Four Year Degree Course in Engineering & Technology
Course and Examination Scheme with Credit Grade System
Third Semester B.E. (Computer Science & Engineering)

Subject Code	Subject	Teaching Scheme Hours per week L	T	P	No. of Credits	Examination Scheme Theory Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional MSE	IE	Total	Min. Passing Marks	Practical Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
CS301	Applied Mathematics-III	3	1	0	4	3	80	10	10	100	40	--	--	--	--
CS302	Electronic Devices & Circuits	3	1	0	3	3	80	10	10	100	40	--	--	--	--
CS303	Object Oriented Programming	3	1	0	3	3	80	10	10	100	40	--	--	--	--
CS304	Data Structures	3	1	0	3	3	80	10	10	100	40	--	--	--	--
CS305	Computer Architecture & Organization	3	1	0	4	3	80	10	10	100	40	--	--	--	--
	Laboratories														
CS306	Electronic Devices & Circuits	0	0	3	2	--	--	--	--	--	--	25	25	50	25
CS307	Object Oriented Programming	0	0	3	2	--	--	--	--	--	--	25	25	50	25
CS308	Data Structures	0	0	3	2	--	--	--	--	--	--	25	25	50	25
	Total	**15**	**5**	**9**	--	--	--	**500**	--	--	--	**150**	--		
	Semester Total	**29**			**23**										**650**

Four Year Degree Course in Engineering & Technology
Course and Examination Scheme with Credit Grade System
Fourth Semester B.E. (Computer Science & Engineering)

Subject Code	Subject	Teaching Scheme					Examination Scheme										
		Hours per week			No. of Credits		Theory					Practical				Total	Min. Passing Marks
		L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional MSE	Max. Marks Sessional IE	Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE				
CS401	Applied Mathematics-IV	3	1	0	4	3	80	10	10	100	40	--	--	--	--		
CS402	Digital Circuits & Fundamentals of Microprocessor	3	1	0	3	3	80	10	10	100	40	--	--	--	--		
CS403	Database Management System	3	1	0	3	3	80	10	10	100	40	--	--	--	--		
CS404	System Programming	3	1	0	4	3	80	10	10	100	40	--	--	--	--		
CS405	Theory of Computation	3	1	0	4	3	80	10	10	100	40	--	--	--	--		
	Laboratories																
CS406	Digital Circuits & Fundamentals of Microprocessor	0	0	3	2	--	--	--	--	--	--	25	25	50	25		
CS407	Database Management System	0	0	3	2	--	--	--	--	--	--	25	25	50	25		
CS408	Computer Workshop	0	0	2	2	--	--	--	--	--	--	25	25	50	25		
	Total	**15**	**5**	**8**		--	--	--	--	**500**	--	--	--	**150**	--		
	Semester Total	**28**			**24**												**650**

Four Year Degree Course in Engineering & Technology
Course and Examination Scheme with Credit Grade System
Fifth Semester B.E. (Computer Science & Engineering)

Subject Code	Subject	Teaching Scheme Hours per week			No. of Credits	Examination Scheme Theory						Practical				
		L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional MSE	Max. Marks Sessional IE	Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
CS501	Object Oriented Analysis & Design	3	1	0	3	3	80	10	10	100	40	--	--	--	--
CS502	Computer Network	4	1	0	4	3	80	10	10	100	40	--	--	--	--
CS503	Design & Analysis of Algorithms	3	1	0	4	3	80	10	10	100	40	--	--	--	--
CS504	Software Engineering	3	1	0	3	3	80	10	10	100	40	--	--	--	--
CS505	Operating System	3	1	0	4	3	80	10	10	100	40	--	--	--	--
	Laboratories														
CS506	Object Oriented Analysis & Design	0	0	3	2	--	--	--	--	--	--	25	25	50	25
CS507	Computer Network	0	0	3	2	--	--	--	--	--	--	25	25	50	25
CS508	Software Engineering	0	0	3	2	--	--	--	--	--	--	25	25	50	25
CS509	Software Technology Lab	0	0	2	2	--	--	--	--	--	--	25	25	50	25
	Total	**16**	**5**	**11**	**--**	**--**	**--**	**500**	**--**	**--**	**--**	**200**	**--**		
	Semester Total	**32**			**26**										**700**

Four Year Degree Course in Engineering & Technology
Course and Examination Scheme with Credit Grade System
Sixth Semester B.E. (Computer Science & Engineering)

