SYLLABUS

MATHEMATICS – III					
Course Code	**IT310**		**Credit**	**4**	
Scheme of Instructions hours/weeks	**L**	**T**	**P**	**Total**	
	3	**1**	**0**	**42 hours/sem**	
Scheme of Examination TOTAL= 150 marks	**IA**	**TW**	**TM**	**P**	**O**
	25	**25**	**100**	**0**	**0**

Course Objectives:

The course aims at getting students well versed in mathematics that arises in engineering. This will help them competently deal with linear systems, differential equations, recurrence relations and probabilistic models.

Course Outcomes:

The student will be able to:

CO1	Understand the mathematics of matrices, various transforms used in Engineering and basic concepts of probability.
CO2	Compute the rank, Eigen values, Eigen vectors of a given matrix and transforms of continuous and discrete functions.
CO3	Solve differential equations, integral equations and difference equations using the various transforms and analyzing the consistency of a linear system of equations.
CO4	Model real life problems with matrices and probability distributions.

UNIT 1	
Matrices : Types of matrices, Determinant, inverse of matrix, Elementary transformations, Elementary matrices, Rank of matrix, Reduction to normal form, Canonical form, Rank using elementary transformation, Linear independence and dependence of vectors, System of the form AX = 0, and AX = B, and their solutions, Eigen values, Eigen vectors with properties, Cayley-Hamilton theorem with its applications, minimal polynomial, Diagonalization.	10 hrs
UNIT 2	
Laplace Transforms: Definition. Existence conditions, properties, inverse Laplace transforms. Laplace transform of periodic functions, Convolution theorem, Laplace transform of Dirac-Delta function, Application of Laplace transforms in solving linear differential equations with initial conditions and system of linear simultaneous differential equations.	11hrs
UNIT 3	
Fourier Transform : Fourier Transform, Inverse Fourier transform, Fourier Sine and Cosine transform Convolution and application. **Z-Transform**: Definition, region of convergence, properties, Z-transform on impulse function, Convolution theorem, application to difference equations.	10 hrs
UNIT 4	
Probability: Definition, properties, Axioms of probability, conditional probability, theorem on total probability, Baye's theorem; Random variables-discrete & continuous; Expectation and Variance, Standard deviation, Moment Generating Function & properties, Standard distributions: discrete-Binomial, Geometric & Poisson; continuous- Uniform, Normal, exponential.	11hrs

TEXTBOOKS	
1	B. S. Grewal;Higher Engineering Mathematics; Khanna Publications, New Delhi.

2	Erwin Kreyzing; Advanced Engineering Mathematic; New International Limited.
REFERENCES	
1	P. Kandasamy; Engineering Mathematics; Chand & Co., New Delhi.
2	Srimanta Pal, Subodh C. Bhunia; Engineering Mathematics; Oxford University Press
3	D. S. Chandrasekhraiah; Engineering Mathematics- Part III ; Prism Books Pvt. Ltd.
4	Montgomery, D. C., Probability and Statistics for Engineers; Prentice Hall of India.

INTEGRATED ELECTRONICS					
Course Code	**IT320**		**Credit**	**3**	
Scheme of Instructions hours/weeks	**L**	**T**	**P**	**Total**	
	3	**0**	**0**	**42 hours/sem**	
Scheme of Examination TOTAL= 125 marks	**IA**	**TW**	**TM**	**P**	**O**
	25	**0**	**100**	**0**	**0**

Course Objectives:

The objective of the course is to provide the knowledge of logic circuits, computer system's processors & organization. The characteristics of boolean laws, performance measures of analog circuits, instruction pipelining concepts and interfacing mechanism of a computer system is also imparted to the students.

Course Outcomes:

The student will be able to:

CO1	Understand the logic circuits, computer system's processors & organization
CO2	Apply boolean laws, bus interconnection techniques & logical instructions for a given problem statement
CO3	Analyze performance measures of analog circuits, cache memory concepts & architecture of microprocessors and its functionality
CO4	Evaluate flip-flops, timers working, instruction pipelining & interfacing mechanism of a computer system

UNIT 1	
DIGITAL LOGIC SYSTEM Boolean algebra, NOR and NAND Gates, And or Invert Gates, De Morgan's theorem, Positive and Negative LogicArithmetic Circuits, Binary Addition & Subtraction **COMBINATIONAL LOGIC CIRCUITS:**Boolean laws and theorems, Sum of Products, Truth table, Pairs, Quads, and Octets, Karnaugh mapping, Product of Sums Method and Simplification. **FLIP-FLOP:**RS Flip-Flops, D and JK Flip-Flops, Counters: Asynchronous Counter, Registers: Types of Registers, Serial-in-serial out, Ring Counter, Johnson Counter	11hrs
UNIT 2	
ANALOG SYSTEMS OPAMP -Ideal characteristics, Op-Amp-as inverting amplifier,Op-Ampas non-inverting amplifier, input offset voltage,input offset current, slew rate, CMRR Application of Op –Amp: adder, subtractor, integrator, differentiator.555 Timers: Astable Multivibrator and Monostable Mutivibrator and their applications. Voltage Regulators: Definition, design using IC 723.	10hrs
UNIT 3	
COMPUTER ORGANISATION **INTRODUCTION:**Organization and Architecture, Structure and function. A top level view of Computer Function and Interconnection: Computer Components, Computer Function, Interconnection structure, Bus interconnection. Arithmatic and Logic Unit. **CACHE MEMORY:**Computer memory system Overview, Cache Memory Principles, Elements of Cache Design Interrupt Driven I/O, Direct Memory Access (DMA Controller) The instruction cycle,	11 hrs

