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/31/UG(BE)/2024 Date: 15/07/2024

N O T I F I C A T I O N

Sub: - Ordinance pertaining to Curriculum of Undergraduate Programme Bachelor of Engineering (4th 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 (4th 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 ENGINEERING

VISION

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 environmental considerations.

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 environmental contexts, 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 and receive 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 needs of 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

Electronics and Telecommunication Engineering

7th Semester **Academic year 2024-25**

Sl No	Course Code		Course Title	Teaching Dept.	L	T	P	Credits	CIE Marks	SEE Marks	Total Marks	Exam Hrs
1	PC	ET7TH1	Optical Fiber Communication	ET	3	-	-	3	50	50	100	3
2	PC	ET7TH2	Data Communication Networks	ET	3	-	-	3	50	50	100	3
3	PE	ET7PE3x	Professional Elective-III	ET	3	-	-	3	50	50	100	3
4	PE	ET7PE4x	Professional Elective-IV	ET	3	-	-	3	50	50	100	3
5	PE	ET7PE5x	Professional Elective-V	ET	3	-	-	3	50	50	100	3
6	PC	ET7LB1	Advanced Communication Lab	ET		-	3	1.5	50	50	100	3
7	PC	ET7LB2	Data Communication Networks Lab	ET		-	3	1.5	50	50	100	3
8	PC	ET7PW1	Project Phase-I	ET	-	-	-	2	50	-	50	-
L: Lecture, T-Tutorial, P-Practical/Drawing, CIE: Continuous Internal Evaluation, SEE: Semester End Examination				**Total**	**21**	**-**	**6**	**20**	**400**	**250**	**750**	**21**

There is no SEE for Skill Development-IV Course.
However, all the students should maintain a minimum 85% of attendance and 40% of CIE to get pass in the subject.

Professional Elective-III	Professional Elective-IV	Professional Elective-V
ET7PE31- Satellite Communication	ET7PE41 - Cryptography and Network Security	ET7PE51 - Python Programming
ET7PE32 –Advanced Embedded system design	ET7PE42 - DSP Algorithms and applications	ET7PE52 - IoT and Wireless Sensor Networks
ET7PE33 -Nano Electronics	ET7PE43 - Cognitive Radio Networks	ET7PE53 - Biomedical Signal Processing

Syllabus for the Academic Year – 2024-2025

Department: Electronics and Telecommunication engineering			**Semester:**	VII
Subject: Optical Fiber Communication				
Subject Code:	ET7TH1		**L – T – P - C:**	3-0-0-3

Sl. No	Course Objectives
1	Optical fibers, signal transmission characteristics.
2	Optical sources, photo detectors, optical components and amplifiers.

Unit	Description	Hrs
I	**Overview of optical fiber communications:** Motivations for light wave communications, optical spectral bands, key elements of optical fiber systems, basic optical laws and definitions, optical fiber modes and configurations,mode theory for circular waveguides, single mode fibers, graded-index fiber structure, fiber materials. **Text: 1.1, 1.2, 1.6, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7**	**8**
II	**Attenuation and Dispersion:** Attenuation: absorption, scattering losses, bending losses, signal dispersion in fibers. **Text: 3.1-3.1.1 to 3.1.4, 3.2**	**8**
III	**Optical sources and Photo detectors:** Light-emitting diodes, laser diodes, physical principles of photo diodes, photo detector noise. **Text: 4.2- 4.2.1 to 4.2.3, 4.3-4.3.1, 6.1, 6.2**	**8**
IV	**WDM concepts and Optical components:** Overview of WDM, passive optical couplers: 2x2 fiber coupler, star coupler, Mach- Zehnder interferometer multiplexers, isolators and circulators, fiber grating filters, dielectric thin-film filters, dynamic gain equalizers, OADM **Text:10.1, 10.2-10.2.1,10.2.4, 10.2.5, 10.3, 10.4, 10.5, 10.8.4, 10.8.5**	**8**
V	**Optical amplifiers:** Basic applications and types of optical amplifiers, semiconductor optical amplifiers, erbium-doped fiber amplifiers. **Text:11.1, 11.2, 11.3, 11.4** **SONET/SDH:** Transmission formats and speeds, Optical interfaces, SONET/SDH rings, SONET/SDH networks **Text:13.3**	**7**

Course Outcomes:

Course outcome	Descriptions
CO1	Describe the basic properties and various transmission losses of optical fibers.
CO2	Apply the knowledge of mathematics to solve problems involved in optical fiber communication.
CO3	Analyze the behavior of optical sources, photo detectors, optical components and amplifiers.
CO4	Select and employ operational techniques of optical fiber for various applications.

Course Articulation Matrix

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

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Optical Fiber Communications	Gerd Keiser	5th edition, 2013

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Fiber Optic Communication	John M. senior	3rd edition, 2010
2	Optical Fiber Communications Principles and Practice	John M. senior	Third edition, 2010 reprint

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:**	**VII**
Subject: Data Communication Networks				
Subject Code:	ET7TH2		**L – T – P - C:**	3-0-0-3

Sl. No	Course Objectives
1	Expose students to basic principles of computer networking.
2	To provide an Overview to the main technologies and models used in computer networks.
3	Give students the knowledge of internetworking principles and how the Internet protocols, routing, and applications operate and allow them to practice in this field forming foundation for more advanced courses in networking

Unit	Description	Hrs
I	**Data communication and network models**: Layered tasks, OSI Model,Layers in OSI model, TCP-IP protocol suite, addressing Telephone and cable networks for data communication: Dial up modem, DSL, ADSL, Cable TV networks. **Data Link layer:** Framing **1.1 to 1.4, 2.1 to 2.5, 6.1, 9.2 to 9.5, 11.1**	**08**
II	**Data Link Control**: CRC, Flow and error control, Protocols, Noiseless channels and noisy channels, HDLC. MULTIPLE ACCESSES: Random access, Controlled access. **10.4, 11.2 to 11.6, 12.1 to 12.2.**	**08**
III	**Wired LAN**: Ethernet, IEEE standards, Standard Ethernet, Changes in the standards, Fast Ethernet, Gigabit Ethernet, Wireless LAN IEEE 802.11. Connecting LANs, Connecting devices, Backbone networks and Virtual LANs. **13.1 to 13.5, 14.1, 15.1 to 15.3.**	**08**
IV	**Network Layer**: Logical addressing-Ipv4 addresses, Ipv6 addresses, Network layer: Internet protocol-Ipv4 and Ipv6, Transition from Ipv4 to Ipv6. 19.1 to 19.2, 20.1 to 20.4	**08**
V	**Network layer: Delivery, forwarding, Routing**-Hierarchical routing, Unicast Routing-Distance vector routing Protocols (instability not considered), Linkstate routing. Congestion and QOS: Open loop and closed loop control, Techniques to improve QOS. **22.1 to 22.3, 24.1 to 24.3, 24.5 to 24.6**.	**07**