Subject Code	Subject	Teaching Scheme Hours per week			No. of Credits	Examination Scheme Theory					Practical				
		L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional MSE	Max. Marks Sessional IE	Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
CS601	Java Programming	4	1	0	4	3	80	10	10	100	40	--	--	--	--
CS602	Microprocessor & Microcontrollers	3	1	0	3	3	80	10	10	100	40	--	--	--	--
CS603	Computer Graphics	3	1	0	3	3	80	10	10	100	40	--	--	--	--
CS604	Web Technology	3	1	0	3	3	80	10	10	100	40	--	--	--	--
CS605	Principles of Management	3	0	0	3	3	80	10	10	100	40	--	--	--	--
	Laboratories														
CS606	Java Programming	0	0	3	2	--	--	--	--	--	--	25	25	50	25
CS607	Microprocessor & Microcontrollers	0	0	3	2	--	--	--	--	--	--	25	25	50	25
CS608	Computer Graphics	0	0	3	2	--	--	--	--	--	--	25	25	50	25
CS609	Web Technology	0	0	3	2	--	--	--	--	--	--	25	25	50	25
	Total	**16**	**4**	**12**		**--**	**500**	**--**	**--**	**--**	**200**	**--**			
	Semester Total	**32**			**24**										**700**

(Note: One Lecture of one hour equal to one Credit, One Tutorial/Practical of Three hours equal to two Credit, One Tutorial/Practical of Two hours equal to one Credit, One Practical/Lab. without theory paper of one hour equal to one Credit.)

Four Year Degree Course in Engineering & Technology
Course and Examination Scheme with Credit Grade System
Seventh Semester B.E. (Computer Science & Engineering)

Subject Code	Subject	Teaching Scheme					Examination Scheme										
		Hours per week			No. of Credits		Theory					Practical				Total	Min. Passing Marks
		L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional MSE	Max. Marks Sessional IE	Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE				
CS701	Digital Image Processing	3	1	0	3	3	80	10	10	100	40	--	--	--	--		
CS702	TCP/IP and Internet	3	1	0	3	3	80	10	10	100	40	--	--	--	--		
CS703	Data Warehousing & Mining	3	1	0	3	3	80	10	10	100	40	--	--	--	--		
CS704	Elective-I 1. Advanced Computer Architecture 2. Multimedia Systems 3. Mobile Computing 4. Cloud Computing	3	1	0	4	3	80	10	10	100	40	--	--	--	--		
CS705	Elective-II 1.Enterprise Resource Planning 2. Real Time Systems 3. Robotics 4. Ad-hoc Network	3	1	0	4	3	80	10	10	100	40	--	--	--	--		
	Laboratories																
CS706	Digital Image Processing	0	0	3	2	--	--	--	--	--	--	25	25	50	25		
CS707	TCP/IP and Internet	0	0	3	2	--	--	--	--	--	--	25	25	50	25		
CS708	Data Warehousing & Mining	0	0	3	2	--	--	--	--	--	--	25	25	50	25		
CS709	Project Seminar	0	0	2	2	--	--	--	--	--	--	50	--	50	25		
	Total	**15**	**5**	**11**	**--**	**--**	**--**	**500**	**--**	**--**	**--**	**200**	**--**				
	Semester Total	**31**			**25**											**700**	

Four Year Degree Course in Engineering & Technology
Course and Examination Scheme with Credit Grade System
Eighth Semester B.E. (Computer Science & Engineering)

Subject Code	Subject	Teaching Scheme				Examination Scheme									
		Hours per week			No. of Credits	Theory						Practical			
		L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional MSE	Max. Marks Sessional IE	Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
CS801	Software Testing & Quality Assurance	3	1	0	4										
CS802	Compiler Construction	3	1	0	3	3	80	10	10	100	40	--	--	--	--
CS803	Computer System Security	3	1	0	3	3	80	10	10	100	40	--	--	--	--
CS804	Elective-III : 1.Advanced Database 2. Neural Network & Fuzzy System 3. Soft Computing 4. High Performance Network	3	1	0	4	3	80	10	10	100	40	--	--	--	--
CS805	Elective-IV 1. Distributed System 2. E-Commerce 3. Embedded System 4. Open Source Softwares	3	1	0	4	3	80	10	10	100	40	--	--	--	--
	Laboratories														
CS806	Compiler Construction	0	0	3	2	--	--	--	--	--	--	25	25	50	25
CS807	Computer System Security	0	0	3	2	--	--	--	--	--	--	25	25	50	25
CS808	Project	0	0	6	6	--	--	--	--	--	--	75	75	150	75
	Total	**15**	**5**	**12**	--	--	--	**400**	--	--	--	**250**	--		
	Semester Total	**31**			**28**									**650**	