Instruction Pipelining.	
UNIT 4	
MICROPROCESSOR AND INTERFACING **MICROPROCESSOR 8086:**Detail study of 8086 architecture, addressing modes, instruction formats, data transfer instructions, string instructions, logical instructions, arithmetic instructions, processor control instructions, Interrupt and Interrupt responses **INTERRUPT CONTROLLER:** Features of 8259, block diagram of 8259, Interrupt sequence, priority modes, Programming the 8259 and interfacing.	10 hrs

TEXTBOOKS	
1	R. P. Jain; Modern Digital Electronics;Tata Mac Graw Hill; Second Edition.
2	William Stalling; Computer Organization and Architecture: Designing for performance; Pearson Education; 2010; 8/e ; . ISBN978-81-317-3245-8
3	Douglas V. Hall; Microprocessors and Interfacing: Programming and Hardware; TMH.
REFERENCES	
1	Botkar; Integrated Circuits; Ninth Edition; Khanna Publishers
2	Millman and Halkias; Integrated Electronics: Analog and Digital Electronic Circuits and Systems; Tata MacGraw Hill
3	Morris Mano ; Computer system architecture; Pearson Education; 1993; 3/e; ISBN81-7808-687-5

COMPUTER NETWORKS					
Course Code	**IT330**		**Credit**	**3**	
Scheme of Instructions hours/weeks	**L**	**T**	**P**	**Total**	
	3	**0**	**0**	**42 hours/sem**	
Scheme of Examination TOTAL= 125 marks	**IA**	**TW**	**TM**	**P**	**O**
	25	**0**	**100**	**0**	**0**

Course Objectives:

This course is to provide students with an overview of the concepts and fundamentals of data communication and computer networks. Topics to be covered include: data communication concepts and techniques in a layered network architecture, communications switching and routing, types of communication, network congestion, network topologies, network configuration and management, network model components, layered network models (OSI reference model, TCP/IP networking architecture) and their protocols, various types of networks (LAN, MAN, WAN and Wireless networks) and their protocols.

Course Outcomes (COs)

The students will be able to:

CO1	Build an understanding of the fundamental concepts of of data communication and computer networks.
CO2	Summarize with the basic taxonomy and terminology in the computer networking area.
CO3	Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.
CO4	Generate optimal routing/congestion control algorithms as per the specific equirements of the organizational implicational needs.

UNIT 1	
NETWORK MODELS AND PHYSICAL LAYER Layered Task, The OSI Reference Model, TCP/IP protocol Suite, Addressing. Topology: Mesh, Star, Tree, Bus and Ring and Hybrid Technologies. Transmission Modes: Simplex, half Duplex and Full-Duplex. Categories of Networks – LAN, MAN and WAN, Inter networks. Transmission Media: Guided Media – Twisted–pair cable, Coaxial cable and Optical fibre. Unguided Media – Wireless Communication, Terrestrial microwave, satellite communication and cellular telephony. Transmission Impairments: Distortion, attenuation and noise, Shannon's Theorem, Comparison of different Media Data Encoding: Analog Data, Digital Data, Analog Signal and Digital Signals. Spread Spectrum: Direct Sequence and Frequency Hopping, CDMA.	11hrs
UNIT 2	
DATA LINK LAYER Flow Control – Stop and Wait Flow Control, Sliding Window , Error Detection: Types of errors, Detection Methods, Parity Check, Cyclic Redundancy Check using modulo-2, Polynomials (CRC-16, CRC-32), Error Control – Stop and Wait ARQ, Go-Back-N ARQ and Selective-Reject ARQ. Switching - Packet Switching, Message Switching and circuit switching Medium Access Control Sub layer (MAC), the channel allocation problem, Multiple Access Protocols: ALOHA, Carrier Sense Multiple Access (CSMA) protocols, Collision-free protocol, Bit-Map Protocol, Binary Countdown, Limited contention protocols, Adaptive Tree Walk Protocol.	10hrs
UNIT 3	
NETWORK LAYER Network Layer: Network Layer design issues, Routing Algorithms - optimality principle, shortest path, flooding, Distance Vector Routing, Link state Routing, Need	11hrs

for congestion control. Internet Protocol, IP Address, IP ver. 4, IP ver. 6, DHCP. Brief introduction to Address Resolution Protocol, Reverse Address Resolution Protocol, Internet Control Message Protocol, Internet Group Message Protocol.	
UNIT 4	
TRANSPORT LAYER, APPLICATION LAYER AND WIRELESS NETWORK Transport Layer: UDP, Purpose of UDP, UDP Header, TCP, the TCP Service Model, The TCP Segment Header, TCP Connection Establishment, The TCP Connection Release, Comparison of TCP and UDP. Sockets. Application Layer: Domain Name System – DNS, FTP, TFTP, Telnet Protocol, Hyper Text Transfer Protocol (HTTP), Simple Mail Transfer Protocol (SMTP), Simple Network Management Protocol (SNMP). Wireless Networks: Wireless concepts, IEEE 802.11 Wireless LANs (Wi-Fi), 802.16 Wi-MAX.	10hrs

TEXTBOOKS	
1	Behrouz A. Forouzan; Data Communications and Networking; TMH; 2013, 5/e
2	William Stallings; Data and Computer Communication; 7/e.
3	Andrew S Tanenbaum; Computer Networks; Pearson Education; 5/e
REFERENCES	
1	Bud Bates; Wireless Networked Communications: Concepts, Technology and Implementation
2	Jim Kurose, Keith Ross;Computer Networking: A Top-down Approach; Addison-Wesley2009,5/e
3	J.S Katre; Computer Network Technology; Tech-Max Publications; 2010.