Course outcome

Course outcome	Descriptions
CO1	Understand the principles of computer networking, architectures, and reference models. (L1)
CO2	Acquire knowledge of techniques: framing, switching, LAN, DLL and channel allocation. (L2)
CO3	Analyze network addressing, data handling, fragmentation, network layer protocols performance (L4)
CO4	Apply the basic principles of error control, routing, flow control, and congestion control mechanisms for real time networks. (L3)

Course Articulation Matrix

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

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Data communications and Networking	Behrouz.A. Forouzan	Tata McGraw-Hill

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Computer Networks	James F. Kurose, Keith W. Ross	2nd Edition /2003
2	Introduction to Data communication and networking	Wayne Tomasi	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:**	VII
Subject: Satellite Communication				
Subject Code:	ET7PE31		**L – T – P - C:**	3-0-0-3

Sl. No	Course Objectives
1	Explain orbital mechanics and orbital elements.
2	Discuss various satellite subsytems and study of launch vehicles.
3	Understand the satellite access schemes.
4	Discuss the concepts of GPS.

Unit	Description	Hrs
I	**Orbital Mechanics and Launchers –** Orbital mechanics, look angle Determination, Orbital perturbations, Orbit determination, Launches and Launch Vehicles, Orbital effects in communications Systems performance. **(Text 1: chapter 2 – 2.1, 2.2, 2.3, 2.4, 2.5, 2.6)**	**8**
II	**Satellites-** Satellite subsystems, Attitude and orbit control systems (AOCS), Telemetry, Tracking, Command and Monitoring, Power systems, Communications subsystems and Satellite antennas. **(Text 1: chapter3 – 3.1, 3.2, 3.3, 3.4, 3.5, 3.6)**	**8**
III	**Satellite Link Design-** Introduction, Basic Transmission Theory, System Noise Temperature and G/T Ratio, Design of Downlinks, Satellite Systems using Small Earth Stations, Uplink Design, Design for Specified C/N. **(Text 1: chapter4 – 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7)**	**8**
IV	**Multiple Access & VSAT systems-** Introduction, Code Division Multiple Access, FDMA, TDMA, Error Control for Digital Satellite Links: Implementation of Error Detection on satellite Links. VSAT System: Introduction, Overview of VSAT systems. **(Text 1: chapter6 – 6.1, 6.2, 6.3, 6.8 and chapter9 – 9.1, 9.2)**	**8**
V	Satellite Navigation and the Global Positioning System - Introduction,Radio and Satellite Navigation, GPS position Location Principles, GPS receivers and Codes, Satellite Signal Acquisition, GPS Navigation Message, GPS Signal Levels, Time Accuracy, GPS Receiver Operation, GPS C/A code accuracy. **(Text 1: chapter12 – 12.1 – 12.11)**	**7**

Course Outcomes:

Course outcome	Descriptions
CO1	Ability to understand the concept of orbital mechanics, different types of satellite subsystems, and multiple access technologies. (L4)
CO2	Analyze the system noise temperature, look angles for practical applications. (L3)
CO3	Design the satellite link budget. (L5)
CO4	Understand the concept of VSAT systems and GPS working principles. [L2]

Course Articulation Matrix

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

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Satellite Communications	Timothy Pratt, Charles Bostian, Jeremy Allnutt	Second edition

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Satellite Communications	W. L. Pitchand, H. L. Suyderhoud, R. A. Nelson	2nd Ed/2007
2	Satellite communication concept and applications	K N Rajarao	2nd Edition/2013
3	Satellite Communications	Dennis Roddy	4th Edition/2006

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:**	**VII**
Subject: Advanced Embedded System Design				
Subject Code:	**ET7PE32**		**L – T – P - C:**	**3–0 –0 –3**

Sl. No	Course Objectives
1	Impart the concepts and architecture of embedded systems
2	To make the students capable of designing embedded systems.
3	Set the required background in embedded firmware concepts and RTOS.
4	Familiarizing the students in Embedded System Development Environment.

Unit	Description	Hrs
I	**Introduction and examples of embedded systems** Introduction to Embedded Systems Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Characteristics and Quality Attributes of Embedded Systems. **(Chapter 1:1.1-1.5, Chapter 3: 3.1-3.2)** .	**7**
II	**Typical Embedded System:** Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory: ROM, RAM, Memory Shadowing, Sensors and Actuators, Communication Interface: Onboard and External Communication Interfaces (**Chapter 2:2.1-2.4)**	**9**
III	**Embedded Firmware:** Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages**. (Chapter 2:2.6 Chapter 9:9.1-9.2)**	**7**
IV	**Real-Time Operating System (RTOS) based Embedded System Design:** Operating System Basics, Types of OS, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling, Threads, Processes and Scheduling, Task Communication, Task Synchronization, Device Drivers, How to Choose an RTOS. **(Chapter 10: 10.1-10.10)**	**8**
V	**Embedded System Development Environment** The Integrated Development Environment (IDE), Types of Files Generated on Cross compilation, Disassembler/ELDompiler, Simulators, Emulators and Debugging, Target Hardware Debugging, Boundary Scan. **(Chapter 13: 13.1-13.6)**	**8**

Course Outcomes:

Course outcome	Descriptions
CO1	Know about embedded system and characteristics of an Embedded System.
CO2	Understand the crucial aspects of embedded systems, sensors & actuators, communication protocols , Firmware circuits andIntegrated Development Environment.
CO3	To design embedded firmware approaches.
CO4	To calculate the execution time of task scheduling techniques in RTOS.

Course Articulation Matrix

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

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Introduction to Embedded Systems	Shibu K.V	Mc Graw Hill,2009

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Embedded Systems	Raj Kamal	TMH.
2	Embedded System Design	Frank Vahid, Tony Givargis,	John Wiley.
3	Embedded Systems	Lyla,	Pearson,2013
4	An Embedded Software Primer	David E. Simon,	Pearson Education

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:**	**VII**
Subject: Nano Electronics				
Subject Code:	**ET7PE33**		**L – T – P C:**	**3– 0 – 0 – 3**

Sl. No	Course Objectives
1	Know the types of nanotechnology, atomic structure, molecular technology and preparation of Nano materials.
2	Understand the fundamentals of nano electronics and its properties.
3	Know the Silicon MOSFET's, QTD and carbon nano tubes.
4	Understand the fundamentals of molecular electronics.

