Third Year – First Semester
Computer Network and Data Communication (PCCS -311)
Professional Core (PC); 4 Credits(3-1-0)

Objectives:

Upon completing the Subject, the student will:

1. be familiar with the basics of data communication.
2. be familiar with various types of computer networks.
3. have experience in designing communication protocols.
4. be exposed to the TCP/IP protocol suite.

Unit	Contents	No. of Lectures
Unit 1	**Introduction To Computer Network:** Uses of Computer Network, Network hardware, Layered Architecture, function of the layers, Network standardization, OSI & TCP/IP Reference model, Physical layer services & hardware Protocols.	**10**
Unit 2	**Data Link Control:** Framing, Flow Control: Stop and wait Protocols, Sliding Window Protocols. Error Detection & Error Control, High Level Data Link Control (HDLC),Other Data Link Control Protocols : Pure ALOHA & Slotted ALOHA , Markov chain model for S-ALOHA and delay in S-ALOHA , IEEE LAN Protocols, Ethernet, Ad Hoc network	**06**
Unit 3	**Network Layer & Transport Layer:** Network Layer Protocols: Design issues : Virtual Circuits and datagram's, Routing Algorithms: Optimality principle, Shortest path routing- Dijkstra's algorithms, Distance Vector routing, Link state routing, Flow and Congestion Control: packet discarding , Traffic shaping , Choke packets, RSVP, IP fragment, RIP, OSPF, Inside router, Network layer performance model, Poisson model, M/M/1 Queue, Blocking probability, Little's formula, Transport Layer Protocols : Basic functions, Connection Management : Establishment and releases , Crash recovery, TCP & UDP, Reliability Models, AIMD Policy.	**06**

Unit 4	**Upper Layers:** Session Layer Protocols: Dialog Management, Synchronization, Presentation layer functions: translation, encryption, compression, Cryptography: substitution andTranspositionCiphers,Data Encryption standards (DES) , DES Chaining, Breaking DES, Public Key cryptography, Authentication protocols, Different compression coding techniques. Application layer protocols & services: Email, World Wide Web, file transfer protocol, remote file server, internet telephony & chatting.	**10**
Unit 5	**Special & High Speed Networks & Network Devices:** FDDI: access method, addressing, electrical specification, frame format, comparison of FDDI-I & FDDI-II. DQDB & WAN implementation.25 networks its features. Frame Relay: operation, congestion control & frame format. SONET / SDH: layers, frame & application. Internet & related software's NETSCAPE & MOSAIC .Networking devices: Repeaters, Bridge Routers & Gateways.	**10**
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Reference/Text Books:

1. Computer networks", Second Ed., A.S. Tannenbaum, Prentice Hall India.
2. Data Communication, Computer Networks, Halsall, Pearson Education.
3. Data Networks, D.Bertsekas and R. Gailagher, PHI Second Ed.
4. Internetworking with TCP/□P, Vol. 1, D.E. Corner, Prentice Hall India.
5. Computer Networking with IP, Stalling, Pearson Education.

Computer Graphics (PCCS-312)
Professional Core (PC); 4 Credits(3-0-2)

Objectives:

1. To get the Knowledge about the basics concepts of multimedia and its applications.
2. To get the knowledge of its relevance with internet and its future aspects

Unit	Contents	No. of Lectures
Unit 1	Line generation: Points lines, Planes, Pixels and Frame buffers, vector and character generation. Graphics Primitives: Display devices, Primitive devices, Display File Structure, Display control text.	**08**
Unit 2	Polygon: Polygon Representation, Entering polygons, Filling polygons. Segments: Segments table, creating deleting and renaming segments, visibility, image transformations.	**08**
Unit 3	Transformations: Matrices transformation, transformation routines, displays procedure. Windowing and Clipping: Viewing transformation and clipping, generalize clipping, multiple windowing.	**10**
Unit 4	Three Dimension: 3-D geometry primitives, transformations, projection clipping. Interaction: Hardware input devices handling algorithms, Event handling echoing, Interactive techniques.	**08**
Unit 5	Hidden Line and Surface: Back face removal algorithms, hidden line methods. Rendering and Illumination: Introduction to curve generation, Bezier, Hermite and B-spline algorithms and their comparisons	**10**
		44

References/Text Books:

1. Rogers, "Procedural Elements of Computer Graphics", McGraw Hill
2. Asthana, Sinha, "Computer Graphics", Addison Wesley Newman and Sproul, "Principle of Interactive Computer Graphics", McGraw Hill
3. Steven Harrington, "Computer Graphics", A Programming Approach, 2nd Edition
4. Rogar and Adams, "Mathematical Elements of Computer Graphics", McGraw Hill.

Design and Analysis of Algorithm (PCCS-313)
Professional Core (PC); 4 Credits (3-1-0)

Objectives:

1. Analyze the asymptotic performance of algorithms.
2. Write rigorous correctness proofs for algorithms.
3. Demonstrate a familiarity with major algorithms and data structures.
4. Apply important algorithmic design paradigms and methods of analysis.
5. Synthesize efficient algorithms in common engineering design situations.