DATA STRUCTURES AND ALGORITHM WITH C++					
Course Code	**IT340**		**Credit**	**4**	
Scheme of Instructions hours/weeks	**L**	**T**	**P**	**Total**	
	3	**1**	**0**	**40hours/sem**	
Scheme of Examination TOTAL= 150 marks	**IA**	**TW**	**TM**	**P**	**O**
	25	**25**	**100**	**0**	**0**

Course Objectives:

The objective of the course is to provide knowledge of different data structures ,searching and sorting techniques. The data structures like stack ,queue ,list, tree and graphs will help in building applications and solving real world problems.

Course Outcomes (COs)

The students will be able to:

CO1	Describe different sorting/searching techniques and different data structures like stack ,queue ,linked list, trees and graph.
CO2	Demonstrate and use different sorting/searching techniques and different data structures like stack ,queue ,linked list, trees and graph to develop application.
CO3	Select appropriate data structures and sorting techniques to solve real world problems.
CO4	Develop complete applications using appropriate data structures.

UNIT 1	
INTRODUCTION TO DATA REPRESENTATION & DATA STRUCTURES Representation of arrays and their applications. **STACKS:**representation of stacks and its applications,Recursion, Tower of Hanoi, Implementation of recursive procedures by stacks. **QUEUES:**representation of queues and its applications, circular queues, priority queues, dequeue.	10hrs
UNIT 2	
LISTS & TREES **LISTS:**Singly linked list, doubly linked list, circular linked list, linked stacks and queues and its applications. **TREES:**Basic terminology, binary trees and their representations, traversals of trees, applications of trees – infix/postfix representation if expressions and inter-conversion, B-tree, AVL.	10hrs
UNIT 3	
SORTING & SEARCHING **SORTING:**Basic concept, Exchange sort, Selection sort, Insertion sort, Quick sort, Tree sort, Merge sort, Radix sort, Heaps and Heap sort. **SEARCHING:**Basic searching techniques, sequential and binary search, tree searching. **HASHING:**Hash function, collision handling mechanisms.	10hrs
UNIT 4	
GRAPHS & ITS APPLICATIONS **GRAPHS:**Basic terminology, representation of graphs, directed and	10hrs

undirected graphs and their traversals, depth first and breadth first search, spanning trees. **APPLICATIONS OF GRAPHS:**Shortest path problem, topological sorting, matching.	

TEXTBOOKS	
1	S.K.Srivastava;Data Structures Through C In Depth; BPB publications
2	YedidyahLangson, MoshejAugenstein, Aaron M. Tenenbaum; Data Structures using C & C++; Prentice Hall of India.
REFERENCES	
1	Robert L. Kruse; Data Structures and Program Design in ; PHI.
2	Rajesh K.Shukla:Data structures using c and c++;Wiley India,2009
3	Sahni; Data Structures, Algorithms and Applications in C++; MGH.
4	Ellis HOROwitz and Sartaj Sahni; Fundamentals of Data Structures; Galgotia Publications.

SOFTWARE ENGINEERING					
Course Code	**IT350**		**Credit**	**3**	
Scheme of Instructions hours/weeks	**L**	**T**	**P**	**Total**	
	3	**0**	**0**	**42 hours/sem**	
Scheme of Examination TOTAL= 125 marks	**IA**	**TW**	**TM**	**P**	**O**
	25	**0**	**100**	**0**	**0**

Course Objectives:

The objective of the course is to provide knowledge of applying the principles of software engineering to develop a systematic, well planned ,managed software.

Course Outcomes:

The student will be able to:

CO1	Understand the different phases of Software development
CO2	Apply the principles of software engineering to design, develop and manage a software system.
CO3	Analyze the necessity and requirements of software development for an organization
CO4	Design and Create a software using the different phases of software development.

UNIT 1	
Introduction to Software Engineering: scope of software engineering, The software process- client, developer. **Software development life cycle**: user requirement phase, specification phase, design phase, implementation phase, integration phase, maintenance phase. **Capability maturity models** and KPA's, Software life cycle models and comparison of all life cycle models.	11 hrs
UNIT 2	
Requirements gathering- Data dictionary, Data flow diagrams. IEEE standards for software requirements. **Effort estimation and scheduling**: LOC, Function point analysis and Basic COCOMO model. Basic design concepts: Cohesion and its various types, Coupling and its various types. **Testing**: Software quality Assurance, Walkthroughs, Inspections, Attributes to be tested, Introduction to Black box v/s White box testing.	10hrs
UNIT 3	
Object modeling using UML: UML overview, nature and purpose of models. Use case diagrams, class diagrams, activity diagram, sequence diagram, interaction diagram. Sample Tool- Argo UML, an open source tool.	10hrs
UNIT 4	
Project planning: process database, process capability baseline, Process planning: process tailoring & requirements change management. **Quality management**: quality concepts, quality process planning, defect prevention planning, Risk management: concepts, risk management activities, risk assessment, identification& prioritization. **Project management plan**: team management, Software configuration management process, Project execution : review process, Project monitoring and control: project tracking & milestone analysis. **Project closure analysis** :role & closure analysis report.	11 hrs

TEXTBOOKS	
1	Stephen R.Schah ; Object Oriented and Classical Software Engineering; TMH.
2	James Rumbaugh, Ivar Jacobson, Grady Booch; The Unified Modeling Language Reference Manual, Pearson education; 2/e.
3.	Pankaj Jalote ; Software Project Management in practice; PEA.
REFERENCES	
1	Roger S. Pressman ; Software Engineering – A practitioner's approach; McGraw Hill; 6/e.
2	J.Rumbaugh et al; Object Oriented Modelling & Design; PHI.