Unit	Description	Hrs
I	**Mesoscopic physics and Nanotechnologies:** Introduction tonanotechnology, Impacts, Limitations of conventional microelectronics, Trends in microelectronics and optoelectronics, characteristic lengths in mesoscopic systems, Quantum mechanical coherence. Classification of Nano structures, Low dimensional structures. Quantum wells, wires and dots, Density of states and dimensionality, semiconductor hetero structures **(Text 1: 1.1 to 1.7)**	**8**
II	**Nano layers:** Production of Nano layers: physical vapour deposition, chemical vapour deposition. Molecular Beam Epitaxy, Ion Implantation, Formation of Silicon. Dioxide- dry and wet oxidation methods, Characterization of Nanolayers. **(Text 2: 4.1, 4.1.1 to 4.1.5, 4.2)**	**8**
III	**Nanostructures**: Introduction to characterization of nanostructures, tools used for of nano materials characterization, microscope-optical, electron, and electron microscope. Principle of operation of Scanning Tunnelling Microscope, Atomic Force Microscope, Scanning Electron microscope, Specimen interaction. Transmission Electron Microscope. X-Ray Diffraction analysis, PL & UV Spectroscopy, Particle size analyser. Two-dimensional electronic system, two-dimensional behaviour, MOSFET structures, Hetero junctions. Quantum wells, modulation doped quantum wells, multiple quantum wells. The concept of super lattices Kronig - Penney model of super lattice. **(Text 2: 5.1, 5.2, 5.3, 5.4.1, 5.4.2, 5.4.3)**	**8**
IV	**Transport of charge in Nanostructures under Electric field**: parallel transport, hot electrons, perpendicular transport. Quantum transport in nanostructures, Coulomb blockade. Transport of charge in magnetic field - Effect of magnetic field on a crystal. Aharonov-Bohm effect, the Shubnikov-de Hass effect, the quantum Hall effect. **(Text 1: 6.1 to 6.6)**	**7**
V	**Nano-electronic devices:** MODFETS, hetero junction bipolar transistors. Resonant tunnel effect, RTD, RTT, Hot electron transistors. Coulomb blockade effect and single electron transistor, CNT transistors. Hetero structure semiconductor laser. Quantum well laser, quantum dot LED, quantum dot laser. Quantum well optical modulator, quantum Well sub band photo detectors, principles of NEMS. **(Text1: 8.1 to 8.6)**	**8**

Course Outcomes:

Course outcome	Descriptions
CO1	Understand basic concepts of nanoelectronic devices and nano technology.
CO2	Discuss the types of nanotechnology, molecular technology and the preparation of nano materials.
CO3	Describe the concepts of silicon MOSFET and Quantum Transport Devices.
CO4	Explain the concepts, functions, fabrications and applications of molecular electronics.

Course Articulation Matrix

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

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Nanotechnology for Microelectronics and optoelectronics	J.M. Martinez-Duart, R.J. Martin Palma, F. Agulle Rueda	Elsevier,2006
2	Nanotechnology and Nanoelctronics	W.R. Fahrner	Springer,2005

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Introduction to Nanoscience & Technology	Chattopadhyay, Banerjee	PHI,2012
2	Fundamentals of Nanoelectronics	George W. Hanson	Pearson Education,2009
3	Nanoelectronics and nanosystems	K. Goser, P. Glosekotter, J. Dienstuhl	Springer,2005

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Syllabus for the Academic Year – 2024-2025

Department: Electronics and Telecommunication engineering			**Semester:**	**VII**
Subject: Cryptography and Network security				
Subject Code:	ET7PE41		**L – T – P - C:**	3-0-0-3

Sl. No	Course Objectives
1	Explain the objectives of network and information security.
2	Understand various cryptographic algorithms.
3	Analyze the basic categories of threats and attacks to computer networks.
4	Discuss Web security and Firewalls.

Unit	Description	Hrs
I	Security Concepts: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security. Cryptography Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks. **Text 2: 1.1 to 1.5, 2.1 to 2.9**	**8**
II	Symmetric key Ciphers: Block Cipher principles, DES, AES, Blowfish, RC5, IDEA, Block cipher operation, Stream ciphers, RC4. Asymmetric key Ciphers: Principles of public key cryptosystems, RSA algorithm, Elgamal Cryptography, Diffie-Hellman Key Exchange, Knapsack Algorithm. **Text 1: 3.1,7.4,9.1,10.1 Text 2: 3.4 to 3.9, 4.2 to 4.6, 4.8 & 4.9**	**8**
III	Cryptographic Hash Functions: Message Authentication, Secure Hash Algorithm (SHA-512), Message authentication codes: Authentication requirements, HMAC, CMAC, Digital signatures, Elgamal Digital Signature Scheme. Key Management and Distribution: Symmetric Key Distribution Using Symmetric & Asymmetric Encryption, Distribution of Public Keys, Kerberos, X.509 Authentication Service, Public – Key Infrastructure. **Text 1:11.5,12.1,12.5,12.6,13.1,13.2,14.1,14.2**	**8**
IV	Transport-level Security: Web security considerations, Secure Socket Layer and Transport Layer Security, HTTPS, Secure Shell (SSH) Wireless Network Security: Wireless Security, Mobile Device Security, IEEE 802.11 Wireless LAN, IEEE 802.11i Wireless LAN Security. **Text 1: 16.1 to 16.5,17.1, 17.2, 17.4**	**8**
V	E-Mail Security: Pretty Good Privacy, S/MIME IP Security: IP Security overview, IP Security architecture, Authentication Header, Encapsulating security payload, Combining security associations, Internet Key Exchange Case Studies on Cryptography and security: Secure Multiparty Calculation, Virtual Elections, Single sign On, Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability.**Text 1: 18.1,18.2,19.1 to 19.5,Text 2: Case studies**	**7**

Course Outcomes:

Course outcome	Descriptions
CO1	Recognize the need of enforcing securities and cryptographic policies with case studies.
CO2	understand basic cryptographic algorithms, message and web authentication and security issues
CO3	Apply effective cryptographic techniques for network security.
CO4	Interpret different security principles on devices and typical applications.

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	2	1		1						1		1		1
CO3	1	2								1				1
CO4	1	1								1		1		-

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Cryptography and NetworkSecurity	Principles and Practice: WilliamStallings	**2010**
2	Cryptography and NetworkSecurity:	Atul Kahate	

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Cryptography and NetworkSecurity	C K Shyamala, NHarini, Dr T RPadmanabhan	2011
2	Cryptography and NetworkSecurity	ForouzanMukhopadhya y	2008

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:**	**VII**
Subject: DSP Algorithms and Applications				
Subject Code:	**ET7PE42**		**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.
4	Understand the concept of interfacing DSP processor to Memory and Peripheral devices.

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: Sec 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: Sec 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: Sec 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: Sec 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: Sec 9.1 to 9.8, 11.4, 11.5**	7

Course Outcomes:

Course outcome	Descriptions
CO1	Relate basic signal processing concepts and acquire knowledge of DSP computational building blocks.
CO2	Extend the architectural features of TMS320C54XX to provide efficient design solutions.
CO3	Develop ALP of basic DSP Algorithms using TMS320C54xx DSP processors.
CO4	Design an interfacing circuit to connect DSP processor to memory and peripherals.

