SNDT Women's University

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Syllabus B.Tech. in Computer Science & Technology

SNDT Women's University

1, Nathibai Thackersey Road,
Mumbai 400 020 Revised – 2014

(Applicable to students taking admission in and after 2015)

SNDT Women's University
1, Nathibai Thackersey Road, Mumbai 400020

Faculty Name: Technology
Course Name : B.Tech (COMPUTER SCIENCE & TECHNOLOGY)
SCHEME: Semester I

Code	Subjects	L	Cr	P / T	D	TP	TW	P/V	T
	Engineering Mathematics-I	4	4		2.5	75	25		100
	Applied Science-I	4	4		2.5	75	25		100
	Engineering Drawing	4	4		2.5	75	25		100
	Electrical Circuits	4	4		2.5	75	25		100
	Programming in C	4	4		2.5	75	25		100
	Applied Science Lab –I		2	2	2		25	25	50
	Electrical Circuits lab		2	2	2		25	25	50
	C Programming Lab		2	2	2		25	25	50
	Workshop-I		2	2	2		25	25	50
	Engineering Drawing Tutorial		2	2	2		25	25	50
Total		**20**	**30**	**10**	**22.5**	**375**	**250**	**125**	**750**

SCHEME: Semester II

Code	Subjects	L	Cr	P / T	D	TP	TW	P/V	T
	Engineering Mathematics-II	4	4		2.5	75	25		100
	Applied Science-II	4	4		2.5	75	25		100
	Electronic Devices	4	4		2.5	75	25		100
	Mechanics and Thermodynamics	4	4		2.5	75	25		100
	Communications Skills-I	4	4		2.5	75	25		100
	Applied Science Lab-II		2	2	2		25	25	50
	Electronic Devices Lab		2	2	2		25	25	50
	Introduction to Computational Techniques		2	2	2		25	25	50
	Workshop-II		2	2	2		25	25	50
	Mechanics and Thermodynamics Lab		2	2	2		25	25	50
Total		**20**	**30**	**10**	**22.5**	**375**	**250**	**125**	**750**

SCHEME: Semester III

Code	Subject	L	Cr	P/T	D	TP	TW	P/V	T
	Engineering Maths-III	4	4		2.5	75	25		100
	Computer Oriented Numerical Methods	4	4		2.5	75	25		100
	Digital Logic Circuits	4	4		2.5	75	25		100
	Discrete Structures & Combinatorics	4	4		2.5	75	25		100
	Data Structures & File Processing	4	4		2.5	75	25		100
	Principles of Communication Engineering	4	4		2.5	75	25		100
	Data Structures & File Processing lab		2	2	2		25	25	50
	Computer Oriented Numerical Methods Lab		2	2	2		25	25	50
	Logic circuit lab		2	2	2		25	25	50
	Principles of Communication Engineering Lab		**2**	**2**	**2**		**25**	**25**	50
	Total	**24**	**32**	**8**	**23**	**450**	**250**	**100**	**800**

SCHEME: Semester IV

Code	Subject	L	Cr	P/T	D	TP	TW	P/V	T
	Probability & Random Theory	4	4		2.5	75	25		100
	Analysis of Algorithm & Complexity	4	4		2.5	75	25		100
	Operating System	4	4		2.5	75	25		100
	Computer Architecture & Organization	4	4		2.5	75	25		100
	Database Management Systems	4	4		2.5	75	25		100
	Object Oriented Programming	4	4		2.5	75	25		100
	Analysis of algorithm and complexity lab		2	2	2		25	25	50
	Database Management Systems Lab		2	2	2		25	25	50
	Systems Software Lab		2	2	2		25	25	50
	Object Oriented Programing Lab		2	2	2		25	25	50
	Total	**24**	**32**	**8**	**23**	**450**	**250**	**100**	**800**

SCHEME: Semester V

Code	Subject	L	Cr	P/T	D	TP	TW	P/V	T
	Microprocessor & Micro controller	**4**	**4**		**2.5**	**75**	**25**		**100**
	Environmental Science	4	4		2.5	75	25		100
	Object Oriented Methodology & Design	4	4		2.5	75	25		100
	Computer Networks	**4**	**4**		**2.5**	**75**	**25**		**100**
	Discrete Time Signal Processing	4	4		2.5	75	25		100
	Communication Skills-II	4	4		2.5	75	25		100
	Microprocessor and Micro controller Lab		2	2	2		25	25	50
	Computer Networks Lab		**2**	**2**	**2**		**25**	**25**	**50**
	Discrete Time Signal Processing lab		2	2	2		25	25	50
	UML with Java		**2**	**2**	**2**		**25**	**25**	**50**
	Total	**24**	**32**	**8**	**23**	**450**	**250**	**100**	**800**

SCHEME: Semester VI

Code	Subject	L	Cr	P/T	D	TP	TW	P/V	T
	Data Mining and Data Warehousing	**4**	**4**		**2.5**	**75**	**25**		**100**
	Information and Cyber Secuirty	4	4		2.5	75	25		100
	Image processing	**4**	**4**		**2.5**	**75**	**25**		**100**
	Software Engineering	4	4		2.5	75	25		100
	Theoretical Computer Science	4	4		2.5	75	25		100
	Mobile Computing and Applications	4	4		2.5	75	25		100
	DMDW lab		**2**	**2**	**2**		**25**	**25**	**50**
	Information and Cyber Secuirty Lab		2	2	2		25	25	50
	Image Processing Lab		**2**	**2**	**2**		**25**	**25**	**50**
	Semister Project		**2**	**2**	**2**		**25**	**25**	**50**
	Total	**24**	**32**	**8**	**23**	**450**	**250**	**100**	**800**

