

Vision of the Department	To produce a blend of creativity & ethical engineering graduates and making them capable of facing the real life challenges.
Mission of the Department	The mission elements of Computer Science & Engineering Department are: M-1. Inculcating the fundamentals of computer science & engineering and analyzing the engineering problems along with the development of solutions keeping environmental aspects. M-2. To cultivate ability for modern tool usage on ethical grounds to widely solve real life issues. M-3. Building team spirit within the students, creating effecting communication for lifelong learning.

Programme Outcomes

1. To solve complex engineering problems by applying the knowledge of mathematics, algorithms, computing principles.
2. Identify and analyze complex engineering problems and define requirements appropriate for it.
3. To design and implement computer based systems and programs to meet desired needs.
4. To provide valid conclusions by using research based knowledge and research methods.
5. To use modern tools necessary for computing practice.
6. To understand the issues related to society by using reasoning.
7. To understand the issues related to environmental context for strengthening of engineering solutions.
8. An understanding of ethical responsibility.
9. To work effectively as team member for the accomplishment of goals.
10. To communicate effectively with community and society.
11. to design and develop various project economically with planning.
12. To engage in life-long learning.

PROGRAM EDUCATIONAL OBJECTIVES (PEOS)

PEO: 1 To provide quality computer education to inculcate modern technical skills among the students.

PEO: 2 To cultivate the ability to analyze the demand of software industry for carrying out hands on projects.

PEO: 3 Inculcate direction qualities to work mutually as a team member with effective briefing skills.

Bachelor of Technology (Computer Science & Engineering)										
Credit-Based Scheme of Studies/Examination										
Semester VI (w.e.f. session 2020-2021)										
S. No.	Course Code	Subject	L:T:P	Hours /Week	Credits	Examination Schedule (Marks)				Duration of Exam (Hrs)
						Major Test	Minor Test	Practical	Total	
1	PC-CS-302	Compiler Design	3:0:0	3	3	75	25	0	100	3
2	PC-CS-304	Computer Networks	3:0:0	3	3	75	25	0	100	3
3	PEC	Elective-II	3:0:0	3	3	75	25	0	100	3
4	PEC	Elective-III	3:0:0	3	3	75	25	0	100	3
5	OE	Open Elective-I	3:0:0	3	3	75	25	0	100	3
6	PROJ – CS-302	Project-1	0:0:6	6	3	0	40	60	100	3
7	PC-CS-306L	UNIX and Linux Programming Lab	0:0:4	4	2	0	40	60	100	3
8	PC-CS-308L	Computer Networks Lab	0:0:4	4	2	0	40	60	100	3
Total				29	22	375	245	180	800	

PEC Elective-II	PEC Elective-III
Advanced Computer Architecture: PE-CS-S302	Simulation & Modeling: PE-CS-S310
Distributed Systems: PE-CS-S304	Mobile Computing: PE-CS-S312
Fault Tolerant Computing: PE-CS-S306	Unix & Linux Programming: PE-CS-S314
Ad-Hoc and Sensor Networks: PE-CS-S308	Real Time Systems: PE-CS-S316
OEC Elective-I	
Soft Skills and Interpersonal Communication: OE-CS-302	
Management Information System: OE-CS-304	
Enterprise Resource Planning: OE-CS-306	

Note: Students be encouraged to go to 6-8 weeks' summer internships mandatory during the summerbreak after the completion of sixth semester exams.

The course of both PE & OE will be offered at 1/3rd strength or 20 students (whichever is smaller) of the section.