Course Articulation Matrix

PO/PSO CO	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: A Practical 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:**	VII
Subject: Cognitive Radio Networks				
Subject Code:	ET7PE43		**L – T – P - C:**	3-0-0-3

Sl. No	Course Objectives
1	To understand the evolving software defined radio and cognitive radio techniques and their essential functionalities.
2	To study the basic architecture and standard for cognitive radio.
3	To understand the physical, MAC and Network layer design of cognitive radio.
4	To expose the student to evolving applications and advanced features of cognitive radio.

Unit	Description	Hrs
I	Digital Communication fundamentals for cognitive radio: Introduction, data transmission, digital modulation techniques, probability of bit error, multicarrier modulation, multicarrier equalization techniques. **(Text 1: 3.1 to 3.6)**	**8**
II	Spectrum access and sharing: Introduction, unlicensed spectrum sharing, licensed sharing, secondary spectrum access, non-real time SSA, real-time SSA. **(Text 1: 5.1 to 5.6)**	**8**
III	Cognitive Radio Architecture: Introduction to architecture, functions, components and design rules: SDR components, iCR node functional components, the cognition components, radio knowledge in architecture, user knowledge in architecture, watchdog timer, the cognition cycle. **(Text 2: 3.1:3.1.10, 3.2: 3.2.1, 3.2.2, 3.2.3, 3.2.7, 3.2.8, 3.2.9, 3.2.13, 3.3)**	**8**
IV	Software Defined Radio Architectures for Cognitive Radios: Introduction, SDR and cognitive radio relationship, SDR architectures, Software tunable analog radio components, antenna systems, reconfigurable digital radio technologies, basic digital radio components. **(Text 2: 4.1 to4.7)**	**8**
V	Applications of cognitive radio: Introduction, Cognitive wireless communication applications, resource optimization and quality enhancing applications, interoperability, end user product/service specific cognitive wireless communication applications, cognitive application challenges. **(Text 2: 13.1 to 13.3)**	**7**

Course Outcomes:

Course outcome	Descriptions
CO1	Gain knowledge on the design principles on software defined radio and cognitive radio.
CO2	Develop the ability to design and implement algorithms for cognitive radio spectrum sensing and dynamic spectrum access.
CO3	Build experiments and projects with real time wireless applications.
CO4	Apply the knowledge of advanced features of cognitive radio for real world applications.

Course Articulation Matrix

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

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Cognitive Radio Communications & Networks	Alexander M. Wyglinski, Maziar Nekovee, Thomas Hou	2010
2	Cognitive Radio, Software Defined Radio, and Adaptive Wireless Systems	Huseyin Arslan (Ed.)	2007

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
01	Cognitive Radio Technology	Bruce Fette	**2006**
02	Cognitive Radio Networks	Kwang-Cheng Chen, Ramjee Prasad	**2009**
03	Principles of Cognitive Radio	Ezio Biglieri, Andrea J. Goldsmith, Dr Larry J. Greenstein, Narayan B. Mandayam, H. Vincent Poor	**2012**

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Syllabus for the Academic Year – 2024-2025

Department: : Electronics and Telecommunication engineering			**Semester:**	**VII**
Subject: Python Programming				
Subject Code:	ET7PE51		**L – T – P - C:**	3-0-0-3

Sl. No	Course Objectives
1	Get acquainted with the syntax and semantics of Python programming language.
2	Understand the operational principles of lists, tuples, dictionaries and sets in structuring data.
3	Learn File handling and Exception handling
4	Demonstrate the use of NumPy, Pandas and Matplotlib libraries.

Unit	Description	Hrs
I	**Variables, Expressions and Statements:** The first program, Comments, Values and data types, Variables, Statements, Evaluating expressions, Operators and operands, Type converter functions, Order of operations, Operations on strings, Input, Composition, The modulus operator. Textbook 1: Chapters 1 – 2	8
II	**Flow control:** Boolean Values, Comparison Operators, Boolean Operators, Mixing Boolean and Comparison Operators, Elements of Flow Control, Program Execution, Flow Control Statements, Importing Modules, Ending a Program Early with sys. exit(), **Functions:** def Statements with Parameters, Return Values and return Statements, The None Value, Keyword Arguments and print(), Local and Global Scope, The global Statement, Exception Handling, A Short Program: Guess the Number **Textbook 1: Chapters 3**	8
III	**Lists:** The List Data Type, Working with Lists, Augmented Assignment Operators, Methods, Example Program: Magic 8 Ball with a List, List-like Types: Strings and Tuples, References, **Dictionaries and Structuring Data:** The Dictionary Data Type, Pretty Printing, Using Data Structures to Model Real-World Things, **Textbook 1: Chapters 4 – 5**	9
IV	**Manipulating Strings:** Working with Strings, Useful String Methods, Project: Password Locker, Project: Adding Bullets to Wiki Markup # **Reading and Writing Files:** Files and File Paths, The os.path Module, The File Reading/Writing Process, Saving Variables with the shelve Module, Saving Variables with the print. format() Function, Project: Generating Random Quiz Files, Project: Multiclipboard, **Textbook 1: Chapters 6 , 8**	7
V	**Extending Python Using NumPy**: What is NumPy?, Creating NumPy Arrays, Array Indexing- Boolean Indexing, Slicing Arrays, NumPy Slice Is a Reference, Reshaping Arrays, Array Math- Dot Product, Matrix, Cumulative Sum, NumPy Sorting, Array Assignment- Copying by Reference, Copying by View (Shallow Copy), Copying by Value (Deep Copy). **Textbook 2: Chapter 2**	7

Course Outcomes:

Course outcome	Descriptions
CO1	Demonstrate proficiency in handling various programming constructs of Python
CO2	Explicate the type of operators, built-in libraries and functions.
CO3	Illustrate the process of representation and accessing of data using various data Structures
CO4	Analyze a given problem and develop solution for the same.

Course Articulation Matrix

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

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Al Sweigart	Automate the Boring Stuff with Python	2015
2	Jeffrey Elkner,Peter Wentworth, Allen B.Down ey, and Chris Meyers	How to Think Like a Computer Scientist: Learning with Python 3 Documentation	Releasing 3rd Edition (Using Python 3.x),April, 2020

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Richard L. Halterman	Fundamentals of Python Programming	Southern Adventist University, 2019, Ebook, ISBN:9781539530268

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Syllabus for the Academic Year – 2024-2025

Department: Electronics and Telecommunication engineering			**Semester:**	**VII**
Subject: IoT and Wireless Sensor Networks				
Subject Code:	ET7PE52		**L – T – P - C:**	3-0-0-3

Sl. No	Course Objectives
1	About the concepts of Internet of things.
2	To be aware of the basics of wireless sensor networks.
3	To enable them to have a brief idea about how to grow with the advancing technologies
4	The course also aims at inculcating the ideas and concepts of Sensor networks which may be considered as the basic building blocks of any IoT system.