SCHEME: Semester VII

Code	Subject	L	Cr	P/T	D	TP	TW	P/V	T
	Advanced Operating system and System Programing	4	4		2.5	75	25		100
	Advanced databases	4	4		2.5	75	25		100
	Deep Learning	4	4		2.5	75	25		100
	Compiler Construction	4	4		2.5	75	25		100
	Elective-I	4	4		2.5	75	25		100
	Advanced Databases Lab		2	2	2		25	25	50
	Deep Learning Lab		2	2	2		25	25	50
	Advanced OS and System Programing Lab		2	2	2		25	25	50
	Elective Lab-I		2	2	2		25	25	50
	Compiler Construction Lab		**2**	**2**	**2**		**25**	**25**	**50**
	Project (Stage I)		**2**	**2**	**2.5**		**25**	**25**	**50**
	Total	**20**	**32**	**12**	**25**	**375**	**275**	**300**	**800**

SCHEME: Semester VIII

Code	Subject	L	Cr	P/T	D	TP	TW	P/V	T
	Cloud Computing	4	4		2.5	75	25		100
	Elective-II	4	4		2.5	75	25		100
	Cloud Computing Lab		2	2	2		25	25	50
	Elective II Lab		2	2	2		25	25	50
	Project (Stage-II)		10	2	8		150	100	250
	Project (Stage- III)		10	2	8		150	100	250
	Total	**8**	**32**	**8**	**25**	**150**	**400**	**250**	**800**

Elective List of Computer Science & Technology

Sr. No	Elective-I	Elective-II
1	**Software Architecture**	**Software Project Management**
2	**Data Science and Bussiness Analytics**	**Big Data Analytics**
3	**Artificial Intelligence and Fuzzy Logic**	**Statistical Analysis tool**
4	**Mobile application development**	**Distributed Computing and Implementation**
5	**Internet of Things**	**Management for IT professional**

L Lectures/Week
Cr Credit
P/T Practical/Tutorial Hrs/Week
D Duration of Theory Exam
TP Theory Paper Marks
TW Term Work Marks
P/V Practical/Viva Marks
T Total

ENGINEERING MATHEMATICS – I			
Branch : ENC/EE/IT/CST	**Sem: I**	**Lectures: 4 Hr**	**Credit: 4**
Objective : On completion of the course, the student will have: ● **Confidence in using mathematics to analyze and solve problems both in academic and technical field**			

Sr. No.	Topic and Details	No. of Lectures assigned	Weightage in %
1	**Partial Differentiation** - Definition, differentiation of composite implicit functions, chain rule	4	20
	Euler's theorem on Homogeneous functions		
	Total differentiation of composite functions using partial differentiation.	6	
	Errors and approximation		
	Extreme values of functions of two variables, applications in engineering.		
2	**Matrices** 1– Types of Matrices. Adjoint of a matrix, Inverse of a matrix by using Adjoint	10	20
	Elementary transformations. Rank of a matrix. Reduction to a normal form.		
	Partitioning of matrices, Orthogonal Matrices		
3	**Matrices 2** - System of homogeneous and non – homogeneous equations, their consistency and solutions	10	20
	Linear dependence and independence of rows and columns of a matrix area in a real field		
	Eigen values and Eigen vectors. Cayley Hamilton theorem, Minimal Polynomial – Derogatory and non derogatory matrices.		
4	**Complex Numbers** -Definition of complex numbers Cartesian, Polar and exponential form. Algebra of Complex numbers De–Moiver's theorem and roots of complex numbers.	6	12
5	**Hyperbolic functions –** Hyperbolic Functions, Separation real and imaginary parts of circular & Hyperbolic functions.	4	8
6	Logarithm of complex numbers. Logarithm of complex numbers.	2	4
7	**Differential Calculus** - Successive differentiation, Leibnitz's theorem (without proof) and applications in engg. field Indeterminate forms .L'Hospital's rule	5	10
8	**Expansion of functions (real variables) Taylor's and Maclaurin's series**	3	6
	Total	50	100

Reference Books:

1. P. N. Wartikar & J. N. Wartikar, "Elements of Applied Mathematics", 1st edition, Pune Vidyarthi Griha Prakashan, 1995.
2. B. S. Grewal, "Higher Engineering Mathematics", 34th edition, Khanna Publishers,

1998.
3. Shanti Narayan, “Matrices”, 9th Edition, S. Chand, 1997.
4. Shanti Narayan, “Differential Calculus”, 14th Edition, S. Chand, 1996.
5. A. R. Vashishtha, “Matrices”, 27th Edition, Krishna Prakashan Mesdia (P) Ltd; 1996.
6. Edwin Kreyszig, “Advance Engg. Mathematics”, 5th Edition, New Age International (P) Ltd; 1997.

APPLIED SCIENCE – I			
Branch : ENC/EE/IT/CST	**Sem: I**	**Lectures: 4 Hr**	**Credit: 4**

Objective : The students will acquire knowledge of
Different types diffraction and interference and perform experiments on the same.
2. Prisms and gratings, sonic displays and sonogram, sound and acoustics.
3. Lasers, optical fibres, hologram and concept of photocell, electron diffraction and modern physics which is the basis of electronics.
4. Principles underlying various methods of water analysis and treatment.
5. photophysical and chemical process taking place in our surroundings and applications of spectroscopy in engineering.
6. Materials used in different fields of engineering and their composition, construction and applications such as batteries, electrodes, etc