III-Semester B. E. (Computer Science & Engineering)

Course Code: CS301
Title of the Course: Applied Mathematics-III

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	01	--	04	04	03	10	10	80	100

Unit	Contents	Hours
I	Z-Transform: Definition, Properties, Inverse by partial fractions and convolution theorem. Application of Z-Transform to solve differential equations with constant coefficients. Fourier Integers and Fourier Transforms.	11
II	Matrices: Inverse of Matrix by ad joint and partitioning method. Rank of Matrix and consistency of system of linear simultaneous equations. Linear dependence. Eigen Values and Eigen Vector, Reduction to diagonal form.	08
III	Matrices: Cayley-Hamilton Theorem, Sylvester's Theorem (statement only) . Solution of second order ordinary linear differential equations with constant coefficients b y matrix method, Largest Eigen value and co rresponding Eigen vector by iteration.	08
IV	Random Variables and Probability Distributions: Random variables discrete and continuous, Probability functions and distribution functions fo r discrete and continuous random variables, Joint distribution.	09
V	Mathematical Expectation: Mathematical expectation, Variance and Stand ard Deviation, Moments, Moment generating fu nctio n, Coefficient of Skewness & Kurtosis.	09
	Total	45

Text Book/s:

1. Higher Engineering Mathematics by B.S. Grewal
2. Probability and Statistics by Murray R. Spiegel

Reference Book/s:

1. A Text Book of Engineering Mathematics by N.P.Bali and Manish Goyal.
2. Mathematics of Engineers, Chandrika Prasad
3. Advance Mathematics for Engineers, Chandrika Prasad
4. Applied Mathematics for Engineers, L.A. Pipes & Harville
5. A Text Book of Applied Mathematics, P.N. Wartikar & J.N. Wartikar

III-Semester B. E. (Computer Science & Engineering)

Course Code: CS302
Title of the Course: Electronic Devices & Circuits

Course Scheme				Evaluation Scheme (Theory)					
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	01	--	04	03	03	10	10	80	100

Unit	Contents	Hours
I	**Semiconductor Devices and Applications:** Diode as a Half Wave Rectifier, Full Wave Rectifier, Breakdown in diodes, Zener and Avalanche Mechanism, Voltage regulator using Zener Diode, Characteristics of BJT, Biasing of BJT, Fixed Bias, Collector to Base Bias, Self Bias, Stability Factor, Thermal Runaway, Thermal compensation	10
II	**Small Signal Analysis of BJT:** Two Port Network, H Parameters, Small Signal Analysis of CB, CE & CC Amplifiers, Millers Theorem, High Input Impedance Circuits, Bootstrapping	09
III	**Power Amplifiers:** Classification of amplifiers, Class A, Class B, Class AB, Push pull Configuration, Complementary Symmetry, Harmonic Distortion, Cross Over Distortion	08
IV	**Oscillators:** Feedback Topologies, Voltage Shunt, Voltage Series, Current Shunt & Current Series Feedback, Barkhausen Criterion, Hartley, Colpitt, RC Phase Shift, Wein Bridge & Crystal Oscillator.	09
V	**FET and its Analysis:** JFET: Principle of Operation, Characteristics, Biasing, Small signal Analysis of CG, CS, & CD amplifiers, MOSFET: Principle of Operation, Characteristics, Enhancement Type, Depletion Type MOSFET	09
	Total	45

Text Book/s:

1. Electronic Devices and Circuits –Millman and Halkias
2. Integrated Electronics -Jacob Millman and Christos C. Halkias

Reference Book/s:

1. Electronic Devices and Circuits- Allen Mottershead .
2. Electronic Devices and Circuits-S.Salivahanan and N.Suresh Kumar.
3. Electronic Principles – Albert Malvino

III-Semester B. E. (Computer Science & Engineering)

Course Code: CS303
Title of the Course: Object Oriented Programming

Course Scheme Evaluation Scheme (Theory)

Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	01	--	04	03	03	10	10	80	100

Unit	Contents	Hours
I	Principles of Object-Oriented Programming, Beginning with C++, Tokens, Expressions and Control Structures	09
II	Functions in C++, Function protopying, call by reference, Return by reference, Inline Function, Default Arguments, Function Overloading, Friend and Virtual Function, Classes and Objects, Defining Member Functions, Arrays within a class, Memory allocation for Objects, Arrays of Objects, Objects as Function Arguments, Friend Functions, Pointers to members	09
III	Constructors and Destructors, Parameterized constructors, Constructors with Default Arguments, Dynamic Initialization of Objects, Copy constructors, Dynamic constructors, Constructing Two-dimensional Arrays, const Objects, Operator Overloading and Type Conversions, Inheritance: Extending Classes, Types of inheritance, Virtual Base Classes, Abstract Classes, Constructors in Derived Classes, Member Classes	09
IV	Pointers, Pointers to Objects, this Pointer, Pointers to Derived Classes, Virtual Functions, Pure Virtual Functions and Polymorphism	09
V	Managing Console I/O Operations, Working with Files, Templates	09
	Total	45

Text Book/s:

1. Object Oriented Programming with C++ by E Balagu rusamy McGraw-Hill
2. Let Us C++ by Y. kanetkar

Reference Books:

1. C++ : The Complete reference , by Herbert Schildt , 4thedition,Tata McGraw Hill
2. Masterin g C++ by K R Venug opal & Prasad, Tata McGray Hill

III-Semester B. E. (Computer Science & Engineering)

Course Code: CS304
Title of the Course: Data Structures

Course Scheme				Evaluation Scheme (Theory)					
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	01	--	04	03	03	10	10	80	100

Unit	Contents	Hours
I	**General concepts and linear data structure:** Abstract data structure as an organization of data with specified properties and operations, Time and space analysis of algorithms, Big oh and theta notations and o mega notations, average, b est and worst case analysis, Representation of Arrays: Single and Multi-dimensional – Address calculation usin g Column and Row major ordering, Representation of Stacks and queues using arrays –Circular queues, Priority queues, Dequeue, Application of stacks, Con version from infix to postfix and prefix expressions, Evaluation of postfix expression using stacks, Multiple stacks.	09
II	**Linked list:** Linked list, Simp ly Linked list, Implementation of Linked list using static & Dynamic memory allocation – dynamic memory allocatio n, operations on linked list, stacks and queues, polynomial representation and manipulations are using linked list, circular linked list, doubly linked list, Generalized list.	09
III	**Trees:** General and binary trees, Representations and traversals, General trees as binary Trees, binary search tree, Applications, the concept of balancing and its ad vantages, B–trees, B + Trees, AVL Trees, Threaded Binary Trees. Hash functio ns, Collision resolution, Expected behavior, Applications.	09
IV	**Graphs and digraphs:** Representations, Breadth and depth first searches, connectivity Algorithms, sho rtest path, Minimal spanning tree, the union find problem, Hamiltonian Path.	09
V	**Sorting:** Elemen tary sorts: Selection, Insertion, Bubble sort, Shell sort, Radix sort, Quick sort, Merge sort, Heap sort, Bucket sorting, external sorting, worst case and average behavior, Lower bound for sorting using comparisons.	09
	Total	45

Text Books:

1. Data Structures using C by Tenenbaum, Pearson Education
2. Data Structures through C by G. S. Baluja Dhanpat Rai & Co.
3. Data Structures by Seymour Lipschutz, Schaum's Outlines.

Reference Book/s:

1. Sartaj Sahani, Data Structures in C
2. D. Samantha, Classic Data Structures, PHI Publication
3. Data Structures – Rob ert Kruse.