COMPUTER HARDWARE LAB					
Course Code	**IT360**		**Credit**	**2**	
Scheme of Instructions hours/weeks	**L**	**T**	**P**	**Total**	
	0	**0**	**4**	**52 hours/sem**	
Scheme of Examination TOTAL= 75 marks	**IA**	**TW**	**TM**	**P**	**O**
	0	**25**	**0**	**50**	**0**

List of Experiments from Computer networks and Integrated Electronics (Any 10)

1. Implementation of Basic Gates, Use of NAND and NOR gates as universal gates.
2. Implementation of Multiplexer and Demultiplexer
3. Implementation of SR Flip-Flop and D Flip-Flop.
4. Design Non-Inverting Amplifier using Opamp 741IC closed loop voltage gain = 10.
5. Design Opamp Amplifier 741 IC as summing, scaling and averaging amplifier.
6. Design Opamp amplifier 741IC as an Integrator.
7. Installation of Cisco Packet Traces and Network Topology Implementation
8. To configure a Network using Distance Vector Routing Protocol
9. Configuration of DNS, SMTP,FTP and Web Server
10. Program to convert a decimal number into binary value
11. Program to Implement Floating-Point Addition
12. Write an ALP for 8086 Microprocessor 8 - bit addition of two numbers.
13. Write an ALP for 8086 Microprocessor for finding smallest element from an array.
14. Write an ALP for 8086 Microprocessor to implement Fibonacci series.

COMPUTER SOFTWARE LAB					
Course Code	**IT370**		**Credit**	**2**	
Scheme of Instructions hours/weeks	**L**	**T**	**P**	**Total**	
	0	**0**	**4**	**52 hours/sem**	
Scheme of Examination TOTAL= 75 marks	**IA**	**TW**	**TM**	**P**	**O**
	0	**25**	**0**	**50**	**0**

List of Experiments :

List of Experiments from Data Structures

1. Implement a program to convert infix to postfix expression.
2. Implementation of Queue
3. Implementation of Stack
4. Implementation of Linked List
5. Implement binary search tree.
6. Implement hashing techniques.
7. Implementation of sorting techniques
8. Implementation of searching techniques

List of Experiments from Software Engineering

1. Develop IEEE SRS document
2. Design dataflow diagram and a data dictionary
3. Designing UML diagrams (using ArgoUML tools)
4. Mini Project development using SDLC

Technical Communication					
Course Code	**HM001**		**Credit**	**2**	
Scheme of Instructions hours/weeks	**L**	**T**	**P**	**Total**	
	2	**0**	**0**	**26 hours/sem**	
Scheme of Examination TOTAL= 75 marks	**IA**	**TW**	**TM**	**P**	**O**
	0	**75**	**0**	**0**	**0**

Course Objective:

To ensure understanding of the basics of communication through English, aspects of verbal & non verbal communication. To speak a neutral & correct form of English. To appreciate & develop skills required for the competitive world.

Course Outcomes:

The student will be able to:

CO1	Demonstrate precise language skills with suitable vocabulary and apt style.
CO2	Develop life skills/interpersonal skills to progress professionally.
CO3	Apply traits of suitable candidature for a job/higher education.
CO4	Deliver formal presentations and effectively implementing the verbal and non-verbal skills.

UNIT -1	7
Communication **Oral Communication** Listening, Speaking, Reading, Writing (LSRW), Conversational Dialogues, Role Play, Barriers to Oral Communication, Effective Oral Communication, Principles of Communication, Dos and Don'ts of Group Discussion **Global Communication** Social Media, People Analytics, Models of Culture, Cross-Cultural Communication, Compare Cultures of the World, Impact of Cultural Differences on Managerial Communication, Effective Communicator in a Cross-Cultural setting	
UNIT -2	7
Personality Development Social Etiquette, Email Etiquette, Table Etiquette, Telephone Etiquette, SWOC Analysis, Life Coaching, Emotional Intelligence, Leadership, Time Management, Motivation, Goal Setting, Team Work and Collaboration, Critical Thinking and Problem Solving, Professional Attitude, Persuasion, Anxiety and Stress Management, Social Responsibility	
UNIT -3	6
Career Development Resume Building, Interviewing Skills, Job Search, Personal Networking and Branding, Personal Finance, Build Professional Portfolio	
UNIT -4	6
Public Speaking Methods to overcome anxiety, Build Confidence, Use of Media Aids, Craft an Impactful Speech, Design Impactful Presentations, Effective Presentation Delivery	

TEXTBOOKS	
1	Meenakshi Raman and Sangeeta Sharma; Technical Communication: Principles and Practice, 3rd ed; Oxford University Press
2	Meenakshi Raman, Prakash Singh; Business Communication; 2nd ed.; Oxford University

	Press
3	Dr. K. Alex; Soft Skills: Know Yourself and Know The World; 3rd ed; S. Chand Publishing
REFERENCES	
1	Nicky Stanton; Mastering Communication; 5th ed.; Palgrave Master Series; Red Globe Press
2	Ghosh, B. N.; Managing Soft Skills for Personality Development; Tata McGraw Hill; 2012
3	Wallace and Masters; Personal Development for Life and Work;10th edition; Thomson Learning
4	Lehman, Dufrene, Sinha; BCOM : A South-Asian Perspective with CourseMate; 2nd edition; Cengage Learning
5	Ashraf Rizvi; Effective Technical Communication; Tata McGraw-Hill; 2005
6	MolefiKete Asante, William B. Gudykunst, Bella Mody; Handbook of International and Intercultural Communication; 2nd ed.; Sage Publications

MATHEMATICS- I& II (*BRIDGE COURSE)					
Course Code	**AC390**		**Credits**	**0**	
Scheme of Instruction Hours/ Week	**L**	**T**	**P**	**TOTAL**	
	2	**0**	**0**	**26 hrs/sem**	
Scheme of Examination TOTAL = 0 marks	**IA**	**TW**	**TM**	**P**	**O**
	0	**0**	**0**	**0**	**0**

Course Outline:

This is an audit course.