Sr. No.	Topic and Details	No. of Lectures assigned	Weightage in %
1	**Interference and diffraction of Light:** Interference due to division of wavefront and division of amplitude, Young’s double slit expt., Superposition, Theory of Biprism, Interference from parallel thin films, wedge shaped films, Newton rings, Michelson interferometer. Fresnel Diffraction, Diffraction at a straight edge, Fraunhoffer diffraction, Diffraction grating, dispersive power of Grating, resolving power of prism and grating.	6	12
2	**Polarization and ultrasonics:** Introduction, production of plane polarized light by different methods, Brewster and Malus Laws. Double refraction, Quarter & half wave plate, Nicol prism, specific rotation, Laurent’s half shade polarimeter. Ramdson & Huygen Eye pieces, Electron microscope **Ultrasonics:** Classification of Sound- decibel- Weber–Fechner law – Sabine’s formula- derivation using growth and decay method – Absorption Coefficient and its determination –factors affecting acoustics of buildings and their remedies. Production of ultrasonics by magnetostriction and piezoelectric methods - acoustic grating –Non Destructive Testing – pulse echo system through transmission and reflection modes - A,B and C – scan displays, Medical applications - Sonogram	9	18

3	**Fiber Optics and Holography:** Introduction, temporal and spatial coherence, principle of Laser, stimulated and spontaneous emission, Einstein's Coefficients, He-Ne Laser, Ruby Laser, Application of Lasers.Fundamental ideas about optical fiber, Types of fibers, Acceptance angle and cone, Numerical aperture, Propagation mechanism and communication in optical fiber. Attenuation, Signal loss in optical fiber and dispersion. Basic Principle of Holography, Construction and reconstruction of Image on hologram and applications of holography.	5	10
4	**Quantum mechanics:** Introduction, Wave particle duality, de Broglie wavelength; experimental verification of de Broglie theory; properties of matter waves; Wave function, Physical interpretation of wave function; Heisenberg's uncertainty principle; Electron diffraction experiment and Gama ray microscope experiment; Applications of uncertainty principle; Schrodinger's time dependent wave equation, time independent wave equation, - Motion of free particle, Physical significance of wave function – Particle in a one dimensional box, Compton's effect.	7	12
5	**Water and its treatment:** Impurities in water, Hardness of water, types of hardness. Determination of Hardness of water by EDTA method and problems. Softening of water by Hot and cold lime soda method and problems. Zeolite process and problems. Ion Exchange process • **Drinking water or Municipal water,** Treatments removal of microorganisms, by adding Bleaching powder, Disinfection by Ozone, Electrodialysis and Reverse osmosis, ultra filtration. **BOD, COD** (def,& significance), sewage treatments activated sludge process, numerical problems related to COD	5	10
6	**Photochemistry and analytical methods:** Laws of Photochemistry, Photo physical processes, Chemiluminescence and Photo-sensitization, Fluorescence and Phosphorescence, Photochemical reactions: Photolysis of HI, Photochemical reaction between H_2 and Br_2, Photosensitized reactions and photocleavage of water, Quantum efficiency. Elementary ideas and simple applications of U.V., visible, infra-red, microwave and HNMR spectral techniques.	6	10
7	**Lubricants:** Introduction, Definition, Mechanism of Lubrication, Classification of lubricants, Solid lubricants (graphite & Molybdenum disulphide), Semisolid lubricants (greases Na base , Li base , Ca base) , Liquid lubricants (blended oils). Properties of lubricants, definition and significance of viscosity ,viscosity index, flash and fire points, cloud and pour points, oiliness, Emulsification, Acid value and problems, Saponification value and problems.	4	10

8	**Chemistry in the Service of Society** (Illustrative Examples and application Only) Building and Construction Materials(1), Health and Medicine(2), Materials for Electronics(1), Material for Transport Technology(1), Materials for Energy Devices(2), Environment-Pollution Monitoring and Control(2) and Catalysis and catalyst Development(1).	4	8
	Total	50	100

Text /Reference Books

1. A Textbook of Engineering physics - Avadhanulu & Kshirsagar, S.Chand
2. Modern Engineering Physics – Vasudeva, S.Chand
3. A textbook of Mechanics: J. C. Upadhyay
4. Engineering Chemistry – Jain & Jain, Dhanpat Rai
5. Engineering Chemistry – Dara & Dara, S Chand
6. A Text Book of Engineering Chemistry – Shashi Chawla (Dhanpat Rai)

ENGINEERING DRAWING			
Branch : ENC/EE/IT/CST	**Sem: I**	**Lectures: 4 Hr**	**Credit: 4**

Objective : After studying this course:-

- **Students should be able to visualize the objects.**
- **They should be able to understand and read drawing.**
- **They should be able to present the same.**

Sr. No.	**Topic and Details**	**No. of Lectures assigned**	**Weightage in %**
1	**Principles of Drawing** Drawing Instruments and their uses Standard sizes of drawing sheets (ISO-A series) Letters and numbers (single stroke vertical) Convention of lines and their applications. Scale (reduced, enlarged & full size) plain scale and diagonal scale. Dimensioning technique types and applications of chain, parallel and coordinate dimensioning. Geometrical constructions.	6	10

2	**Engineering curves** Conic Section To draw an ellipse by Arcs of circle method & Concentric circles method. To draw a parabola by Directrix and focus method &Rectangle method To draw a hyperbola by Transverse Axis and focus method & rectangular hyperbola. Engineering curves To draw involutes of circle & pentagon, To draw a cycloid, epicycloids, hypocycloid	8	20
3	**Orthographic projections** Introduction to Orthographic projections. Projection of points and lines Conversion of pictorial view into Orthographic Views (First Angle Projection Method Only) – elevation, plan and end view	12	30
4	**Projection of Planes**: Triangular, Square, Rectangular, Pentagonal, Hexagonal and Circular planes inclined to either HP or VP only.	6	10
5	**Projection of Solids: -** (Prism, Pyramid, Cylinder, Cone only) Solid projection with the axis inclined to HP and VP.	8	10
6	**Isometric projections** Isometric scale, comparison of true scale with isometric scale. Conversion of orthographic views into isometric View / projection.	10	20
	Total	50	100