III-Semester B. E. (Computer Science & Engineering)

Course Code: CS305
Title of the Course: Computer Architecture & Organisation

Course Scheme					Evaluation Scheme (Theory)			
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	01	--	04	04	03	10	10	80	100

Unit	Contents	Hours
I	BASIC STRUCTURE OF COMPUTER: Functional units, Basic operational concepts, Bus structure, Addressing modes, subroutines: parameter passing, Instruction formats, expanding opcodes method. BASIC PROCESSING UNIT: Bus architecture, Execution of a Complete Instruction, sequencing of control signals, Hardwired control, Microprogrammed Control, Microinstruction format, Bit slice concepts.	09
II	ARITHEMATIC: Number representations and their operations, Designs of Fast Adders, Signed multiplication, Booth 's algorithm, bit – pair recording, Integer division, Floating point number and operation, guard bits and rounding.	09
III	THE MEMORY SYSTEM: Various technologies used in memory design, higher order memory design, multimodule memories and interleaving, Associative memory, Cache memory, Virtual memory.	09
IV	INPUT / OUTPUT ORGANIZATION: I/O mapped I/O and memory mapped I/O, Interrupts and Interrupts handling mechanism, vectored interrupted , synchronous Vs. asynchronous data transfer, Direct memory access, Computer Peripherals : I / O Devices such as magnetic tapes, magnetic disks, CD-ROM systems.	09
V	RISC philosophy: pipelining, basic concepts in pipelining, delayed branch, branch prediction, data dependency, influence of pipelining on instruction set design, multiple execution units, performance considerations. Basic concepts in parallel processing & classification of parallel architectures. Vector Processing, array processor.	09
	Total	45

Text Books:

1. V. C. Hamacher Z. G. Vranesic and S. G. Zaky, Computer Organizatio n, Mc Graw Hill, 5th edition, 2002.
2. A. S. Tanenbaum, "Structured Computer Organization", 4th edition, Pearson Education.

Reference Books:

1. Computer Architecture & Organization, 3rd edition – J. P. Hayes
2. Marries Mano, "Computer System and Architecture", Pearson Education.
3. William Stallings, "Computer Organization & Architecture", Pearson Education.

III-Semester B. E. (Computer Science & Engineering)

Course Code: CS306
Title of the Course: Electronic Devices & Circuits

Course Scheme					Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total
--	--	01	03	02	25	25	50

Practical: Students should perfo rm 10-12 Experiments from the given list.

List of Practical's:

1. Experiment on V-I Characteristics of diode.
2. Experiment on study Reverse Bios Characteristics of Diode.
3. Experiment on V-I Characteristics of Zener Diode.
4. Experiment on V-I Characteristics of transistor in CE mode.
5. Experiment on V-I Characteristics of transistor in CB mode.
6. Experiment on Class A and Class AB.
7. Experiments of Push Pull amplifier.
8. Experiments of Wein Bridge Oscillator.
9. Experiments on Crystal Oscillator.
10. Experiments on Colpitt Oscillator.
11. Experiments of Characteristics of JFET
12. Experiments on MOSFET.

III-Semester B. E. (Computer Science & Engineering)

Course Code: CS307
Title of the Course: Object Oriented Programming

	Course Scheme			Evaluation Scheme (Laboratory)				
Lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total	
--	--	01	03	02	25	25	50	

Practical: Students should perform 10-12 Experiments from the given list.

List of Practical:

1. Write a Simple C++ program witho ut using Class & Object
2. Write a program using Class & Object.
3. Write a program using Function Overloading.
4. Write a program using Operator Overloading.
5. Write a program u sing Inheritance.
6. Write a program using Virtual Function.
7. Write a program using Friend Function.
8. Write a program using Constructor.
9. Write a program using Dynamic Initialization of Objects.
10. Write a program using Copy Constructo r.
11. Write a program using Virtual Base Class.
12. Write a program using Abstract Class.
13. Write a program for file handling

III-Semester B. E. (Computer Science & Engineering)

Course Code: CS308
Title of the Course: Data Structures

Course Scheme					Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total
--	--	01	03	02	25	25	50

Practical: Students should perfo rm 10-12 Experiments from the given list using C.

List of Practical:

1. Write a Menu driven program for Stack Operation.
2. Implement stack as an ADT. Use this ADT to p erform expression conversion and evaluation. (Infix - Postfix, Infix-Prefix, Prefix-Infix, Prefix-Postfix, Postfix-Infix, Postfix-Prefix).
3. Write a program for Circular Queue.
4. Write a program for Priority Queue.
5. Write a program for linked list.
6. Write a program for doubly linked list.
7. Write a program for Binary tree.
8. Write a program for BFS.
9. Write a program for DFS.
10. Write a program for Bubble Sort.
11. Write a program for Selection Sort.
12. Write a program for Heap Sort.
13. Write a program for Merge Sort.
14. Write a program for Traversal of Tree: Preorder, Inorder and Postorder.