*This course is compulsory to direct second year/lateral entry students. It is introduced to reduce the knowledge gap in the students.

The syllabus is selected topics from FE110 Mathematics I and FE120 Mathematics II.

The Text books and References are same as shown in FE110 Mathematics I and FE120 Mathematics II.

COMPUTATIONAL TECHNIQUES					
Course Code	**IT410**		**Credit**	**4**	
Scheme of Instructions hours/weeks	**L**	**T**	**P**	**Total**	
	3	**1**	**0**	**52 hours/sem**	
Scheme of Examination TOTAL= 150 marks	**IA**	**TW**	**TM**	**P**	**O**
	25	**25**	**100**	**0**	**0**

Course Objectives:

This course is designed to introduce students to the techniques, algorithms, and reasoning processes involved in the study of discrete mathematical structures that are essential to the field of Computer Science and to use these techniques in subsequent courses in the design and analysis of algorithms, computability theory, software engineering, and computer systems.

Course Outcomes:

The student will be able to:

CO1	Understand operations on discrete structures such as sets, functions, relations, equivalence relations, partial orderings and numerical methods.
CO2	Solve combinatorial problems using the basic principles of counting theory, including permutations, combinations, pigeonhole principle, recurrence relations.
CO3	Apply numerical techniques to solve engineering problems
CO4	Construct mathematical arguments using logical connectives and quantifiers and verify the correctness of an argument using propositional and predicate logic and truth tables.

UNIT 1	
Set Theory : Sets, Set Operations, inclusion-Exclusion principle, Relations and their properties, Equivalence Relations, partial orderings. **Functions:** One-to-One and Onto Functions, Inverse Function, Composition of functions, Graphs of functions and some important functions used in computer science. **Integers:** Integers and division, primes and greatest common divisors, Euclidean algorithm, Congruence Basic properties, Modular arithmetic.	10hrs
UNIT 2	
Propositional Calculus: Propositional logic, propositional equivalences, predicates and quantifiers, rules of inference. **Mathematical Induction:** Principle of Mathematical Induction and applications. **Counting:** The fundamental rules of counting, permutations and combinations, pigeonhole principle, binomial coefficients. **Advanced Counting Techniques:** Recurrence relations, formulation, solving linear recurrence relations using characteristic roots.	11hrs
UNIT 3	
Solutions of Non-linear equations : Bisection Method, False Position Method, Newton Raphson method, Secant method.	10 hrs

Interpolation: Forward and backward differences, Central differences, Divided differences, Difference tables, Interpolating polynomials Newton Forward & Backward difference interpolation formula, Lagrange's interpolation formula, Newton's Divided difference interpolation formula.	
UNIT 4	
Solution of ordinary Differential equations: Numerical Solution of a differential equation with initial value. Euler's method, Euler's predictor-corrector method, Runge-Kutta 2^{nd} & 4^{th} order method. **Numerical Integration**: Trapezoidal Rule, Simpson's 1/3 rule, Simpson's 3/8 rule, Weddle's rule, Romberg Integration.	11 hrs

TEXTBOOKS	
1	Kenneth H. Rosen; Discrete Mathematics and Its Applications; Tata McGraw Hill (6th edition).
2	G.V.Kumbhojkar; Discrete Structures And Graph Theory; Pradeep Prakashan.
REFERENCES	
1	J. P. Tremblay and R. Manohar, McGraw Hill; Discrete Mathematical Structures with Applications to Computer Science; New York McGraw Hill.
2	Swapan Kumar Sarkar; Discrete Mathematics; S. Chand Publication.
3	Dr. D. S. C ; Discrete Mathematical Structures; Prism Books Pvt. Ltd.
4	Ralph P. Grimaldi , Discrete and Combinatorial Mathematics: An Applied Introduction, 5th Edition, Pearson.

EMBEDDED SYSTEM					
Course Code	**IT420**		**Credit**	**3**	
Scheme of Instructions hours/weeks	**L**	**T**	**P**	**Total**	
	3	**0**	**0**	**40 hours/sem**	
Scheme of Examination TOTAL= 150 marks	**IA**	**TW**	**TM**	**P**	**O**
	25	**25**	**100**	**0**	**0**

Course Objectives:

The objective of the course is to provide basic understanding of design process in embedded systems, microcontrollers, and hardware architecture. It covers the concepts of jump and call instructions, Timer/Counter programming, Serial Communication. The course also briefly covers Arduino Kit programming and Introduces Raspberry Pi programming.

Course Outcomes:

The student will be able to:

CO1	Understand the basic operation of embedded system, microcontrollers, and the features of Arduino, Raspberry Pi.
CO2	Apply the instruction set commands and programming concepts to develop a prototype.
CO3	Analyze the properties and features of embedded system, microcontrollers, and advance programming languages.
CO4	Design and develop an efficient embedded system, and implement programs using Arduino, Raspberry Pi.