PC-CS-302	Compiler Design						
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	0	0	3	75	25	100	3 Hrs.
Purpose	To introduce compiler design concepts and their implementation						
Course Outcomes(CO)							
CO1	To understand the role and designing of a lexical analyzer.						
CO2	To analyze the role and designing of syntax analyzer or parser.						
CO3	To identify the role of semantic analyzer and intermediate code generation.						
CO4	To explore the design importance of optimization of codes and error detection						

UNIT I

Introduction to Language Processing System, Compiling Analysis of the Source Program, Phases of a Compiler, Compiler Construction Tools. Lexical Analysis –Regular Expression, Introduction to Finite Automata and Regular Expression, Conversion of Regular Expression to NFA, Role of Lexical Analyzer, Specification of Tokens.

UNIT II

Syntax Analysis: Role of the Parser, Abstract Syntax Trees, Ambiguity in Context-Free Grammars, Types of Parsing: - Top Down Parsing, Recursive Descent Parsing, LL Parser, Back Tracking, Bottom Up Parsing, SLRParser, Canonical LR Parser, LALR Parser.

UNIT III

Semantic Analysis: Semantic Errors, Attribute Grammar, Synthesized attributes, Static Allocation, Stack Allocation, Heap Allocation, Activation Trees, Symbol Table, Intermediate Code Generation and Code Intermediate languages, Declarations, Assignment Statements, Boolean Expressions, Case Statements, DAG representation of Basic Blocks, A simple Code generator from DAG, Issues in the Design of Code Generator

UNIT IV

Code Optimization and Run Time Environments, Principal Sources of Optimization, Machine-independent Optimization, Machine-dependent Optimization, Optimization of Basic Blocks, Loop Optimization, Peephole Optimization, Introduction to Global Data Flow Analysis, Storage Organization, Static Storage Management, Heap Storage management, Parameter Passing. Error Recovery, Panic mode, Statement mode, Global correction.

Suggested Book:

1. Alfred Aho, Ravi Sethi, Jeffrey D Ullman, “Compilers Principles, Techniques and Tools”, Pearson Education Asia, 2018.
2. Allen I. Holub “Compiler Design in C”, Prentice Hall of India, 2003.
3. C. N. Fischer and R. J. LeBlanc, “Crafting a compiler with C”, Benjamin Cummings, 2003.
4. V Raghavan , “ Principles of Compiler Design”, Second Edition, Tata McGraw-Hill, 2018.
5. Henk Alblas and Albert Nymeyer, “Practice and Principles of Compiler Building with C”, PHI, 2001.

Kenneth C. Loudon, “Compiler Construction: Principles and Practice”, Thompson Learning, 200

PC-CS-304	Computer Networks						
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	0	0	3	75	25	100	3 Hrs.
Purpose	To introduce the architecture and layers of computer network, protocols used at different Layers.						
Course Outcomes(CO)							
CO1	To understand the basic concept of networking, types, networking topologies and layered architecture.						
CO2	To understand data link layer and MAC sub-layer`						
CO3	To understand the network Layer functioning						
CO4	To understand the transport layer and application layer operation						

Unit -I

Introduction to Computer Networks : Data Communication System and its components, Data Flow, Computer network and its goals, Types of computer networks: LAN, MAN, WAN, Wireless and Wired networks, broadcast and point-to-point networks, Network topologies, protocols, interfaces and services, ISO-OSI reference model, TCP/IP architecture.

Physical Layer: Concept of Analog & Digital Signal, Bandwidth, Transmission Impairments: Attenuation, Distortion, Noise, Multiplexing: Frequency Division, Time Division, Wavelength Division, Transmission Media: Twisted pair, Coaxial cable, Fiber optics, Wireless transmission (radio, microwave, infrared), Switching: Circuit Switching, Message Switching, Packet Switching & comparisons, narrowband ISDN, broadband ISDN.

Unit -II

Data link layer: Error Control, Types of errors, framing (character and bit stuffing), error detection & correction methods; Flow control; Protocols: Stop & wait ARQ, Go-Back- N ARQ, sliding window protocols, Selective repeat ARQ, HDLC;

Medium access sub layer: Point to point protocol, FDDI, token bus, token ring; Reservation, polling, Multiple access protocols: Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, FDMA, TDMA, CDMA, LLC, Traditional Ethernet, fast Ethernet, Network devices-repeaters, hubs, switches, Bridges, Router, Gateway.