Unit	Description	Hrs
I	Introduction to IoT: Definition & Characteristics of IoT, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies, IoT Levels.**(Text1:1.1,1.1.1,1.2.1,1.3.1,1.3.2,1.3.3, 1.4.1 to 1.4.5,1.5.1 to 1.5.6)** .	**8**
II	**IoT System Management:** Introduction, Machine-to-Machine (M2M), Difference between IoT and M2M, SDN and NFV for IoT, Need for IoT System Management, SNMP, Network Operator Requirements, NETCONF, YANG, IoT Systems Management with NETCONF-YANG.(**Text1:**3.1 ,3.2,3.3,3.3,3.4.1,4.2,4.2.1,4.3,4.4,4.5,4.6)	**8**
III	**Domain Specific IoTs:** Applications, Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, health & Lifestyle.**(Text1:2.1 to 2.10)**.	**8**
IV	**Overview of Wireless Sensor Networks:** Introduction, Challenges for Wireless Sensor Networks, Enabling Technologies for Wireless Sensor Networks. Architectures: Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes, Operating Systems and Execution Environments, Network Architecture-Sensor Network Scenarios, Optimization Goals and Figures of Merit, Gateway Concepts. Physical Layer and Transceiver Design Considerations. **(Text1:1.4,1.6,2.1,2.2,2.3,3.1,3.2,3.3,3.5,4.3)**	**8**
V	**Communication Protocols:** Introduction, Fundamentals of (wireless) MAC protocols, Important classes of MAC protocols, MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts - S-MAC, The Mediation Device Protocol, Wakeup Radio Concepts, Contention based protocols(CSMA,PAMAS), Schedule based protocols (LEACH, SMACS, TRAMA), Routing Protocols-Energy-Efficient Routing, Geographic Routing, Hierarchical networks by clustering. **(Text2:5.1,5.1.2,5.1.3,5.2,5.2.2,5.2.3,5.2.4,5.43,5.3.2,5.4.1,5.4.2,5. 4.3)**	**7**

Course Outcomes:

Course outcome	Descriptions
CO1	Describe the OSI Model for the IoT/M2M Systems and WSN.
CO2	Understand the architecture and design principles for IoT and WSN
CO3	Learn the Applicatins of iot and wsn..
CO4	Identify the communication protocols which best suits the WSNs.

Course Articulation Matrix

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

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Internet of Things – A hands-on approach,	Arshdeep Bahga and Vijay Madisetti	2015
2	Wireless Sensor Networks- An Information Processing Approach	Feng Zhao & Leonidas J. Guibas	2007.

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Syllabus for the Academic Year – 2024-2025

Department: Electronics and Telecommunication engineering			**Semester:**	**VII**
Subject: Biomedical Signal Processing				
Subject Code:	**ET7PE53**		**L – T – P - C:**	**3 – 0 – 0 – 3**

Sl. No	Course Objectives
1	Understand the basic signals in the field of biomedical.
2	Study origins and characteristics of some of the most commonly used biomedical signals, including ECG.
3	Understand Sources and characteristics of noise and artifacts in bio signals.
4	Understand use of bio signals in diagnosis, patient monitoring and physiological investigation.

Unit	Description	Hrs
I	**Introduction to Biomedical Signals:** The nature of biomedical signals, examples of biomedical signals, objectives and difficulties in biomedical signal analysis. **Electro-cardiography:** Basic electrocardiography, ECG leads systems, ECG signal characteristics. **(Chapter 1, 2: 2.1-2.3)**	8
II	**Basics of Digital Filtering:** Digital filters, the z transform, Elements of a digital filter, Types of digital filters, Transfer function of a difference equation, the z-plane pole-zero plot, the rubber membrane concept. **Adaptive Filters:** Principal noise canceller model, 60-Hz adaptive canceling using a sine wave model, other applications of adaptive filtering. **(Chapter 4: 4.1-4.7, 8: 8.1- 8.3)**	8
III	**Signal Averaging:** Basics of signal averaging, Signal averaging as a digital filter, a typical average, Software for signal averaging, Limitations of signal averaging. **(Chapter 9: 9.1-9.5)**	8
IV	**Data Reduction Techniques:** Turning point algorithm, AZTEC algorithm, Fan algorithm, Huffman coding. **(Chapter 10: 10.1-10.4)**	7
V	**ECG QRS Detection and Analysis Systems:** Power spectrum of the ECG, Band pass filtering techniques, Differentiation techniques, Template matching techniques, A QRS detection algorithm, ECG interpretation, ST-segment analyzer, Portable arrhythmia monitor. **(Chapter 12: 12.1-12.5, 13: 13.1-13.3)**	8

Course Outcomes:

Course outcome	Descriptions
CO1	Understand various methods of acquiring and processing bio signals.
CO2	Explain various sources of bio signal distortions and its remedial techniques.
CO3	Analyze and demonstrate ECG and EEG signal with characteristic feature points.
CO4	Model a basic biomedical system.

Course Articulation Matrix

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

Text Books:

Sl. No.	Text Book title	Author	Volume and Year of Edition
1	Biomedical Signal Processing	Willis J. Tompkins	2001.

Reference Books:

Sl. No.	Text Book title	Author	Volume and Year of Edition
1	Biomedical Signal Analysis	Rangaraj M. Rangayyan	2002

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Syllabus for the Academic Year – 2024-2025

Department: Electronics and Telecommunication engineering	**Semester:**	**VII**

Subject: Advanced Communication Lab				
Subject Code:	ET7LB1		**L – T – P - C:**	0-0-3-1.5

Sl. No	Course Objectives
1	To conduct experiments on optical fiber communication, coupler, resonator and wireless modules (Bluetooth, NRF module, ZigBee, GSM, NodeMCU)

LAB CONTENT

Sl. No	Experiment Description
1	Conduct an experiment on optical fiber kit to measure the following: i) Numerical aperture ii) Acceptance angle iii) Attenuation iv) Bendingloss
2	Conduct an experiment to measure power division of Micro strip Directionalcouplers and power dividers.
3	Conduct an experiment to measure resonance of Micro strip ring Resonatorand plot resonance graph.
4	RFID Tag reader
5	Applications of Bluetooth
6	Applications using node MCU
7	Applications of GSM
8	Wireless data transmission using NRF Module. (Transmitter & Receiver).
9	Data transmission between 2 different IDEs (Arduino – python & vice-versa)

Course Outcomes:

Course outcome	Descriptions
CO1	Measure the various optical fiber communication losses.
CO2	Understand various concepts related to micro strip components.
CO3	Develop different applications using different wireless modules.
CO4	Integrate two different programming platforms.

