SCHEME OF INSTRUCTION AND EXAMINATION
BE IV YEAR
(ELECTRONCIS AND COMMUNICATION ENGINEERING)

SEMESTER – II

S.No.	Code No.	Subject	Scheme of Instruction		Scheme of Examination		
					Duration in Hours	Max. Marks	
		THEORY	L/T	D/P		Univ. Exams	Sessionals
1	EC 451	Data Communication Computer Networks	4	-	3	75	25
2		Elective – III	4	-	3	75	25
3		Elective – IV	4	-	3	75	25
		PRACTICALS					
1	EC 481	General Seminar	-	3	--	--	25
2	EC 482	Project	-	6	Viva-voce	Grade	50
		TOTAL	**12**	**9**		**225**	**150**

	Elective – III		Elective – IV
EC 461	Real Time Operating System	EC 471	Nano Electronics
EC 462	Coding Theory and Techniques	EC 472	Global Navigational Satellite Systems
EC 463	Design of Fault Tolerant Systems	EC 473	Fuzzy Logic and Applications
EC 464	Radar Systems	EC 474	Wireless Sensor Networks
EC 465	Mobile and Cellular Communication	EC475	EMIC
EC 466	System Verilog	EC 476	Speech Signal Processing
EC 467	Analog VLSI Design	EC 477	Advanced Digital Design
		EC 478	Scripting Language
LA XXX	Intellectual Property Rights	CE XXX	Disaster Mitigation and Management

DATA COMMUNICATIONS AND COMPUTER NETWORKS

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

Course Objectives:

1. To provide a conceptual foundation for the study of data communications using the open Systems interconnect (OSI) model for layered architecture.
2. To study the principles of network protocols and internetworking
3. To understand the Network security and Internet applications.
4. To understand the concepts of switched communication networks.
5. To understand the performance of data link layer protocols for error and flow control.
6. To understand various routing protocols and network security.

UNIT-I

Data communication: A Communication Model, The Need for Protocol Architecture and Standardization, Network Types: LAN, WAN, MAN. Network Topologies: Bus, Star, Ring, Hybrid. Line configurations. Reference Models: OSI, TCP/IP .

Circuit switching: Circuit Switching Principles and concepts.
Packet switching: Virtual circuit and Datagram subnets, X.25.

UNIT-II

Data Link Layer: Need for Data Link Control, Design issues, Framing, Error Detection and Correction, Flow control Protocols: Stop and Wait, Sliding Window, ARQ Protocols, HDLC.

MAC Sub Layer: Multiple Access Protocols: ALOHA, CSMA, Wireless LAN. IEEE 802.2, 802.3, 802.4,802.11,802.15, 802.16 standards. Bridges and Routers.

UNIT-III

Network Layer: Network layer Services, Routing algorithms : Shortest Path Routing, Flooding, Hierarchical routing, Broadcast, Multicast, Distance Vector Routing, and Congestion Control Algorithms.

Internet Working: The Network Layer in Internet :IPV4, IPV6, Comparison of IPV4 and IPV6, IP Addressing, ATM Networks.

UNIT-IV

Transport Layer: Transport Services, Elements of Transport Layer, Connection management, TCP and UDP protocols, ATM AAL Layer Protocol.

UNIT-V

Application Layer: Domain Name System, SNMP, Electronic Mail, World Wide Web.

Network Security: Cryptography Symmetric Key and Public Key algorithms, Digital Signatures, Authentication Protocols.

Suggested Reading:

1. Andrew S Tanenbaum, “Computer Networks,” 5/e, Pearson Education, 2011.
2. Behrouz A. Forouzan, “Data Communication and Networking,”3/e, TMH, 2008.
3. William Stallings, “Data and Computer Communications,” 8/e, PHI, 2004.
4. Prakash C. Guptha, “Data Communications and Computer Networks,” PHI.

EC 463 ***With effect from Academic Year 2017-18***

DESIGN OF FAULT TOLERANT SYSTEMS

(ELECTIVE –III)

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

Course Objectives:

1. To understand the basic concepts and metrics of reliable systems.
2. To be able to comprehend the methods involved in testing of circuits.
3. Appreciating the techniques involved in developing reliable and fault tolerant modules using redundancy.
4. Gain insight into practical applications of reliable systems.