Unit-III

Network layer: Addressing: Internet address, sub-netting; Routing techniques, static vs. dynamic routing, routing table, DHCP, IEEE standards 802.x, Routing algorithms: shortest path algorithm, flooding, distance vector routing, link state routing; Protocols: ARP, RARP, IP, ICMP, IGMP, IPV6; Unicast and multicast routing protocols, ATM.

Unit-IV

Transport layer: Process to process delivery; UDP; TCP, RPC, Congestion control algorithm: Leaky bucket algorithm, Token bucket algorithm, choke packets; Quality of service: techniques to improve QoS. **Application layer:** DNS; SMTP, SNMP, FTP, HTTP & WWW; Firewalls, Bluetooth, Email, S/MIME, IMAP, **Network Security:** Cryptography, user authentication, security protocols in internet, public key encryption algorithm, digital signatures

Suggested Books:

1. Behrouz A. Forouzan, "Data communication and Networking", Tata McGraw Hill, Fourth Edition, 2011.
2. Computer Networks, 4th Edition, Pearson Education by Andrew S. Tanenbaum
1. Larry L. Peterson, Peter S. Davie, "Computer Networks", Elsevier, Fifth Edition, 2012.
2. William Stallings, "Data and Computer Communication", Eighth Edition, Pearson Education, 2007.
3. James F. Kurose, Keith W. Ross, "Computer Networking: A Top-Down Approach Featuring the Internet", Pearson Education, 2005.

PE-CS-S308	Mobile Ad-hoc and Wireless Sensor Networks						
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	0	0	3	60	40	100	3 Hrs.
Program Objective (PO)	To enable students to describe and deal with computer communication and networking, various reference models and architectures along with implemented wireless communication techniques and various security and privacy parameters are also studied.						
Course Outcomes (CO)							
After completion of course students will be able to							
CO1	Classify traditional networks and discuss various wireless networking standards, compare and contrast various IEEE wireless LAN and Ethernet standards.						
CO2	Describe cellular architecture and IPv4 and IPv6 header formats has to be discussed along with mobile IP.						
CO3	Recently deployed high performance computing standards, VPN, routing protocols as to be gone through.						
CO4	Various security and privacy standards/tools to be described.						

Unit I

Introduction to Mobile Ad hoc Networks (MANET) – Mobility Management, Characteristics and Attributes related to MANETs, Modeling distributed applications for MANET, MAC mechanisms and protocols.

Unit II

MANET Routing Protocols: Ad hoc network routing protocols, destination sequenced distance vector algorithm, cluster based gateway switch routing, global state routing, fish-eye state routing, dynamic source routing, ad hoc on-demand routing, OLSR & TORA routing, location aided routing, zonal routing algorithm.

Unit III

Ad-Hoc Network Security: Link layer, Network layer, Trust and key management. Self policing MANET

– Node Misbehaviour, secure routing, reputation systems.

Wireless Sensor Networks (WSN) : Design Issues, Clustering, Applications of WSN.

Unit IV

MAC layer and Routing Protocols in WSN

Data Management: Retrieval Techniques in WSN, Sensor databases, distributed query processing, Data dissemination and aggregation schemes, Operating Systems for WSN, Security issues in WSN.

Suggested Books:

- 1 C. Siva Ram Murthy & B.S. Manoj, Mobile Ad hoc Networks – Architectures & Protocols, Pearson Education, New Delhi, 2004
- 2 C M Cordeiro & D.P. Agrawal, Adhoc & Sensor Networks – Theory and Applications, ISBN 981256-682-1, World Scientific Singapore, 2006
- 3 C. S. Raghvendra, Wireless Sensor Networks, Springer-Verlag, 2006.