Text /Reference Books

1. Narayana, K.L. and Kannaiah, P "Engineering Graphics" Tata Mcgraw Hill
2. Bhatt, N.D. "Elementary Engineering Drawing" Charotar book stall, Anand 1998
3. Lakshminaarayanan, V and Vaish Wanar, R.S. "Engineering Graphics" Jain Brothers, New Delhi
4. Chandra, A.M. and Chandra Satish, "Engineering Graphics" Narosa,
5. Venugopal K. : Engineering Drawing & Graphics + Auto CAD, New Age International
6. Venugopal K. : Engineering Graphics, New Age International

ELECTRICAL CIRCUITS			
Branch : ENC/EE/IT/CST	**Sem: I**	**Lectures: 4 Hr**	**Credit: 4**

Objective :The learners will be able to

- **Acquire knowledge about basic components of electrical circuits**
- **Understand working of different electrical circuits**
- **Analyze AC circuits**
- **Analyze DC circuits**

Sr. No	Topic and Details	No. of Lectures assigned	Weightage in %
1	**Classification of devices of electrical circuits:** Basic components of the circuit model a) Resistance b) Inductance c) Capacitance, Parameters and its representations (sign conventions and graphical representations.	4	8
2	**Electrical Sources** : Different types of Energy Sources ,Ideal sources a)current b)voltage, Dependent and independent sources, transformation of energy sources	4	8
3	**Classification of Elements** : Criteria for classification, a) Lumped /Distributed b) Linear/Non linear elements c) Passive/Active elements d) Bilateral/non-bilateral elements e) Time variant/Time invariant elements	4	8
4	**Basic circuit Analysis** : Nodal analysis with voltage source, nodal analysis with current source, Mesh analysis using Matrix and Loop method a) Super mesh b) super node	6	12
5	**Transient Analysis**: Introduction, Differential equation, order of the circuit, network equation, initial and final conditions of basic elements, Problems based on the above concepts concentrating on RL,RC,LC,RLC circuits	4	8
6	**Network Theorems** : Superposition, Thevenin's theorem, Norton's theorem, Substitution, Reciprocity, Maximum power transfer theorem, Tellegen's theorem, star-delta transformation	8	16
7	**Introduction to A.C. Circuits/Steady state analysis:** Introduction & alternating currents and voltages a) sine wave, angular relation, phase of a sine wave, sine wave equation b) concepts of lead/lag c)voltage and current values of a sine wave, Instantaneous value, peak value, R.M.S. value, average value .form factor Phase relation:-a)in a pure resistor b)pure inductor c)pure capacitor d)AC thru. RL in series e)AC thru. RC in series f) series RLC Series resonance, Parallel branched A.C. circuit: - a) RLC b) parallel resonance. Power in A.C. circuits: a) pure resistor, capacitor and inductor circuits b) Concepts of power factors, application of power factor, phase diagrams.	8	16
8	**Transformers** : Types of transformers, testing of transformers, Ideal transformers	8	16
		50	100

References :

1. Murthy & Kamath,"Basic Circuit Analysis",2nd Edition,JaicoPublishing Home.
2. B.L.Theraja,"Electrical Engg. &Technology",2nd Edition ,S.chand &Co.
3. Van Valkenberg,"Network analysis",3rd Edition,Prentice Hall of India.
4. V.N.Mittal,"Basic Electrical Engg.",7th reprint

PROGRAMMING IN C			
Branch : ENC/EE/IT/CST	**Sem: I**	**Lectures: 4 Hr**	**Credit: 4**

Objective:

- This course is designed to provide a comprehensive study of the C programming language.
- It stresses the strengths of C, which provide students with the means of writing efficient, maintainable, and portable code.
- The nature of C language is emphasized in the wide variety of examples and applications.
- To learn and acquire art of computer programming.
- To know about some popular programming languages and how to choose Programming language for solving a problem

Sr. No	Topic and Details	No. of Lectures assigned	Weightage in %
1	**Introduction:** Flowcharts, algorithms, importance of C, Basic structure of C programs.	02	04
2	**Basic notation:** Constants such as integer, real, character, string, and backslash character, variables, declaration of variables, Data types such as fundamental, user defined, and derived, user defined type declaration, assignment statement, defining symbolic constants, Operators, different types of operators such as arithmetic, relational, logical, assignment, increment, decrement, conditional, bitwise, and special, Expression, precedence of arithmetic operator, computational problems, type conversions in expression, different rules of conversion, casting a value, operator precedence and associativity.	06	12
3	**Input – Output Functions:** different format specifiers, formatted input function scanf (), other input functions such as getchar (), getch(), getche(), gets(), formatted output function printf(), other output functions such as putchar (), puts() different character test functions.	06	12
4	**Decision Making and Branching:** Simple if statement, the if-else statement, Nested if … else statements, the else … if ladder, the switch statement, goto statement, continue statement, break statement.	04	08
5	**Loop:** loops, different types of loop such as entry control, and exit control, the while statement, the do statement, the for statement, nested for loop jumps in loops.	04	08
6	**Arrays:** Definition, one–dimensional array, general form of array declaration, initialization of array, two–dimensional array, initializing two–dimensional array, multidimensional array, applications of array.	04	08
7	**Strings:** Reading a string, writing a string, different string handling functions such as strcat(), strcmp(), strcpy(), and strlen().	04	08