UNIT-I

Basic concepts of Reliability: Failures and faults, Reliability and failure rate, Relation between reliability & mean time between failure, Maintainability & Availability, reliability of series and parallel systems. Modeling of faults. Test generation for combinational logic Circuits: conventional methods-path sensitization & Boolean difference. Random testing- transition count testing and signature analysis.

UNIT-II

Fault Tolerant Design-I: Basic concepts ,static,(NMR and use of error correcting codes), dynamic, hybrid and self purging redundancy, Sift-out Modular Redundancy (SMR), triple modular redundancy, SMR reconfiguration.3

UNIT-III

Fault Tolerant Design-II: Time redundancy, software redundancy, fail-soft operation, examples of practical fault tolerant systems, introduction to fault tolerant design of VLSI chips.

UNIT-IV

Self checking circuits: Design of totally self checking checkers, checkers using m-out of a codes, Berger codes and low cost residue code, self-checking sequential machines, partially self-checking circuits. Fail safe Design: Strongly fault secure circuits, fail-safe design of sequential circuits using partition theory and Berger codes, totally self checking PLA design.

UNIT-V

Design for testable combination logic circuits: Basic concepts of testability, controllability and observability. The Reed-Muller expansion technique, level OR-AND-OR design, use of control and syndrome-testing design.
Built-in-test, built-in-test of VLSI chips, design for autonomous self-test, design in testability into logic boards.

Suggested Reading:

1. Parag K. Lala, "Fault Tolerant & Fault Testable Hardware Design",PHI, 1985
2. Parag K. Lala, "Digital systems Design using PLD's", PHI 1990.
3. N.N. Biswas, "Logic Design Theory", PHI 1990.
4. Konad Chakraborthy & Pinaki Mazumdar, Fault tolerance and Reliability Techniques for high – density random – access memories Reason, 2002.

EC 465 ***Effect from the academic year 2017 - 2018***

MOBILE CELLULAR COMMUNICATIONS

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

Course objectives:

1. To understand the concept and implementation of frequency reuse and Handoff techniques and to analyze interference and capacity enhancement.
2. To appreciate the factors influencing outdoor and indoor propagation systems and to analyze various multiple access protocols based on their merits and demerits.
3. To visualize the system architectures and implementation of GSM and CDMA based mobile communication systems.
4. To understand the concepts in various Mobile Technologies

UNIT-I

Basic Cellular system and its operation, frequency reuse, channel assignment strategies, Handoff process, factors influencing handoffs, handoffs in different Generations, Interference and system capacity, Cross talk, Enhancing capacity and cell coverage, Trunked radio system. Manual and Automatic Electronic Exchanges.

UNIT-II

Free space propagation model, three basic propagation mechanisms, practical link budget design using path loss models, outdoor propagation models: Durkin's model and indoor propagation model, partition losses. Small scale multipath propagation, Parameters of mobile multipath channels, types of small scale fading. Cell Tower Antenna/radiation pattern, Mobile antennas/ radiation patterns

UNIT-III

Data multiple access Technologies in Communication: FDMA, TDMA, SSMA, FHMA, CDMA, SDMA, Packet radio protocols, CSMA, Reservation protocols time Frame details.

UNIT-IV

GSM: Services and Features, System architecture, Radio Sub system, Channel Types, Frame structure and Signal processing.

CDMA: Digital Cellular standard IS-95, Forward Channel, Reverse Channel.

UNIT-V

Comparison of Mobile communication Technologies: 1G, 2G and 2.5G, technology Features of 3G and 4G and 5G, WLAN, Bluetooth, PAN, Trends in Radio and Personal Communications, UMTS system architecture and Radio Interface.

Suggested Reading:

1. Theodore.S.Rappaport, "Wireless Communications: Principles and Practice," 2/e, Pearson Education, 2010.
2. William. C.Y. Lee, "Mobile Communication Engineering," 2/e, Mc-Graw Hill, 2008.
3. T.L. Singal "Wireless Communication Systems," 1/e, TMH Publications, 2010.
4. William.C.Y.Lee, *"*Mobile Cellular Telecommunications: Analog and Digital Systems*,"* 2/e, Mc-Graw Hill, 2011.