Course Articulation Matrix

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

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Syllabus for the Academic Year – 2024-2025

Department: Electronics and Telecommunication engineering	**Semester:**	**VII**

Subject:	Data Communication Networks Lab			
Subject Code:	ET7LB2		**L – T – P - C:**	0-0-3-1.5

Sl. No	Course Objectives
1	Expose students to basic principles of computer networking.
2	To provide an Overview to the main technologies and models used in computer networks.
3	Give students the knowledge of internetworking principles and howthe Internet protocols, routing, and applications operate and allow them to practice in this field forming foundation for more advanced courses in networking
4	Expose students to basic concepts of computer networking using NS2 tool.

LAB CONTENT

Sl. No	Experiment Description
1	Write a C program to simulate Bit-stuffing/ De-stuffing in HDLC.
2	Write a C program for Encryption of a given message using Substitution method.
3	Write a C program for Decryption of a given message using Substitution method.
4	Write a C program to simulate Shortest Path Algorithm for the givengraph.
5	Write a C program to compute polynomial code Checksum for CRC-CCITT: i) Without error ii) With error
6	Implement the following operations using DOS interrupts i) Create and delete a directory ii) Create and delete a file.
7	Simulate a three nodes point-to-point network with duplex links between them. Set the queue size vary the bandwidth and find the number of packets dropped.
8	Simulate a four node point-to-point network, and connect the links as follows: n0-n2, n1-n2 and n2-n3. Apply TCP agent between n0-n3 and UDP n1-n3. Apply relevant applications over TCP and UDP agents changing the parameter and determine the number of packets by TCP/UD.
9	Simulate the different types of Internet traffic such as FTP and TELNET over a network and analyze the throughput.
10	Simulate an Ethernet LAN using N-nodes (6-10), change error rate and data rate and compare the throughput.
11	Using RS 232 cable carries Asynchronous communication between two systems.

Course Outcomes:

Course outcome	Descriptions
CO1	Understand principles and protocols of computer networking layers(L3)
CO2	Acquire knowledge of techniques: framing, routing, security (L3)
CO3	Design algorithms for chained layers (L4)
CO4	Design the network using NS2 tool. (L3)

Course Articulation Matrix

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

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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

8th Semester **(NEW: 170 credits)** **Academic year 2024-25**

Sl No	Course Code		Course Title	Teaching Dept.	L	T	P	Credits	CIE Marks	SEE Marks	Total Marks	Exam Hrs
1	PE	ET8PE1x	Professional Elective-VI	ET	3	-	-	3	50	50	100	3
2	PE	ET8PE2x	Professional Elective-VII	ET	3	-	-	3	50	50	100	3
3	PC	ET8TS1	Technical Seminar	ET	3	-	-	2	50	--	50	-
4	PC	ET8PW2	Project Phase-2	ET	3	-	-	8	50	50	100	3
L: Lecture, T-Tutorial, P-Practical/Drawing, CIE: Continuous Internal Evaluation, SEE: Semester End Examination				**Total**	**12**	**-**	**-**	**16**	**200**	**150**	**350**	**15**

There is no SEE for Skill Development-IV course.
However, all the students should maintain a minimum 85% of attendance and 40% of CIE to get pass in thesubject.

Professional Elective-VI	Professional Elective-VII
ET8PE11 - Machine learning with Python	ET8PE21 - Software Defined Networks
ET8PE12 - Telemedicine and Telecare	ET8PE22 - Multi-rate Systems and Filter Banks
ET8PE13 - SOC Communication Architecture	ET8PE23 - 4G LTE/5G Communications

Syllabus for the Academic Year – 2024 - 2025

Department: Electronics and Telecommunication engineering			**Semester:**	**VIII**
Subject: Machine Learning with Python				
Subject Code:	ET8PE11		**L – T – P - C:**	3-0-0-3

Sl. No	Course Objectives
1	Learn the field of Machine Learning, describing a variety of learning paradigms, algorithms, theoretical results, and applications
2	Learn the skills of decision making algorithms.
3	Understand Artificial Intelligence concept and its problem space.
4	Illustrate ML algorithm and their usage in applications.

Unit	Description	Hrs
I	**Introduction:** Well posed learning problems, Designing a Learning system, Perspective and Issues in Machine Learning. Concept Learning: Concept learning task, Concept learning as search, Find-S algorithm, Version space, Candidate Elimination algorithm, Inductive Bias. Python libraries suitable for Machine Learning: Numerical Analysis and Data Exploration with NumPy Arrays, and Data Visualization with Matplotlib **Text Book1, Sections: 1.1 –1.3, 2.1-2.4, 2.7**	8
II	**Decision Tree Learning:** Decision tree representation, Appropriate problems for decision tree learning, Basic decision tree learning algorithm, hypothesis space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning. Example program in Python **Text Book1, Sections: 3.1-3.6**	8
III	Artificial Neural Networks: Introduction, Neural Network representation, Appropriate problems, Perceptron's, Back propagation algorithm. **Text book 1, Sections: 4.1 – 4.5**	9
IV	Bayesian Learning: Introduction, Bayes theorem, Bayes theorem and concept learning, ML and LS error hypothesis, ML for predicting probabilities, MDL principle, Naive Bayes classifier, Bayesian belief networks. **Text book 1, Sections: 6.1 – 6.5, 6.9, 6.11,**	7
V	Evaluating Hypothesis: Motivation, Estimating hypothesis accuracy, Basicsof sampling theorem, General approach for deriving confidence intervals, Difference in error of two hypothese.. **Text book 1, Sections: 5.1-5.5**.	7

Course Outcomes:

Course outcome	Descriptions
CO1	Identify the problems for machine learning. And select theeither supervised, unsupervised or reinforcement learning.
CO2	Explain theory of probability and statistics related to machine learning
CO3	Illustrate the process of representation and accessing of datausing various data Structures
CO4	Investigate concept learning, ANN, Bayes classifier.

Course Articulation Matrix

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

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Machine Learning	Tom M. Mitchell,.	India Edition 2013
2	Jeffrey Elkner, Peter Wentworth, Allen B. Downey, and Chris Meyers	How to Think Like a Computer Scientist: Learning with Python 3 Documentation	Releasing 3rd Edition (Using Python 3.x), April, 2020

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Trevor Hastie, Robert Tibshirani,et,al	springer series in statistics.	2nd edition

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Syllabus for the Academic Year – 2024 - 2025

Department: Electronics and Telecommunication engineering			**Semester:**	VIII
Subject: Telemedicine and Telecare				
Subject Code:	ET8PE12		**L – T – P - C:**	3-0-0-3

Sl. No	Course Objectives
1	Learn the key principles for telemedicine and health.
2	Understand tele-medical technology.
3	Know tele-medical standards, mobile telemedicine and its applications.