8	**Functions:** Different types of functions such as library and user defined, difference between them, need of function, advantages of functions, declaration of a function, function call, definition of a function, return values and their types, category of a function, void function, nesting of functions, recursion, function with array, scope of a variable, internal and external variable, storage classes such as automatic, external, static, register.	06	12
9	**Structures:** Definition, various ways of declaration of structure variable, structure initialization, arrays of structures, arrays within structure, structures within structures, structures and functions, unions, bit fields.	04	08
10	**Pointers:** Why pointers, accessing the address of a variable, pointer declaration, pointer initialization, accessing a variable through its pointer, pointer to pointer, pointer expressions, passing address to a function(call by reference), function returning pointers, pointers and arrays, passing array elements to a function, pointer and two dimensional array, pointer and three dimensional array, arrays of pointers, pointers and structure. Link List: dynamic memory allocation, allocation of memory using malloc(), and calloc(), releasing the used space by using free() function, linked list, advantages and disadvantages of linked list, basic operations on linked list such as creation, traversing, counting the number of nodes in a list, printing a list, insertion, deletion, searching, concatenation of two list.	06	12
	File Management: Defining and opening a file, closing a file, Input/Output operations on files, structure storage in file.	4	08
		50	100

Text Book :

1. E.Balgurusamy, “Programming in ANSI C”, 2nd edition, Tata McGraw Hill.

Reference Books :

1. Yashavant Kanetkar, “Let Us C”, 3rd edition, BPB Publications.
2. P.B. Mahapatra, “Thinking in C”, Wheeler Publishing.
3. Yashavant Kanetkar, “Understanding Pointers in C”, 2nd edition, BPB Publication

APPLIED SCIENCE LAB I			
Branch : ENC/EE/IT/CST	**Sem: I**	**Practical Hrs: 2Hr**	**Credit: 2**

Sr. No	**Detail Syllabus**		
1	Objective To understand the concept of fiber optics, junction diode, lasers and study application of ultrasonics. To study understand, atomic structure, ionization, spectroscopy, Electronegativity		

ELECTRICAL CIRCUITS LAB			
Branch : ENC/EE/IT/CST	**Sem: I**	**Practical Hrs: 2Hr**	**Credit: 2**

Sr. No	**Detail Syllabus**		
1	Objective:-Students should understand the concepts of network theorems and its verifications. Practical's should consist of the verification of the various theorems applicable to the circuit, verification of Kirchhoff's laws, charging and discharging of the capacitors, testing of the transformers. Sources of energy, Power calculation/estimation of a particular setup, Stabilizer		

C PROGRAMMING LAB			
Branch : ENC/EE/IT/CST	**Sem: I**	**Practical Hrs: 2Hr**	**Credit: 2**

Sr. No	**Detail Syllabus**		
1	Introduction to Linux operating system. Problem solving techniques, flowchart Drawing, Algorithm development. Use of these techniques for solving problems using C language.		

WORKSHOP-I			
Branch : ENC/EE/IT/CST	**Sem: I**	**Practical Hrs: 2Hr**	**Credit: 2**

Sr. No	**Detail Syllabus**		
1	Workshop consist of the jobs to be done in Mechanical Engineering		

ENGINEERING DRAWING TUTORIAL			
Branch : ENC/EE/IT/CST	Sem: I	Practical Hrs: 2Hr	Credit: 2

Sr. No	**Detail Syllabus**		

1	**1. Tutorial :** **2. Sheet-1**: engineering curves (o4 problems) **3. Sheet -2:** Orthographic projection.(2 problems). **4. Sheet -3**: Orthographic projection. (2 problems). **5. Sheet- 4**: Isometric Projections (2 problems). 6. **One A-3 size sketch book consisting of:-** 7. 1) 4 problems each from Projection of Curves, Lines, Planes and Solids. 8. 2) 4 problems from orthographic projection. 9. 3) 4 problems each from Isometric projections.		

ENGINEERING MATHEMATICS – II			
Branch : ENC/EE/IT/CST	**Sem: II**	**Lectures: 4 Hr**	**Credit: 4**
Objective : **Confidence in using mathematics to analyze and solve problems both in academic and technical field**			

Sr. No	**Topic and Details**	**No. of Lectures assigned**	**Weightage in %**
1	**Differential equations** - Differential equation of 1st order and 1st degree, Linear differential equations, Bernoulli's equations. Exact differential equations Integrating factors.	5	10
2	**Differential equations** - Differential equations of higher order. (Linear equations) Differential operator D, Solutions of f(D)y=X Linear differential equations with constant and variable coefficients. (Cauchy Linear Equations and Legendre's Linear equations) Applications (Where the differential equation is given). inEngg. Field (first order and higher order)	10	20
3	Vector Algebra And Vector Calculus – Product of three or more vectors, LaGrange's Identity **Vector Calculus** Vector differentiation – rules and theorems on vector differentiation Scalar point functions and vector point functions, gradient, divergent and curl and applications Solenoid and irrotational fields, scalar potential of irrotational vectors, Laplace's equations in harmonic function - applications in engineering.	10	20
4	**Differentiation Under Integral Sign** – Theorems on differentiation under integral sign (without proof). Application in evaluating integrals	4	8

5	Integral Calculus – Curve tracing (Standard curves) Rectification (Arc length). Double Integrals –Evaluation, Change of order of integration, double integration of polar coordinates, Application of single and double integration – mass and volume, triple integration, Applications	11	22
6	Error Functions –Error functions and its properties, problems based on it, Beta And Gamma Functions – beta and gamma functions, properties, relation between beta & gamma functions,	2	4
8	Relation between beta & gamma functions, Duplication formula and problems based on it, applications in engineering. Duplication formula and problems based on it, applications in engineering.	6	12

Text book:

1. B. S. Grewal, Higher Engineering Mathematics, 34th edition, Khanna Publishers, 1998. (Rs.170).

References:

1. P.N.Wartikar & J. N. Wartikar, Elements of Applied Mathematics, 1st edition, Pune Vidyarthi Griha Prakashan, 1995. (Rs. 110/-)
2. Shanti Narayan, Differential Calculus, 14th Edition, S. Chand, 1996. (Rs. 60/-)
3. Murry Spiega, Vector Analysi
4. Edwin Kreyszig, Advance Engg. Mathematics, 5th Edition, New Age International (P) Ltd; 1997. (Rs.295/-)