UNIT 1	
Introduction to Embedded System **8051 Microcontroller Architecture:** Hardware, Input/output pins, Ports and circuits. **8051 Instruction Set:** Addressing Modes, Data movement instruction: External Data move. Code **Memory Read-Only-Data moves.** Logic operation: Bit and Byte level, Rotate and Swap. Arithmetic operations: Flags, Incrementing, Decrementing, Addition, subtraction, Multiplication and division, Decimal arithmetic.	10 hrs
UNIT 2	
Jump and call Instructions: Jump and call program range, Jumps, Call and subroutine, Interrupts and returns in details. **Timer|Counter Programming:** Programming 8051 timer, Counter programming, Programming timer 0 and 1 in 8051 C. **Serial Communication:** Basics of Serial Communication, 8051 connections to RS-232, 8051 serial Communication Programming in C.	10hrs
UNIT 3	
Prototyping Embedded Devices: Electronics, Sensors, Actuators, Scaling up the Electronics. **Embedded Computing Basics:** Microcontrollers, System-on-chips, choosing platform. **Arduino:** Developing on Arduino, hardware, Openness, Simple Programs/Projects	10 hrs

UNIT 4	
Introduction to Raspberry Pi: Structure of the boards, Peripherals, Configuring Your PI **Linux and Raspberry:** Command Line, Linux Commands **Basic Input and Output:** Using Inputs and Outputs, Digital Output, Digital Input**Programming inputs and outputs.**	10 hrs

TEXTBOOKS	
1	Kenneth J. Ayala, Penram International; The 805I Microcontroller, Architecture, Programming & Application ; Second Edition
2	Muhammad Ali Mazidi and Janice Mazidi, Prentice; The 805I Microcontroller and embedded system using assembly & C
3.	Adrian McEwen & Hakim Cassimally; Designing the Internet of Things
4.	Matt Richardson & Shawn Wallace; Getting started with Raspberry Pi
REFERENCES	
1	Ruth Suehle & Tom Callaway ; Raspberry Pi Hacks;

OBJECT ORIENTED PROGRAMMING USING JAVA					
Course Code	**IT430**		**Credit**	**3**	
Scheme of Instructions hours/weeks	**L**	**T**	**P**	**Total**	
	3	**0**	**0**	**40 hours/sem**	
Scheme of Examination TOTAL= 125 marks	**IA**	**TW**	**TM**	**P**	**O**
	25	**0**	**100**	**0**	**0**

Course Objectives:

The objective of the course is to provide the principles and techniques of object-oriented programming using Java and to learn and implement object-oriented features such as encapsulation, inheritance and polymorphism along with error-handling techniques .

Course Outcomes (COs)

The students will be able to:

CO1	Discuss the OOP's concept and Apply the concepts to design, implement, compile, test and execute simple Java programs.
CO2	To apply the major object-oriented concepts to implement object oriented programs in Java like: encapsulation, inheritance and polymorphism.
CO3	To design and develop object-oriented programs and software using Java
CO4	Illustrate multithreading concepts by experimenting with programs

UNIT 1	
Introduction to Java : Basics of Java programming, Data types, Variables, Operators, Control structures including selection, Looping, Java methods, Overloading, Math class, Arrays in java. Objects and Classes : Basics of objects and classes in java, Constructors, Finalizer, Visibility modifiers, Methods and objects, Inbuilt classes like String, Character, StringBuffer, File, this reference	10 hrs
UNIT 2	
Inheritance and Polymorphism : Inheritance in java, Super and sub class, Overriding, Object class, Polymorphism, Dynamic binding, Generic programming, Casting objects, Instance of operator, Abstract class, Interface in java, Package in java, UTIL package.	10 hrs
UNIT 3	
Event and GUI programming : Event handling in java, Event types, Mouse and key events, GUI Basics, Panels, Frames, Layout Managers: Flow Layout, Border Layout, Grid Layout, GUI components like Buttons, Check Boxes, Radio Buttons, Labels, Text Fields, Text Areas, Combo Boxes, Lists, Scroll Bars, Sliders, Windows, Menus, Dialog Box, Applet and its life cycle, Introduction to swingstreams and classes, Manipulators, File Handling	10 hrs
UNIT 4	
I/O programming : Text and Binary I/O, Binary I/O classes, Object I/O, Random Access Files Multithreading in java : Thread life cycle and methods, Runnable interface, Thread synchronization, Exception handling with try-catch-finally, Collections in java, Introduction to JavaBeans and Network Programming..	10 hrs

TEXTBOOKS	
1	Programming with Java, 6th edition, Balagurusamy, Mc Graw Hill

2	Complete Reference Java J2se, Herbert Schildt, Tata McGraw Hill.
REFERENCES	
1	Introduction to Java Programming (Comprehensive Version), Daniel Liang, Seventh Edition, Pearson..
2	Programming in Java, Sachin Malhotra & Saurabh Chaudhary, Oxford University Press.
3	Core Java Volume-I Fundamentals, Eight Edition, Horstmann & Cornell, Pearson Education.
4	Java Programming, D. S. Malik, Cengage Learning.

OPERATING SYSTEMS					
Course Code	**IT440**		**Credit**	**3**	
Scheme of Instructions hours/weeks	**L**	**T**	**P**	**Total**	
	3	**0**	**0**	**40 hours/sem**	
Scheme of Examination TOTAL= 125 marks	**IA**	**TW**	**TM**	**P**	**O**
	25	**0**	**100**	**0**	**0**

Course Objectives:

The subject aims to provide the student with an understanding of how Operating systems work and in addition understanding the concepts of scheduling, memory management and deadlock management.

Course Outcomes:

The student will be able to:

CO1	Identify and reproduce the basic concepts of Modern operating systems and Understand the various operating system mechanisms and operations.
CO2	Apply concepts of memory management including virtual Memory and Page Replacement to the issues that occur in Real time applications
CO3	Analyze issues related to file system interface, implementation, disk management, multiprocessor Operating systems, protection and security mechanisms
CO4	Create simple shell scripts and android applications that can be used for easing daily tasks.