Unit	Description	Hrs
I	**TELEMEDICINE AND HEALTH** History and evolution of telemedicine, Organs of telemedicine, Global and Indian scenario, Ethical and legal aspects of Telemedicine - Confidentiality, Social and legal issues, Safety and regulatory issues, Advances in Telemedicine	**8**
II	**TELEMEDICAL TECHNOLOGY** Principles of Multimedia - Text, Audio, Video, data, Data communications and networks, PSTN, POTS, ANT, ISDN, Internet, Air/ wireless communications, Communication infrastructure for telemedicine – LAN and WAN technology. Satellite communication, Mobile communication.	**8**
III	**TELEMEDICAL STANDARDS** Data Security and Standards: Encryption, Cryptography, Mechanisms of encryption, phases of Encryption. Protocols: TCP/IP, ISO-OSI, Standards to followed DICOM, HL7, H. 320 series Video Conferencing, Security and confidentiality of medical records, Cyber laws related to telemedicine	**8**
IV	**MOBILE TELEMEDICINE** Tele radiology: Image Acquisition system Display system, Tele pathology, Medical information storage and management for telemedicine – patient information, medical history, test reports, medical images, Hospitalinformation system	**8**
V	**TELEMEDICAL APPLICATIONS** Telemedicine – health education and self care. Introduction to robotics surgery, Telesurgery, Telecardiology, Teleoncology, Telemedicine in neurosciences, Business aspects - Project planning and costing, Usage of telemedicine	**7**

Course Outcomes:

Course outcome	Descriptions
CO1	Understand the basics of Telemedicine and its applications.
CO2	Apply multimedia technologies in Telemedicine.
CO3	Explain Protocols behind encryption techniques for secure Transmission of data.
CO4	Apply Tele-health in healthcare.

Course Articulation Matrix

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

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	"Essentials of Telemedicine and Telecare"	Norris, A.C.	Wiley, 2002

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Introduction to Telemedicine Royal Society of Medicine	Richard Wootton. John Craig, Victor Patterson	2006
2	Medical Informatics A Primer	Mohan Bansal	2004

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Syllabus for the Academic Year – 2024 - 2025

Department: Electronics and Telecommunication engineering			**Semester:**	VIII
Subject: SOC Communication Architecture				
Subject Code:	ET8PE13		**L – T – P - C:**	3-0-0-3

Sl. No	Course Objectives
1	Analyze the functional and nonfunctional performance of the system early in the design process to support design decisions.
2	Analyze hardware/software tradeoffs, algorithms, and architectures to optimize the system based on requirements and implementation constraints.
3	Analyze tradeoffs and explore architecture and micro-architecture design spaces to develop and synthesize custom hardware accelerators.

Unit	Description	Hrs
I	Introduction to SoC: Review of Moore's law and CMOS scaling, benefits of System on Chip integration in terms of cost, power, and performance. Comparison on System on Board, System on Chip, and System-in-Package. Typical goals in SoC design cost reduction, power reduction, design effort reduction, performance maximization. Productivity gap issues and the ways to improve the gap – IP based design and design reuse. **Text 1: 1.1-1.7**	**08**
II	System On Chip Design Process: A canonical SoC Design, SoC Design flow, waterfall vs spiral, top-down vs bottom-up, Specification requirement, Types of Specification, System Design Process, System level design issues, Soft IP vs Hard IP, IP verification and Integration, Hardware-Software co design, Design for timing closure, Logic design issues, Verification strategy, On chip buses and interfaces, Low Power, Hardware Accelerators in Soc. **Text 1:3.1-3.6**	**08**
III	Embedded Memories: cache memories, flash memories, embedded DRAM. Topics related to cache memories. Cache coherence. MESI protocol and Directory-based coherence. **Text 1: 5.1-5.6**	**08**
IV	Interconnect Customization and Configuration: Bus architecture and its limitations. Network on Chip (NOC) topologies. Mesh-based NoC. Routing in an NoC. Packet switching and wormhole routing. **Text 1: 6.1-6.5**	**08**
V	MPSoCs: What, why, How MPSoCs, Techniques for designing MPSoCs, Performance and flexibility for MPSoCs design Case Study: A Low Power Open Multimedia Application Platform for 3G Wireless. **Text 2: 3.1-3.6**	**07**

Course Outcomes:

Course outcome	Descriptions
CO1	Apply concepts of Moore's law, CMOS scaling to understand the System on Chip with its need, evolution, challenges, goals, superiority over system on board & stacked ICs in package.
CO2	Analyze Typical goals in SoC design and also inter connect architecture.
CO3	Design solutions for issues at system level, and issues of Hardware-Software co design and make an effective presentation, IP based design and design reuse
CO4	Discuss Productivity gap issues, Verification strategy, Routing in an NoC. Packet switching and wormhole routing.

Course Articulation Matrix

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

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	On-Chip Communication Architectures: System on Chip Interconnect	Sudeep Pasrichaand Nikil Dutt	2008
2	Introduction to system on package SOP Miniaturization of the Entire System	Rao R. Tummala, Madhavan Swaminathan	2008

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Design of System on a Chip: Devices and Components	Ricardo Reis	2004
2	Co-Verification of Hardware and Software for ARM System on Chip Design (EmbeddedTechnology)"	Jason Andrews	--

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SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY- TUMAKURU
(A constituent College of Siddhartha Academy of Higher Education, Tumakuru)
Syllabus for the Academic Year – 2024-2025

Department: Electronics and Telecommunication engineering			**Semester:**	VIII
Subject: Software Defined Networks				
Subject Code:	ET8PE21		**L – T – P - C:**	3-0-0-3

Sl. No	Course Objectives
1	Understand the basics of software defined networking
2	Identify an emerging paradigm in computer networking that allows a logically centralized software program to control the behavior of an entire network .
3	Learn the skills to do advanced networking programming
4	Analyse to use software programs to perform varying and complex networking tasks .