APPLIED SCIENCE – II			
Branch : ENC/EE/IT/CST	**Sem: II**	**Lectures: 4 Hr**	**Credit: 4**

Objective :

- **To understand the crystal structure of solids, conductors, semiconductors, magnetic and superconductor materials, properties of these materials which are responsible for their applications, theories to understand their behavior etc.**
- **To study the polymers, alloys, various engineered materials and nanomaterials and their applications in various fields.**
- **The topics on motion and mechanics are useful in understanding concepts of motion, velocity, impulse and applications such as recoil of gun, motion of lift, potential, kinetic energy, torque etc.**
- **Approach to demonstrate the working of electrodes, their behavior and differentiate various types of corrosion, gain knowledge on control measures associated with corrosion.**
- **To gain knowledge about different types of fuels and understand the terminologies involved in the field of fuel and combustion.**

Sr. No	**Topic and Details**	**No. of Lectures assigned**	**Weightage in %**

1	Water:- Impurities in water, hardness of water, temporary and permanent hardness, Alkaline and non alkaline hardness, units of hardness, estimation of hardness, estimation of alkalinity, softening of water various methods, calculation of water softening reagents, boiler problems, priming and foaming, sludge and scale formation, corrosion and caustic embitterment. Prevention of above problem.	5	10
2	Polymers:-Nomenclature, classification, types of polymerization, classification of plastic, synthesis of thermosetting and thermo softening plastic, fabrication of plastic, natural rubber its properties and uses.	5	10
3	Fuels:- Merits and Demerits, determination of calorific value by bomb calorimeter, Dulong Pet's formula, analysis of coal, manufacture of coke, petroleum refining, fractionation, cracing, synthetic petro, purification of gasoline, knocking, octane, celane number and antiknocking.	5	10
4	Instrumental methods:- Chromatography:- types depending on nature of mobile phase and stationary phase, solid liquid , liquid-liquid c, gas-liquid , gas-solid , Ion-Exchange, thin layer, paper, principle and working of all chromatography.	5	10
5	Corrosion:-Electrochemical theory of corrosion, factors affecting corrosion, different types of corrosion, prevention of corrosion, cathodic and anodic protection, methods of application on metallic coating	5	10
6	Crystal structure:-Introduction, atomic arrangement in crystals, unit cells, primitive and non-premitive, bravais lattice, cube system, nearest neighbor distance , co-ordination number atomic packing fraction/ efficiency, Diamond cubic crystal for various materials such as dielectric materials, Ferro electric materials, piezoelectric materials, effects of dielectrics materials effects of dielectrics, insulating materials and their requirements	6	12
7	Motion charge particles:-Motion of charges particles, parallel to field, perpendicular to the field, electrostatic deflection sensitivity, motion of charged particles in magnetic field, intensive field, magnetic static deflection sensitivity, Thomson's method to find EM field, Electrostatic focusing, magneto static focusing, Applications such as CRO, cyclotron wave optics	6	12
8	Interference :- Interference of eight waves, methods of obtaining interference patterns, interference in thin films, colors exhibited by thin films, types of fringes, interference at a wedge, measurement of small dimension by interference method, Newton's ring, application of reflected system. Diffraction, types of diffraction , introduction to fennels diffraction, Fraun hoffers diffraction, plane diffraction, plane diffraction grating, resolving power Application	7	14
9	Magnetic properties and materials:- Introduction , magnetic permeability, magnetization, di-magnetization, para-magnetism, ferro- magnetism, hysterisis effect hyterisis tool, domain theory, ferrite	6	12
		50	100

Text Books:

1. Jain and Jain, " Engineering Chemisty" 11th Edition, Dhanpat Rai and Sons, 1998.
2. S. S. Dara, " Engineering Chemistry" 6th Edition, S. Chand Company, 1997.

Reference Books:

1. R. K. Gaur and S. L. Gupta, "Engineering Physics" 7th Edition, Dhanpat Rai Publications, 1997.
2. B. L. Theraja, "Modern Physics", 5th Edition, S. Chand and Company Ltd, 1997.
I. Wilson and J.F. B Hawkes, " Optoelectronics- An Introduction", 2nd Edition , PHI, 1999.

ELECTRONIC DEVICES			
Branch : ENC/EE/IT/CST	**Sem: II**	**Lectures: 4 Hr**	**Credit: 4**

Objective : The learners will be able to

- **Acquire knowledge about physics of basic semiconductor devices**
- **Understand different electronic devices**
- **Analyze characteristic of different semiconductor devices**
- **Knowledge about advanced semiconductor devices and their applications**

Sr. No	Topic and Details	No. of Lectures assigned	Weightage in %
1	Introduction to Semiconductor: mobility and conductivity, intrinsic semiconductor, donor and acceptor impurities, Fermi level, Drift currents and Diffusion currents, Energy Band Diagrams	2	4
2	Semiconductor Diodes:- PN junction, Depletion layer, characteristics, Piece-wise linear characteristics & equivalent circuits, Diode resistance, Capacitance, switching time, Small signal models of diodes	4	8
3	Varactor diode: Working and characteristics Tunnel diode: V-I Characteristics and working TED (Transferred Electron Device): Basic concept, Negative differential resistance IMPATT: Static and Dynamic Characteristics	4	8
4	Diode Application: Diode clipping, Clamping types of biasing in detail, voltage multiplying circuits.	8	16
5	Regulators:- Rectifiers (half, full, center tapped and bridge) with its detail analysis, Filters (C,L,LC,CLC) with its analysis in detail, Zener diodes and its regulation, regulators IC 78XX and 79XX	10	20
6	BJT:- Construction and types, characteristics, BJT as a amplifier, CB, CE, CC Configuration ,Biasing Types, dc analysis and stability factor, DC load line and Ac load line	8	16
7	JFET:- Construction and working with its characteristics FET as a amplifier, CS, CD, CG, configuration Biasing Types, Low frequency small signal ac equivalent circuit of JFET amplifiers	8	16