PE-CS-S312	Mobile Computing						
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	0	0	3	75	25	100	3 Hrs.
Purpose	To impart knowledge of mobile and wireless computing systems and techniques.						
Course Outcomes(CO)							
CO1	Describe the concepts of mobile computing and cellular networks.						
CO2	Learn the basic concepts of wireless networks.						
CO3	Study of various issues of mobile computing and basics of cloud computing.						
CO4	Description and applications of Ad hoc networks.						

UNIT – I

Introduction, Issues in mobile computing, Overview of wireless telephony: cellular concept- Cell, Co- Channel Interference, Frequency reuse, HLR-VLR, handoffs, channel allocation in Cellular systems, Mobile computing Architecture, Design considerations for mobile computing, Mobile Computing through Internet, Making existing applications mobile enabled, 3G, 4G.

UNIT – II

Wireless Networking, Wireless LAN Overview: MAC issues, IEEE 802.11, Bluetooth, Wireless multiple access protocols, TCP over wireless, Wireless applications, data broadcasting, Mobile IP, WAP : Architecture, Traditional TCP, Classical TCP, improvements in WAP, WAP applications.

UNIT – III

Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, File system, Disconnected operations Mobile Agents computing, security and fault tolerance, transaction processing in mobile computing environment.

Cloud Architecture model, Types of Clouds: Public Private & Hybrid Clouds, Resource management and scheduling, Clustering, Data Processing in Cloud: Introduction to Map Reduce for Simplified dataprocessing on Large clusters.

UNIT – IV

Ad hoc networks, Manet's & its Applications, Routing & Routing protocols- Global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV), Temporary ordered routing algorithm (TORA), Fish eye routing protocol, QoS in Ad Hoc Networks.

Suggested Books:

1. Rajkamal, Mobile Computing, 2/E Oxford University Press, 2011.
2. J. Schiller, Mobile Communications, Addison Wesley
3. Yi Bing Lin, Wireless and Mobile Networks Architecture , John Wiley.
4. M. V. D. Heijden, M. Taylor, Understanding WAP, Artech House.
5. Charles Perkins, Mobile IP, Addison Wesley.
6. Charles Perkins, Ad hoc Networks, Addison Wesley.
7. Judith Hurwitz, Robin Bllor, Marcia Kaufmann, Fern Halper, Cloud Computing for Dummies, 2009.

OE-CS-304 Management Information System							
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	0	0	3	75	25	100	3 Hour
Purpose	To familiarize the students with Management Information System.						
	Course Outcomes						
CO1	Understand and articulate fundamental concepts of information technology management.						
CO2	Assess and apply IT to solve common business problems.						
CO3	Suggest and defend effective solutions to business problems, and design a database application to solve a business problem.						
CO4	Discuss the ethical aspects of information technology use in the organization and its governance issues.						

UNIT I

Introduction: Definition information system, role and impact of MIS, The challenges of Information system, Nature of MIS, Characteristics of MIS, Myths regarding MIS, Requirements of MIS, Problems & Solutions in implementing MIS, Benefits of MIS, Limitations of MIS, Significance of MIS, Components of MIS. Role of MIS, Major Management challenge to building and using information system in Organization, functions of management.

UNIT II

Information system and Organizations: The relationship between Organization and Information System, Information needs of different organization levels: Information concept as quality product, classification and value of information, methods of data and information collection. Strategic role of information system, Salient features of Organization, Information, management and decision making, How Organization affect Information Systems, How Information system affect Organization, Ethical and Social impact of information system.

UNIT III

Business application of Information System: Foundation Concepts Information systems in Business: Information system and technology, Business Applications, Development and Management. The internet networked E-business Enterprise: Internet, and Extranet in business. Electronic Commerce System: Electronics commerce Fundamentals, Commerce Application and issues. E-business Decision Support: Decision support in E-Business, Artificial Intelligence Technologies in business.