IV-Semester B. E. (Computer Science & Engineering)

Course Code: CS401
Title of the Course: Applied Mathematics-IV

Course Scheme					Evaluation Scheme (Theory)			
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	01	--	04	04	03	10	10	80	100

Unit	Contents	Hours
I	Set Theory: Basic Concepts of set theory, The power set, Some operations on sets, Venn diagram, Basic set identities, Cartesian product, Properties of binary relation in a set, Matrix and the Graphs of a relation, Equivalence relation, Partial order relation, comp ability, Compositio n of binary relation, Function, Composition of functions, Inverse Functions, Characteristics Function of a set.	09
II	Mathematical Logic: Statements Connectives: Negotiation, Conjunction, Disjunction, Conditional and bico nditional, statement formulas and truth table. Tautologies , Equivalence of formulas, Duality laws, Tautological implication. Theory of inference for statement calculus, Theory of inference for Pred icate calculus.	09
III	Algebraic Structures: Semigroups and Monoids, Groups (definitions and examples) Cyclic groups , Permutation group s, subgro ups and Homomorphisms. Cosets and Lagranges theorem, Normal subgroups, Rings (definition and examples), subrings, Ring Homomorphisms, Ideals and Quotient Rings, Polynomial Ring, finite fields and integral do main.	09
IV	Lattice Theory & Boolean Algebra: Lattices as partial ordered set (d efinition and examples), some problems of lattices as algebraic system, Sub lattices, Direct Product, Homomorphism, Some special lattices, Boolean algebra (definition and examples), application to switching circuits.	09
V	Graph Theory: Basic concepts of Graph Theory, Basic definitions, Paths, Rechability and connectedness, Matrix representation of Graphs, Trees, Tree Searching, Und irected Trees, Minimal Spanning Trees.	09
	Total	45

Text Book/s:

1. Discrete Mathematics Structures with ap plicatio n to Computer Science by J.P.Trembly & R. Manohar
2. Discrete Maths for Computer Scientists & Mathematicians (Chapter 2,5,7) by J.L.Mott, A. Kandel, T.P.Baker
3. Discrete Mathematics by J.K.Sharma, Macmillan **Publishers** India

Reference Book/s:

1. Elements of Discrete Mathematics by C.L.Liu., Tata McGraw-Hill, 2008.
2. Discrete Mathematics by Lipschutz, McGraw Hill Professional, 2007
3. Discrete Mathematics by R. Johnsonbaugh., 9th ed ition, John Wiley & Sons, 2006

IV-Semester B. E. (Computer Science & Engineering)

Course Code: CS402
Title of the Course: Digital Circuits & Fundamentals of Microprocessor

Course Scheme				Evaluation Scheme (Theory)					
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	01	--	04	03	03	10	10	80	100

Unit	Contents	Hours
I	Number systems, Boolean Algebra, Basic logic circuits, truth tables, Demorgan's law, basic combinational logic circuits and design, sum of product and product of sum, simplification using K-maps, SSI, MSI,LSI & VLSI circuit classification.	09
II	Combinational Logic : Decoders, Encoders, Multiplexers, Demultiplexers, Code converters, Parity circuits and comparators, Arithmetic modules - Adders, Subtractions (Half and Full), BCD adder/subtractor, ALU.	09
III	Basic sequential circuits- latches and flip-flops: SR-flip flop, D-flipflop, JK flip-flop, T flip-flop, Timing hazards, Race around Condition, J -K Master Slave Flip flop. Excitation tables of Flip Flops, Conversion of one type flip-flop to another type flips flop, Counters, types of Counters, Design of Mod N counters Using K-map, Lock Free Counters, Up down Counter.	09
IV	Introduction to 8085 microprocessor, architecture, instruction set, Timing diagrams, Flags, addressing modes, Assembly language programming, interrupts.	09
V	Memory organization & interfacing. Interfacing I/O devices PPI 8255, 8253, and its organization & interfacing with 8085.	09
	Total	45

Text Book/s:

1. Digital Design by Morris Mano Prentice-Hall, 2007
2. Fundamental of Digital Electronics: A. Anand Kumar.
3. Microprocessor Architecture Programming & Applications with the 8085 by Ramesh Gaonkar

Reference Book/s:

1. Digital Electronics 3rd Edition 2003 by R.P.Jain TATA McGraw-Hill.
2. Digital circuit & design: A. P. Godse.
3. Microprocessor Techniques by A. P. Godse. Technical Publication.