8	Structure and physical operation of Enhancement type MOSFET. The Depletion Type MOSFET ,V-I and CV characteristics, Channel length modulation, Short Channel effects, MOSFET Model MESFET: Device structure, principle of operation, V-I characteristics, High frequency performance	6	12
		50	100

Text Books:

1. Boylstead and Nshelasky, "Electronic Devices and Circuits" 11th Edition, PHP, 2013.
2. Milman Grabel, "Microelectronics" 12th Edition, McGraw Hill.

Reference Books:

1. Bhargav Gupta, "Basic Electronics and Linear Circuits".
2. Bell, David A. "Electronic Devices & Circuits" Oxford, Fifth Edition.
1. S Slivahanan and N. Suresh Kumar, "Electronic Devices and Circuits", McGraw Hill, Third Edition

INTRODUCTION TO MECHANICS AND THERMODYNAMICS			
Branch : ENC/EE/IT/CST	**Sem: II**	**Lectures: 4 Hr**	**Credit: 4**
Objective :			

Sr. No	Topic and Details	No. of Lectures assigned	Weightage in %
1	**MECHANICS-** Force System– Fundamental concepts, force, characteristic of a force, resolution of a force, resultant of coplanar concurrent force system, method of resolution and composition, resultant of non-coplanar concurrent force system, principle of moments, resultant of coplanar parallel force system, Couple.	5	10
2	EQUILLIBRIUM – Free body diagram (fbd), conditions of equilibrium for a concurrent coplanar force system, Lami's theorem, support reactions.	5	10
3	CENTRE OF GRAVITY – Methods to determine center of gravity, problems based on plane laminae, problems on solids.	5	10
4	ANALYSIS OF TRUSSES - Types of supports, method of joints, method of sections, comparison between method of joints and method of sections	5	10
5	FRICTION – Introduction, types of friction, concept of dry friction, types of friction problems, laws of friction, problems	5	10
6	**ENGINEERING THERMODYNAMICS** Introduction and Basic concepts, Thermodynamics and its laws, classification of system, macroscopic and microscopic view of a system, Thermodynamic process, Quasi static process, Pressure, Temperature, Volume, Numericals.	6	12
7	I-law of Thermodynamics- statement, Work , Energy, Heat, Law of conservation of Energy, Heat & Work, path function, specific heats, Numericals, Equation of steady flow, Non flow processes, Limitations of I-law of Thermodynamics, PMM-I	6	12

8	II-law of Thermodynamics, statement, Kelvin Planck Statement, Clausius Statement, PMM-II , Heat engine, C.O.P., Refrigerator, Numerical, Thermal Efficiency, Carnot cycle, Limitations of carnot cycle, Numerical on Carnot cycle	6	12
9	Heat Transfer – basics, modes of heat transfer, Newton's Law of cooling, Fourier's law of heat conduction , Numerical, Thermal conductivity, Heat Transfer by conduction, Heat Transfer by convection and radiation, Numerical, Heat Transfer through composite slab, Radial Heat Transfer through a thick cylinder, Numerical, Heat sink , basic concepts, applications.	7	14
		50	100

Text Books:

1."Engineering Mechanics" by R.S.Khurmi , S.Chand publications.

2."Engineering Mechanics" by Ramamruthum.

Reference Books:

1. Thermal Engineering by Ballaney.
2. Engineering Thermodynamics by P.K.Nag

COMMUNICATION SKILLS – I			
Branch : ENC/EE/IT/CST	**Sem: II**	**Lectures: 4 Hr**	**Credit: 4**

Objective : The learners will be able to

- **Understand the various genres of communication**
- **Understand communicative behavior**
- **Build capacities for self criticism and think of professional and linguistic growth**
- **Use LSRW skills for linguistic competence**

Sr. No	**Topic and Details**	**No. of Lectures assigned**	**Weightage in %**
1	**Communication:** Concept and meaning of communication, barriers to communication, methods of communication, techniques to improve communication.	4	20
2	**Summarization :** Techniques to summarize a given passage to test comprehension and ability to present written matter in a brief and concise manner.	2 – 3	10
3	**Comprehension and vocabulary:** Technical, scientific or general text with multiple-choice questions to test analytical skills, comprehension and expression.	2 - 3	10
4	**Vocabulary and grammar:** Synonyms, antonyms, one-word substitution, word formation, confused set of words, homophones, homonyms, misspelt words, spellings, You attitude.	9 - 10	20
5	**Basic official correspondence :** Principles of Correspondence, language and style in official letters, formats of letters, (complete-block, modified-block, semi-block) types of letters, (enquiry, replies to enquiries, claims and adjustments, application letters with bio-data)	3 - 4	20
6	**Technical writing :** Framing definitions, classification and description of objects, explanation of a process, writing instructions.	6-8	**20**

7	**Oral Communication:** Topics to be assigned for speech practice fluency and non-verbal communication.	4	20
8	**Group Processes:** Importance of group processes in an organisation. Types of communication in a business organisation, meetings and documentation of meetings.	2 – 3	10
		50	100

Text book:

1. Business correspondence & report writing – R.C.Sharma & Krishna Mohan, Tata McGraw Hill.
2. Business Communication (Revised Edition), Rai & Rai, Himalaya Publishing House. Lesiker & Petit: Business Communication – McGraw Hill Publications.