EC 473 *Effect from the academic year 2017-2018*

FUZZY LOGIC AND APPLICATIONS

(ELECTIVE –IV)

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks
Credits	4

OBJECTIVES:

1. To learn the concepts of regular and fuzzy sets.
2. To gain the knowledge to use fuzzy sets for different applications.
3. To learn the different neural and fuzzy memories.

Unit I

Basics of Fuzzy sets: Fuzzy sets, operation on Fuzzy sets, Extensions of Fuzzy set concepts, extension principle and its applications. Geometry of fuzzy sets, sets as points, counting with fuzzy sets.

Unit II

Fuzzy Relations: Basics of fuzzy relations, operations on fuzzy relations, various types of Binary fuzzy relations, fuzzy relations equations.

Unit III

Membership Functions: Features of the membership function, fuzzification, Membership value assignments — In tuition, in science, Rank ordering, Neural Networks.

Unit IV

Fuzzy — to — crisp: conversions: Defuzzification methods — Max-membership principle, central method, weighted average method, mean-max membership, center of sums, center of largest area, first (or last) of maxima.

Unit V

Fuzzy Associative memories: Fuzzy systems as between — cube mappings, fuzzy and neural function estimators, neural Vs Fuzzy representation of structured knowledge, FANS as mappings, fuzzy Hebb FAMS, the bi-directional FAN theorem for correlation minimum encoding, correlation — product exuding, superimposing FAM rules, recalled outputs and defizzifaction, FAM structure Architecture. Binary input — output FAMS, example of Invented pendulum — Fuzzy contains crane control.

Suggested Reading:

1. C.T. Lin and C.S.George Lee, "Neural Fuzzy Systems", PHI, 1996

2. Bant A KOSKO, "Neural Nehvorks and Fuzzy Systems", PHI, 1994

3. Altrock, C.V., "Fuzzy Logic and Neuro Fuzzy Applications explained", PHI, 1995

EC 474 *Effect from the academic year 2017-2018*

WIRELESS SENSOR NETWORKS

(ELECTIVE –IV)

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

Course Objectives:

1. Determine network architectures, node discovery and localization, deployment strategies, fault tolerance and network security.
2. Build foundation for WSN by presenting challenges of wireless networking at various protocol layers.
3. Determine suitable protocols and radio hardware.
4. Evaluate the performance of sensor network and identify bottlenecks.

UNIT-I : OVERVIEW OF WIRELESS SENSOR NETWORKS

Challenges for Wireless Sensor Networks-Characteristics requirements-required mechanisms, Difference between mobile ad-hoc and sensor networks, Applications of sensor networks-Enabling Technologies for Wireless Sensor Networks

UNIT-II : 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.

UNIT-III : NETWORKING SENSORS

Physical Layer and Transceiver Design Considerations, MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts - S-MAC, Zigbee: IEEE 802.15.4 MAC Layer, The Mediation Device Protocol, Wakeup Radio Concepts, Address and Name Management, Assignment of MAC Addresses, Routing Protocols- Energy-Efficient Routing, Geographic Routing.

UNIT-IV : INFRASTRUCTURE ESTABLISHMENT,PLATFORMS AND TOOLS

Topology Control, Clustering, Time Synchronization, Localization and Positioning, Sensor Tasking and Control.Operating Systems for Wireless Sensor Networks, Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms, Node-level Simulators, State-centric programming.

Operating Systems for Wireless Sensor Networks, Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms, Node-level Simulators, State-centricprogramming.

UNIT-V :SECURITY IN SENSOR NETWORKS

Security Architectures, Survey of Security protocols for Wireless sensor Networks and their Comparisons.

Suggested Reading:

1. Holger Karl and Andreas Willig, "Protocols And Architectures for Wireless Sensor Networks," John Wiley, 2005.

2. Feng Zhao and Leonidas J. Guibas, "Wireless Sensor Networks - An Information Processing Approach," Elsevier, 2007.

3. FazemSohraby, Daniel Minoli, and TaiebZnati, "Wireless Sensor Networks-Technology, Protocols and Applications," John Wiley, 2007.

4. Anna Hac, "Wireless Sensor Network Designs," John Wiley, 2003.

5. Y Wang, "A Survey of Security issues in Wireless sensor Networks", IEEE Communications Survey and Tutorials,2006.