IV-Semester B. E. (Computer Science & Engineering)

Course Code: CS403
Title of the Course: Database Management System

Course Scheme				Evaluation Scheme (Theory)					
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	01	--	04	03	03	10	10	80	100

Unit	Co ntents	Hours
I	Introduction to DBMS :Basic concepts, Advantages of a DBMS over file-processing systems, Data abstraction, Data Models and data independence. Components of a DBMS and overall structure of a DBMS Database terminology Data Modeling: Basic Concepts, Types of data models, E-R data model and Object-oriented data model. Relational, Network and Hierarchical data models and their comp arison. Basics of ER diagram, E-R and EER diagramming, Reducing E-R Diagrams to Tables, Generalization, and Aggregation.	09
II	Relational Model: Basic concepts. Attributes and domains. concept of integrity and referential constraints. Relational Query Languages (Relational Algebra and relational Calcu lus).Concepts of View and triggers. SQL: Structure of a SQL query, DDL and DML, SQL queries, Set Operations, Predicates and Joins, Set membership, Tuple variables, set comparison, ordering of tuples, aggregate functions, nested queries, Database modification using SQL.	09
III	Relational Database Design: Normalization, normal forms, Functional Dependencies, 1NF, 2NF, 3NF, Codd's rule, Notion o f a normalized relations, Multi-valued d ependency and Join dependency.	09
IV	Transaction management: Basic concept of a transaction, Transaction Model , Log Based Recovery, Buffer Management, Checkpoints, Shad ow Paging, Failure With Loss of non - volatile Storage, Stable Storage Implementation. Concurrency Control: Schedules, Testing of Serializability, Lock -based Protocols, Time Stamp Based Protocols, Validation Techniques, Multiple Granularity, Multiversion Schemes, Insert and Delete Operations.	09
V	Database systems Architecture: Centralized, client-server systems, Parallel systems, distributed systems, Web-enab led systems. New Applications: Need for data analysis, Decision support systems, Data Warehouse. On-line Analytical Processing(OLAP), Data minin g concepts, spatial and geographical d atabases, multi-media Databases.	09
	Total	45

Text Books:

1. Database System Concepts by Henry Korth , S. Sud arsan and Others, McGraw Hill
2. Fund amental of Database System – Elmasari , Navathe & Gupta, Pearson Education.
3. Database Systems by S. K. Singh, Pearson Education.

Reference Books:

1. Principles of Database Systems – Ullman, Golgotia Publications 1998.
2. Database System by Connolly, 3rd edition, Pearson Education.

IV-Semester B. E. (Computer Science & Engineering)

Course Code: CS404
Title of the Course: System Programming

Course Scheme				Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	01	--	04	04	03	10	10	80	100

Unit	Co ntents	Hours
I	Background Machine Structure, Assemblers, Loaders, Macro s, Compilers, Formal System, Operating system User Viewpoint : Functions, Operating System User Viewpoint: Batch Control Language, Operating System User Viewpoint: Facilities.	09
II	Machine Structure, Machine Language, And Assembly Language General Machine Structure, General Approach to a New Machine,	10
III	Assemblers General Design Procedure, Design of Assembler. Macro Language and the Macro processor Macro instructions, features of Macro Facility, Macro Instruction Arguments, Conditional Macro Expansion, Macro Calls within Macros, Macros Instructions Defining Macros, Implementation, Implementation of a restricted Facility A Two pass Algorithm, A Single pass Algorithm, Implementation of Macro Calls within Macros, Implementation within an Assembler.	9
IV	Loaders Loader schemes, "Compile and go" Loaders, general Loader scheme, absolute load ers, subroutine linkages, relocating load ers, direct linking loaders, other loader schemes - Binders, linking loaders; Overlays, Dynamic Binders, Design of and absolute Loaders, Design of a Direct-Linking loaders	09
V	Introduction to Device Drivers. Device drivers for Windo ws,Linux/Unix. Lexical Analysis in Compiler Design. Role of lexical analysis, recognition of tokens.	08
	Total	45

Text Books:

1. System Programming b y Leland Beck, Pearso n Ed.
2. Unix device drives by George Pajani, Pearson Ed.
3. Device Drives for Windows by Norton, Add Wesley
4. Assembly & Assemblers by Gorshine, Prentice Hall.