UNIT 1	
OVERVIEW OF OPERATING SYSTEM AND PROCESS MANAGEMENT : Introduction to Operating Systems: Overview and working of different operating systems. Functions of operating systems, Design approaches: layered, kernel based and virtual machine approach. Process management Concepts, Threads, CPU Scheduling, Process Synchronization.	10hrs
UNIT 2	
DEADLOCKS AND MEMORY MANAGEMENT Deadlocks Concept, Deadlock prevention, Deadlock avoidance, Deadlock detection and recovery Memory management: Concept, Swapping, Contiguous memory allocation, Paging, Segmentation, Segmentation with paging. Virtual memory: Concept, Demand paging, Page replacement, Thrashing.	10hrs
UNIT 3	
FILE SYSTEMS ,I/O SYSTEMS AND MULTIPROCESSOR OPERATING SYSTEMS : File system interface: File Concepts, Types, Access Methods, Directory structures. File system implementation: Directory Implementation, Allocation methods, Free space management. I/O Systems: Overview of I/O Systems, Secondary storage structure: Disk structure, Disk scheduling, Disk management, swap space management. Multiprocessor Operating Systems - Introduction, structure of multiprocessor operating system, Processor scheduling: Issues, Smart scheduling ,Affinity based scheduling.	10hrs
UNIT 4	
SHELL PROGRAMMING AND ANDROID BASICS Unix Concepts: understanding UNIX commands, general purpose utilities, file system,	10 hrs

handling ordinary files , basic file attributes, VI editor , Basic shell scripts. Android programming : What is android, versions , Features, Architecture, Devices , Tools required , Creating your first android application, Understanding activities, Designing UI.	

TEXTBOOKS	
1	Silberschatz and Galvin;The Operating System Concepts;Wesley Publishing Co.;3rd Edition
2	M Singhal and NG Sivaratri;Advanced Concepts in Operating Systems;TMH;
3	SumitabhaDas;UNIX - Concepts and applications;TMH;3rd edition
4	Wei-Meng Lee;Beginning Android Application Development.
REFERENCES	
1	Operating Systems by W Stallings. PHI. (page numbers given in syllabus as per the 5^{th}edition)
2	Operating systems, Design and implementation by A.S Tanenbaum,PHI.
3	Operating Systems by Achyut S. Godbole, Tata McGraw Hill

DESIGN AND ANALYSIS OF ALGORITHMS					
Course Code	**IT450**		**Credits**	**4**	
Scheme of Instruction	**L**	**T**	**P**	**TOTAL**	
Hours/ Week	**3**	**1**	**0**	**42 hrs/sem**	
Scheme of Examination	**IA**	**TW**	**TM**	**P**	**O**
TOTAL = 125 marks	**25**	**0**	**100**	**0**	**0**

Course Objectives:

The objective of the course is to learn the different algorithm design techniques and their complexities in order to use the effective technique to solve a problem.

Course Outcomes:

The student will be able to:

CO1	Explain the common algorithms, algorithmic paradigm and data structures used to solve various problems.
CO2	Apply the different algorithm design techniques like divide and conquer strategy , greedy approach, dynamic programming for problem solving.
CO3	Analyze the pros and cons of applying the different algorithm design techniques in terms of time and space complexity.
CO4	Choose an efficient and effective algorithmic solution for different real world problems.

UNIT 1	
Algorithm Analysis & Complexity: Algorithm Definition and Specification, Performance analysis (Space complexity, Time complexity, Asymptotic Notations), Recurrences – Iteration, recursion tree and master method, Performance measurement, Performance analysis of recursive algorithms, Recursion, Towers of Hanoi problem, Comparison of recursion and Iteration. Dynamic Storage Management, Garbage Collection.	10 hrs
UNIT 2	
Divide and Conquer strategy: General method, Binary search, Finding Maximum and Minimum, Merge sort technique, Quick sort technique **Greedy method strategy:** General method, Knapsack problem, Job sequencing with deadlines, Minimum cost Spanning trees (Prims &Kruskals algorithm), Optimal storage on tapes, Optimal merge patterns, Single source Shortest paths.	11 hrs
UNIT 3	
Dynamic Programming: General method, Multistage graphs, All pairs shortest paths, Single Source Shortest paths, Knapsack problem, Travelling Sales person problem. **Search & Traversal Techniques**: Techniques for graphs- Breadth first search, Depth first search, Connected components and spanning trees, Biconnected components.	10 hrs
UNIT 4	
Text processing algorithms (pattern matching): Naïve string matching algorithm, Rabin Karp algorithm, Knuth-Morris-Pratt algorithm. **Backtracking:** General method, 8-queens problem, Sum of subsets Problem, Graph Coloring, Hamiltonian Cycles. NP-Hard and NP-Complete Problems: Basic concepts- non-deterministic algorithms, NP-Hard and NP- Complete classes.	11 hrs

TEXTBOOKS	
1	E.Horowitz, S. Sahini, S. Rajasekaran ; Fundamentals of Computer Algorithms; Galgotia publication.
2	T.H.Cormen, C.E. Leiserson, R.L.Rivest ; Introduction to Algorithms; PHI.

REFRENCES	
1	M. T. Goodrich, R. Tamassia; Algorithm Design; Wiley
2	G. Brassard, P. Bratley; Fundamentals of Algorithmics; Pearson.
3	Robert Sedjewick; Algorithms; Addison Wesley.

