques. |
| CO3 | Acquire knowledge of and basic operations for call establishment, mobility management and handoff. |
| CO4 | Acquire knowledge of channel access and its capacity expansion, Cellular emerging technologies. |

**Course Articulation Matrix:**

| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | | | | | | | | | | 1 | | 1 |
| CO2 | 1 | 1 | | | | | | | 1 | | | | 1 | |
| CO3 | 1 | 1 | | | | | | | | | | | | |
| CO4 | 1 | 2 | | | | | | | | | | | | 1 |

**Text Books:**

| Sl. No. | Author | Text Book title | Publisher | Volume /Issue | Year of Edition |
|---|---|---|---|---|---|
| 1 | Mullet | Wireless Telecom Systems and networks | Thomson Learning | - | 2006 |
| 2 | Theodore S Rappaport | Wireless Communications Principles and Practice | Prentice-Hall, India | 2nd Edition | 2002 |

**Reference Books:**

| Sl. No. | Author | Text Book title | Publisher | Volume /Issue | Year of Edition |
|---|---|---|---|---|---|
| 1 | Lee W.C.Y | Mobile Cellular Telecommunication | MGH | - | 2002 |
| 2 | D P Agrawal | Wireless communication | Thomson learning | 2nd Edition | 2007 |
| 3 | David Tse, Pramod Viswanath | Fundamentals of Wireless Communication | Cambridge | - | 2005 |

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