IV-Semester B. E. (Computer Science & Engineering)

Course Code: CS405
Title of the Course: Theory of Computation

Course Scheme				Evaluation Scheme (Theory)					
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	01	--	04	04	03	10	10	80	100

Unit	Co ntents	Hours
I	Introduction to formal proof – Additional forms of proof – Inductive proofs – . Introduction:alp habets,Strings and Language:automata and Grammars Finite Automata (FA) – Deterministic Finite Automata (DFA)– Non-deterministic Finite Automata (NFA) – Finite Automata with Ep silon transitions.	09
II	Regular expressions(RE)-Defination,FAand RE,REtoFA,FAto RE,algebraic laws for RE,application of Res,Regular grammars and FA,FA for regular grammar,Regular grammar fo r FA,Pumping Lemma..	09
III	Context-Free Grammar (CFG) – Parse Trees – Ambiguity in grammars and languages – Definition of the Pushdown automata – Languages of a Pushdown Automata – Equivalence of Pushdown automata and CFG, Deterministic Pushdown Automata.	09
IV	Normal forms for CFG – Pumping Lemma for CFL - Closure Properties of CFL – Turing Machines – Programming Techniques for TM.	09
V	A language that is not Recursively Enumerable (RE) – An undecidable problem that is RE – Undecidab le problems about Turing Machine – Post's Correspondence Problem - The classes P and NP.	09
Total		45

Text Book/s:

1. J.E.Hopcroft, R.Motwani and J.D Ullman, "Introduction to Automata Theory, Languages and Computations", Second Edition, Pearson Education, 2003.

Reference Book/s:

1. H.R.Lewis and C.H.Papadimitriou, "Elements of The theory of Computation", Second Edition, Pearson Education/PHI, 2003
2. J.Martin, "Introduction to Languages and the Theory of Comp utation", Third Edition, TMH, 2003.
3. Micheal Sipser, "Introductio n of the Theory and Co mputation", Thomson Brokecole, 1997.

IV-Semester B. E. (Computer Science & Engineering)

Course Code: CS406
Title of the Course: Digital Circuits & Fundamentals of Microprocessor

Course Scheme				Evaluation Scheme (Laboratory)			
Lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total
--	--	01	03	02	25	25	50

Practical: Stud ents should perform 10-12 Experiments from the given list.

List of Practicals:

1. Study of logic gates.
2. Study of Demorgan's Law & Kmap.
3. Experimenst on Mux and Demux.
4. Study of Decoder & Encoder.
5. Experiment on Adder & Substractor.
6. Experiment on Flip- Flop.
7. Any Six Experiments on 8085 programming.

IV-Semester B. E. (Computer Science & Engineering)

Course Code: CS407
Title of the Course: Database Management System

Course Scheme				Evaluation Scheme (Laboratory)			
Lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total
--	--	01	03	02	25	25	50

Practical: Stud ents should perform 10-12 Experiments from the given topics.

List of Practical's:

1. Data Definition, Table Creation, Constraints,
2. Insert, Select Commands, Update & Delete Commands.
4. Five experiments on PL/SQL queries.
3. Nested Queries & Join Queries
4. Views
5. High level programming language extensions (Control structures, Procedures and Function s)
6. Front end tools
7. Forms
8. Triggers
9. Menu Design
10. Reports.

Course Code: CS408
Title of the Course: Computer Workshop

Course Scheme				Evaluation Scheme (Laboratory)			
Lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total
--	--	01	02	02	25	25	50

Computer Workshop Lab:

1. Study of PC Hardware
2. Study of Windows Operating System
3. Study of DOS Commands.
4. Study of MS-Word,
5. Study of MS-Access.
6. Study of MS-Power Point

Introduction to Networking Accessories

7. Study of user connections
8. Study of communications channels
9. Study of network architecture (topologies)
10. Study of network typ es

Working under UNIX / LINUX Operating system

11. Structure : Unix Architecture
12. Features of UNIX operating system
13. Layered model of UNIX operating system(study o f kernel and shell)
14. General file commands and Directory commands

Text Books:

1. Computer Fundamentals – Pradeep K. Sinha
2. Introduction to Comp uter Science by ITL ESL, Pearson Education
3. Introduction to UNIX & Shell programming by M. G. Venkateshmurth y, Pearson Educatio n.
4. Unix Shell programming – Yeshwant Kanetkar