Unit	Contents	No. of Lectures
Unit 1	**Introduction:** Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behavior; Performance measurements of Algorithm, Time and space trade-offs, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters' theorem.	**08**
Unit 2	**Fundamental Algorithmic Strategies:** Brute-Force, Greedy,Dynamic Programming, Branch and-Bound and Backtracking methodologies for the design of algorithms; Illustrations of these techniques for Problem-Solving , Bin Packing, Knap Sack TSP. Heuristics – characteristics and their application domains.	**08**
Unit 3	**Graph and Tree Algorithms:** Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm	**12**
Unit 4	**Tractable and Intractable Problems:** Computability of Algorithms, Computability classes – P, NP, NP-complete and NP-hard. Cook's theorem, Standard NP-complete problems and Reduction techniques.	**08**
Unit 5	**Advanced Topics:** Approximation algorithms, Randomized algorithms, Class of problems beyond NP – P SPACE	**08**
		44

Reference/Text Books:

1. Horowitz and Sahani, "Fundamentals of Computer Algorithms", 2ND Edition .University Press

   Thomas H Cormen and Charles E.L Leiserson, "Introduction to Algorithm, PHI

Software Engineering (PCCS-314)
Professional Core (PC); 4 Credits (3-1-0)

Objectives:

1. At the end of the Subject, students should have a basic idea of SDLC, design and modelling, implementation and testing techniques and basic project management methodologies.

Unit	Contents	No. of Lectures
Unit 1	**Software Engineering Basics:** SDLC, Characteristics, Applications, Software Process Models: Waterfall, Spiral.	**04**
Unit 2	**Software Modelling:** ***Overview of Software Modelling*** ***Structured Analysis and Design:*** Principles of Structured Analysis, Requirement analysis, DFD, Entity Relationship diagram, Data dictionary. ***OO Analysis and Design :***Objectives, Principles, Concepts, Design methodologies: Data design, Architectural design, procedural design, Object -oriented concepts.	**16**
Unit 3	**Software Implementation:** Relationship between design and implementation, Implementation issues and programming support environment, Coding the procedural design, Good coding style and review of correctness and readability.	**10**
Unit 4	**System Testing fundamentals**: Objectives, principles, testability, Test cases: White box & Black box testing,Testing strategies: verification & validation, unit test, integration testing, validation testing, system testing	**10**
Unit 5	**Project Planning and Management:** Prototyping, Concepts of Project Management, Role of Metrics & Measurements. S/W Project Planning: Objectives, Decomposition techniques: S/W Sizing, Problem-based estimation, Process based estimation, Cost Estimation Models: COCOMO Model,	**08**
		44

References/Text Books:

1. Roger. S. Pressman, "Software Engineering - A Practitioner's Approach", Third Edition, McGraw Hill, 1992
2. R.E. Fairley, "Software Engineering Concepts", McGraw-Hill, 1985.

Jalota, "An Integrated Approach to Software Engineering", Narosa Publishing House, 1992

Microprocessor and Microcontrollers (ESC-311)
Engineering Science Core (ESC); 4 Credits (3-0-2)

Objectives:

The purpose of this course is to enable the students to acquire knowledge about the basics of processors, co-processors, and their applications

1. Understand concepts of Microprocessors and programming them.
2. Understand concepts of Microcontrollers and programming them.
3. Understand various interfacing circuits necessary for various applications.
4. Understand various interfacing concepts.
5. Understand basic concepts of programming using 8085, 8086 microprocessor
6. &8051 Microcontrollers

Unit	Contents	No. of Lectures
Unit 1	Fundamentals of Microprocessor Architecture. 8-bitMicroprocessor and Microcontroller architecture, Comparison of 8-bit microcontrollers, 16-bit and 32-bit microcontrollers. Definition of embedded system and its characteristics, Role of microcontrollers in embedded Systems. Overview of the 8051 family.	**10**
Unit 2	The 8051 Architecture Internal Block Diagram, CPU, ALU, address, data and control bus, Working registers, SFRs, Clock and RESET circuits, Stack and Stack Pointer, Program Counter, I/O ports, Memory Structures, Data and Program Memory, Timing diagrams and Execution Cycles..	**12**
Unit 3	Memory and I/O Interfacing (Memory and I/O expansion buses, control signals, memory wait states. Interfacing of peripheral devices such as General Purpose I/O, ADC, DAC, timers, counters, memory devices. Module 5: External Communication Interface (6 Hours) Synchronous and Asynchronous Communication. RS232, SPI, I2C. Introduction and interfacing to protocols like Blue-tooth and Zig-bee..	**10**

Unit 4	Instruction Set and Programming (8 Hours) Addressing modes: Introduction, Instruction syntax, Data types, Subroutines Immediate addressing, Register addressing, Direct addressing, Indirect addressing, Relative addressing, Indexed addressing, Bit inherent addressing, bit direct addressing. 8051 Instruction set, Instruction timings. Data transfer instructions, Arithmetic instructions, Logical instructions, Branch instructions, Subroutine instructions, Bit manipulation instruction. Assembly language programs, C language programs. Assemblers and compilers. Programming and debugging tools.	**08**
Unit 5	Applications :LED, LCD and keyboard interfacing. Stepper motor interfacing, DC Motor interfacing, sensor interfacing.	**08**
		48

Reference/Text Books:

1. Ray and Bhurchandi: Advanced microprocessors and peripherals, TMH.
2. Brey: The Intel Microprocessors, Architecture, Programming and Interfacing, PearsonEducation.
3. Senthil Kumar: Microprocessors and interfacing, Oxford University press.
4. Bahadure: Microprocessors 8086 and Pentium family, PHI Learning.
5. Udayashankara and Mallikarjunaswamy: 8051 Microcontroller, TMH.
6. Mazidi and Mazidi: The 8051 Microcontroller and Embedded Systems, Pearson Education
7. D. V. Hall: Microprocessors and Interfacing, TMH.

List of Experiments:

1. Assembly Language Programs of Microprocessor 8086.
2. Assembly Language Programs of Microcontroller 8051.
3. Assembly Language Programs for Interfacing Chips
4. Hands-on experiments related to the course contents of EE18