ALGORITHM AND PROGRAMMING LAB					
Course Code	**IT460**		**Credit**	**2**	
Scheme of Instructions hours/weeks	**L**	**T**	**P**	**Total**	
	0	**0**	**4**	**52 hours/sem**	
Scheme of Examination TOTAL= 75 marks	**IA**	**TW**	**TM**	**P**	**O**
	0	**25**	**0**	**50**	**0**

List of Experiments (Design and Analysis of Algorithms) (Any five)

1. To implement the following using array data structure and analyze its time complexity
   a)Insertion sort b) Selection sort c) Bubble sort d) Quick sort e)Merge sort
2. To implement Linear and Binary search and analyze its time complexity.
3. To implement Dijkstra's algorithm and analyze its time complexity.
4. To implement minimum spanning trees using Kruskal's algorithm.
5. To implement minimum spanning trees using Prim's algorithm.
6. To implement a program for travelling salesman problem.
7. To implement DFS and BFS and analyze their time complexities.
8. To implement following string matching algorithms and analyze time complexities:
   a)Rabin Karp b) Knuth Morris Pratt
9. To implement Hamiltonian cycle problem

List of Experiments (Object Oriented programming using Java) (Any five)

1. Define structure of basic Java program
2. Constructors and Destructors with
3. Classes, methods and objects, Method Overloading.
4. Inheritance and Method overriding.
5. Packages
6. Multithreading
7. Exception Handling.
8. I/O operations
9. Applet structure and Event handling
10. Layout managers.

SOFTWARE SYSTEMS LAB					
Course Code	**IT470**		**Credits**	**2**	
Scheme of Instruction	**L**	**T**	**P**	**TOTAL**	
Hours/ Week	**0**	**0**	**4**	**52 hrs/sem**	
Scheme of Examination	**IA**	**TW**	**TM**	**P**	**O**
TOTAL = 75 marks	**25**	**0**	**0**	**50**	**0**

List of Experiments from Operating Systems

1.CPU Scheduling
2.DeadlockDetection/ Avoidance
3.Page Replacement Algorithms
4.Threading and Synchronization
5.Shell Programming
6. Android Programming

List of Experiments from Embedded systems

1. Mini project using Arduino/ Raspberry Pi kit.

MANAGEMENT & ORGANIZATIONAL BEHAVIOUR					
Course Code	**HM004**		**Credits**	**3**	
Scheme of Instruction	**L**	**T**	**P**	**TOTAL**	
Hours/ Week	**3**	**1**	**0**	**40 hrs/sem**	
Scheme of Examination	**IA**	**TW**	**TM**	**P**	**O**
TOTAL = 125 marks	**25**	**0**	**100**	**0**	**0**

Course objectives:

To help students understand the management of behavior in organizations and to know how organizational behavior affects performance and effectiveness .To understand the dynamics of individual and group behavior in organizations. To help students understand how perceptions, attitudes and values influence their work and professional relationships.

Course outcomes:

The students will be able to

CO1	Explain why organizational behavior is important for managerial decision making and creating a functional organization.
CO2	To appreciate and accommodate differences in perceptions , attitudes and personality and use this to work effectively with diverse individuals and heterogeneous groups.
CO3	To understand how emotions and stress impact the management of organizational functioning.
CO4	To understand organizational dilemmas from an individuals and interpersonal lens

UNIT 1	
Introduction to organizational behavior , to review the reasons for joining organizations. Understanding the importance of organizational behavior in organizations . Understanding the self – to be able to reflect , understand and observe patterns of being in self. Understanding the Johari Window Framework . Perception: Definitions and concept of perception, exploring the factors that influence perception, the perceptual processes that affect the communicator's perception of others . Individual decision making- the cognitive shortcuts and biases the individual has and how they affect decision making.	10 hrs
UNIT 2	
The role of individual in the organization Attitudes and job satisfactions – nature of attitudes- type of work attitudes , job satisfaction, job involvement, organizational commitment, types of organizational commitment , developing organizational commitment , job satisfaction and employee performance. Personality and values: Definition and concept of personality, factors that determine an individual's personality . The Big Five personality model – Personality traits relevant to organizational behavior . Linking an individual's personality and values to the workplace. Motivation – Theories of work motivations, contemporary approaches and applications- linking	10 hrs

employee involvement programs and motivation theories . Employee recognition , employee involvement , variable pay and flexible benefits .	
UNIT 3	
Interpersonal skills and group processes **12hrs.** Understanding teams – creating effective teams- turning individuals Into team players – evaluating team performance and understanding team diversity – the management and assimilation of cultural differences Team processes , team work, factors determining the success of a team , team work . Difference between group and team Stages of group development- group norms, group structure, group status Group cohesiveness and group performance Group decision making – groupthink, groupshift- group decision making techniques The nature of interpersonal skills- how interpersonal relationships influence teams and what managers do. Communication: Functions of organizational communications- the communication process . Electronic communications, managing informations, the grapevine Barriers to communications Managing leadership and communication Trait Theories. Behavioral Theories The leadership construct and the need for creating leaders in the managerial world	10 hrs
UNIT 4	
Organizational culture Definition and concept of organizational culture What do cultures do? – Creating and sustaining cultures. Notion of ethics and spirituality in organizations Power and politics: Understanding the dynamics of power and politics- social influence, individual power , the tactics of power , organizational politics and factors contributing to political behavior Conflict management – views of conflict Organizational change and stress management Defining stress and identifying its potential sources . Identifying the consequences of stress Individual and organization approach to stress.	10 hrs

TEXTBOOKS	
1	Greenberg J. and Baron R. – Behavior in Organizations , 8th Edition, Pearson Prentice Hal
2	Newstrom, J. and Davis, K. (1989)- Organizational Behavior : readings and exercises : 8th edition , New York: Mc graw Hill

REFRENCES	
1	Aswathappa K. (2012) Organizational Behavior : Texts, cases and games , 10th edition, Himalaya Publishing House
2	Robbins, Timothy Judge, Neharika Vohra , 14th edition Pearson – Organisational Behavior
3	K. Aswathappa , Human Resource Management : Text and cases , 7th edition , Mc Graw Hill Education 2015