Unit	Description	Hrs
I	**Introduction** Introduction, What Do They Do?, Distributed Control Planes, Centralized Control Planes, The open flow: Introduction, Hybrid approaches. **Text 1:Chapters 1, 2 and 3**	**08**
II	**SDN Controllers and Network Programmability** Introduction, General Concepts, Layer 3 Centric, Plexxi, Cisco One PK , the management interface, the application-Network Divide, Modern Programmatic Interfaces, I2RS, Modern Orchestration. **Text 1: Chapters 4, 5**	**08**
III	**Data Centre Concepts and Constructs** Introduction, multitenant data centers, SDN solutions for data centre, VLANs, EVPN, VxLan, NVGRE, Virtualization and Data Plane I/O, Service Locations and Chaining, **Text 1: Chapters 6 and 7**	**08**
IV	**Network Topology and Topological Information Abstraction:** Introduction, Network Topology, Traditional Methods, BGP-TE/LS, ALTO, I2RS Topology **Text 1: Chapter 8**	**08**
V	**Building and SDN Framework:** Introduction, Build Code first, The Juniper SDN framework, IETE SDN frameworks, Open daylight Controller Frameworks. **Text 1: Chapter 9**	**07**

Course Outcomes:

Course outcome	Descriptions
CO1	Differentiate between traditional networks and software defined networks.
CO2	Understand advanced and emerging networking technologies.
CO3	Obtain skills to do advanced networking programming.
CO4	Expand upon the knowledge learned and apply it to solve real world problems using the learnt SDN frameworks

Course Articulation Matrix

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

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Software Defined Networks	Thomas D Nadeau and Ken Gray	1st Edition /August 2013

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Software Defined Networks: A Comprehensive Approach	Paul Goransson and Chuck Black	2nd Edition /2014
2	Software Defined Networking with Open Stack	Sreenivas Voruganti and Sriram Subramanian	1st Edition /2016

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Syllabus for the Academic Year – 2024-2025

Department: Electronics and Telecommunication engineering			**Semester:**	VIII
Subject: Multirate Systems and Filter Banks				
Subject Code:	ET8PE22		**L – T – P - C:**	3-0-0-3

Sl. No	Course Objectives
1	To enable the students to understand the fundamentals of Multirate systems.
2	To enable the students to understand the maximally decimated filter banks.
3	To enable the students to understand the para-unitary perfect reconstruction filter banks.
4	To enable the students to understand the linear phase perfect reconstruction QMF banks and cosine modulated filter banks.

Unit	Description	Hrs
I	**Fundamentals of Multi-rate Systems:** Basic multi-rate operations, interconnection of building blocks, poly-phase representation, applications of multi-rate systems, **Chapter 4-4.1.1,4.1.2,4.2,4.3,4.3.1,4.5.1,4.5.2,4.5.4**	**8**
II	**Maximally decimated filter banks:** Errors created in the QMF bank, alias-free QMF system, power symmetric QMF banks, M-channel filter banks, poly-phase representation, perfect reconstruction systems, trans- multiplexers. **Chapter5-5.1.1, 5.1.2, 5.2, 5.2.1, 5.3, 5.3.1, 5.4, 5.4.1, 5.4.2, 5.6, 5.6.3,5.9**	**9**
III	**Para-unitary Perfect Reconstruction Filter Banks:** Lossless transfer matrices, filter bank properties induced by paraunitariness, two channel Para- unitary lattices, transform coding. **Chapter 6 -6.0,6.1.1,6.1.2,6.2,6.2.1,6.2.2,6.3,6.3.1,6.5**	**8**
IV	**Linear Phase Perfect Reconstruction QMF Banks:** Necessary conditions, lattice structures for linear phase FIR PR QMF banks, formal synthesis of linear phase FIR PR QMF lattice. **Chapter 7-7.1, 7.2, 7.3**	**6**
V	**Cosine Modulated Filter Banks:** Pseudo-QMF bank and its design, efficient poly-phase structures, properties of cosine matrices, cosine modulated perfect reconstruction systems. **Chapter 8-8.0, 8.1, 8.1.1, 8.1.2, 8.3, 8.4, 8.5, 8.5.5**	**8**

Course Outcomes:

Course outcome	Descriptions
CO1	Understand the concept of Decimation, Interpolation and their applications
CO2	Analyze various filter banks
CO3	Design Various filter banks
CO4	Discuss the applications of filter banks

Course Articulation Matrix

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

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Multirate Systems and Filter Banks	P.P.Vaidyanathan	2004.

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Wavelets and Filter Banks	Gilbert Strang and Truong Nguyen,	1996
2	Multirate Digital Signal Processing	N. J. Fliege,	2000.

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Syllabus for the Academic Year – 2024-2025

Department: Electronics and Telecommunication engineering			**Semester:**	VIII
Subject: 4G/LTE 5G Communication				
Subject Code:	ET8PE23		**L – T – P - C:**	3-0-0-3

Sl. No	Course Objectives
1	Understand the basics of LTE standardization phases.
2	Explain the system architecture of LTE.
3	Analyze the role of LTE radio interface protocols and logical channels transport processing.
4	Analyze the importance of 5G communication network.

Unit	Description	Hrs
I	**Key Enablers for LTE features:** Introduction to OFDM, Single carrier FDMA, Single carrier FDE, Channel Dependent Multiuser Resource Scheduling, Multi antenna Techniques, IP based Flat network Architecture, LTE Network Architecture. **Text: 1.4 - 1.5 (Text 1)** **Multicarrier Modulation:** OFDM basics, OFDM block diagram, OFDM in LTE, **Text: 3.2,3.2.1,3.2.5,3.33.6 (Text 1)**	**08**
II	**Overview and Channel Structure of LTE** Introduction to LTE, Channel Structure of LTE, Downlink OFDMA Radio Resource, Logical channels. **Text: 6.1, 6.1.2, 6.1.3, 6.2.1, 6.2.2, 6.2.3 (Text 1)**	**08**
III	**Downlink Transport Channel Processing:** Overview, Downlink shared channels, Downlink Control Channels, Broadcast channels, Downlink physical channels. **Text:7.1, 7.1.1, 7.2, 7.2.1, 7.2.3 (Text 1)** MIMO systems, Multiuser and network MIMO systems, MIMO in LTE. **Text 1:5.8, 5.9, 5.10 (Text 1)**	**08**
IV	**Uplink Channel Transport Processing:** Overview, channel coding processing, channel encoding modulation, Uplink shared channels, multi-antenna transmission, Uplink Control channels. **Text: 8.1, 8.1.1, 8.1.2, 8.2, 8.2.2, 8.2.3, 8.3 (Text 1)**	**08**
V	**5G Network Architecture:** Millimeter wave communication, Machine type communication (MTC), Device to Device (DTD) communication, Vehicle to vehicle communication. **(Text 2)**	**07**

Course Outcomes:

Course outcome	Descriptions
CO1	Understand the system architecture and the functional standard specifiedin LTE 4G.
CO2	Analyze the role of LTE radio channel processing
CO3	Analyse the spectrum opportunities and challenges.
CO4	Analyze the security issues and channels in 5G communication systems.

Course Articulation Matrix

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

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Fundamentals of LTE	Arunabha Ghosh, Jan Zhang, Jefferey Andrews, Riaz Mohammed	2010
2	5G Mobile Communications	Wei Xiang, Kan Zheng Xuemin (Sherman) Shen	2017

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	LTE for UMTS Evolution to LTE-Advanced	Harri Holma and Antti Toskala	2011
2	Evolved Packet System (EPS); The LTE and SAE Evolution of 3G UMTS	Pierre Lescuyer and Thierry Lucidarme	2008

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