UNIT IV

Technical Foundation of Information System: Computers and information processing, Computer Hardware, Computer software, Managing data resources, Telecommunication, Enterprise: wide computing and networking.

Strategic and Managerial Implications of Information Systems: Strategic Information System: Introduction, Characteristics of Strategic Information Systems, Strategic Information Systems (SISP), Strategies for developing an SIS, Potential Barriers to developing a Strategic Information System (SIS), Decision Support System (DSS): Decision making concepts, methods, tools and

procedures. Managing Information Resources: Introduction, IRM, Principal of Managing Information Resources, IRM functions, Computer Security: Introduction, Computer Security, Types of Computer Security, Disaster Recovery Plan.

Suggested Books:

1. W.S . Jawadakar, “Management Information System”, McGraw Hill □ J. O. Brien, “ Management Information System”, TMH, New Delhi
2. Uma G . Gupta, “Management Information System” Fifth Edition TMH.
3. Kenneth C. Laudon, “Management Information System Organisation and Technology” TMH

PC-CS-306L	UNIX and Linux Programming Lab						
Lecture	Tutorial 1	Practical 1	Credit	Minor Test	Practical	Total	Time
0	0	4	3.0	40	60	100	3 Hrs.
Purpose	Experimental knowledge of programming skills with expertisation on Unix/Linux platform						
Course Outcomes(CO)							
CO1	Learning of simple and advanced commands of Unix /Linux operating systems.						
CO2	Develop shell programming using Bash or any other shell scripts.						
CO3	Develop advanced shell programming skills.						
CO4	Analyzing & evaluation of performance of various c language based programs with the helpof Make file & debug utilities.						
CO5	Creation of user accounts, Learning of package installation, backup and shutdown process on Unix /Linux operating systems.						

List of Practical

1. Familiarize with Unix/Linux Log In/Log Out and various other commands & vi editor.
2. Develop simple shell programs using Bash or any other shell in Linux.
3. Develop advanced shell programs using grep, fgrep & egrep.
4. Compile and debug various C language based programs using 'makefile' & 'debug' utility.
5. Learning of installation of dual operating systems with Linux having previously installed other window based operating system. Both OSs should be in working operating mode.
6. As Supervisor create and maintain user accounts, learn package installation, taking backups, creation of scripts for file and user management, creation of startup and shutdown scripts using at, batch, cron etc.

NOTE : At least 8 to 12 more programs exercises based on Unix/Linux platform are to be assigned by the concerned teacher.

PC-CS-308L	Computer Networks Lab						
Lecture	Tutorial	Practical	Credit	Minor Test	Practical	Total	Time
0	0	4	2	40	60	100	3 Hour
Purpose	To explore networking concepts using Java programming & networking tools.						
Course Outcomes (CO)							
CO1	Do Problem Solving using algorithms.						
CO2	Design and test simple programs to implement networking concepts using Java.						
CO3	Document artifacts using applied addressing & quality standards.						
CO4	Design simple data transmission using networking concepts and implement.						

COMPUTER NETWORKS LAB

1. Create a socket for HTTP for web page upload and download.
2. Write a code simulating ARP /RARP protocols.
3. Study of TCP/UDP performance.
4. Performance comparison of MAC protocols
5. Performance comparison of routing protocols.
6. Write a program:
 - a. To implement echo server and client in java using TCP sockets.
 - b. To implement date server and client in java using TCP sockets.
 - c. To implement a chat server and client in java using TCP sockets.
7. Write a program:
 - a. To implement echo server and client in java using UDP sockets
To implement a chat server and client in java using UDP sockets.
 - b. To implement a DNS server and client in java using UDP sockets.
8. To flood the server from a spoofed source address leading to a DoS attack.
9. To sniff and parse packets that pass through using raw sockets.
10. To implement simple calculator and invoke arithmetic operations from a remote client.
11. To implement bubble sort and sort data using a remote client.
12. To simulate a sliding window protocol that uses Go Back N ARQ