Reference Books:

1. Modern Business Correspondence, McCommas & Satterwhite, Sixth Edition, McGraw Hill Publications.
2. English for Engineers & Technologists: A skills approach. (Books 1 and 2) Course Authors (Humanities and Social Sciences Division, Anna University, Madras. Orient Longman. (Mainly for comprehension.
3. Technical Writing, Eisenberg, Anne, McGraw Hill Publications. (Teacher reference only)
4. Technical Writing & Professional Communication, Huckins, Thomas, McGraw Hill publications.
5. Written Communication, Freeman, Sarah, Orient Longman.

APPLIED SCIENCE LAB II			
Branch : ENC/EE/IT/CST	**Sem: II**	**Practical Hrs: 2Hr**	**Credit: 2**

Sr. No	**Detail Syllabus**		
1	Determination of hardness of water, estimation of copper in brass, iron, manganese. Determination flash and fire point. Study of various Lasers, characteristics of photo electric devices		

ELECTRONICS DEVICES LAB			
Branch : ENC/EE/IT/CST	**Sem: II**	**Practical Hrs: 2Hr**	**Credit: 2**

Sr. No	**Detail Syllabus**		
1	Study and identification of electronics devices and components, Basic construction and use of common measuring Instruments, Characteristics of the various electronics two terminal and three terminal devices, study of half wave and full wave rectifier using diodes, filters, application of diode clippers, clampers. BJT characteristic, BJT as amplifier characteristics of transistors FET		

INTRODUCTION TO COMPUTATIONAL TECHNIQUES			
Branch : ENC/EE/IT/CST	**Sem: II**	**Practical Hrs: 2Hr**	**Credit: 2**

Sr. No	Detail Syllabus		
1	Practical based on use of general Matlab/Octave Commands. Learn to add, multiply, exponentiate numbers of 'trig' functions and control screen output with 'format'.		
2	Practical based on arrays, vectors that is learn to create, add and multiply vectors ,use of 'sin' and 'sqrt' functions with vector arguments and use 'line space' to create a vector.		
3	Practical based on creating and executing a function file.		
4	Practical based on matrix and array manipulations.		
5	Practical based on plotting simple graphs(2D and 3D)		
6	Practical based on the flow control statements such as 'for' and 'while' loops, 'if_else' construct and a 'switch case otherwise' construct.		
7	Practical based on study of 'structure'.		
8	Practical based on different application such as: 1. Solving linear system 2. Finding Eigen values and eigenvectors. 3. Straight-line fitting. 4. Calculating roots of polynomials. Note: Practical examination will be based on "Exercises" mentioned in the text book.		

Text Books

1. Rudra Pratap, "Getting started with MATLAB: A Quick Introduction for Scientists and Engineers", OXFORD UNIVERSITY PRESS.

Reference Books:

1. Stephen J. Chapman, "MATLAB Programming for Engineers", Third Edition,CENGAGE Learning Publication, 2004. (Rs. 353).

WORKSHOP -II			
Branch : ENC/EE/IT/CST	**Sem: II**	**Practical Hrs: 2Hr**	**Credit: 2**

MECHANICS & THERMODYNAMICS LAB			
Branch : ENC/EE/IT/CST	**Sem: II**	**Practical Hrs: 2Hr**	**Credit: 2**

ENGINEERING MATHEMATICS - III			
Branch : ENC/EE/IT/CST	**Sem: III**	**Lectures: 4 Hr**	**Credit: 4**

Objective : On completion of the course, the student will have:

- **Good Knowledge of Series and Transforms**
- **Confidence in using mathematics to analyze and solve problems both in academic and technical field**
- **Skill in Formulating and analyzing mathematical problems**

Sr. No	Topic and Details	No. of Lectures assigned	Weightage in %
1	Laplace Transform - introduction Definition, properties with regards to summation, differentiation and integration. Laplace Transform of standard functions. Theorems on Laplace Transform Shifting properties. Laplace Transform of functions of the form tf(t), f(t) /t.	7	14
2	**Inverse Laplace Transform** : Evaluation of inverse Laplace transform (by standard formulae and partial fraction method) Laplace Transform of periodic functions, step functions, Dirac Delta functions Convolution integral and its application in finding the inverse Laplace Transform. Solving differential equation by Laplace Transform.	8	16
3	Fourier series – definition and conditions for its existence, Evaluation of Fourier coefficients. Even and Odd functions. Evaluation of Fourier series of even and odd functions. Half range sine and cosine series, Parseval's theorem and its relations. Complex form of Fourier series, Introduction to Fourier Integrals.	5	10
4	**Fourier Integralsand Transforms** : Derivation of Fourier Integrals, Fourier transform, Sine transform and cosine transform – properties and its elementary applications. Parseval's identity and evaluation of definite integrals by using it. Orthogonal functions, expression of function in a series of orthogonal functions.	8	16
5	Complex number – representation in Cartesian, Polar and Exponential forms. De – Moiver's Theorem and its application to complex numbers. Hyperbolic functions.	7	14

6	Complex variables – Continuity and Differentiability of functions of complex variables. Necessary and sufficient conditions for a function to be analytic (Cauchy – Riemann equations in Cartesian and Polar co ordinate system with proof). Determining the function f(z)of complex variable from its real and imaginary parts using Cauchy – Riemann equations.		
7	**Mapping or Transformation** :Conformal mapping and Bilinear mapping – Geometrical representation of mapping.	4	8
8	I**ntegration of Complex Variables** Concept of line integral and its relation with Riemann integral. Concept of point functions and path independent functions. Contour integration, Cauchy's theorem for analytic functions and its applications for multiply connected domains. Cauchy's integral formula and nth derivative of a complex function. Morera's theorem, maximum modulus theorem. Taylor;s and Laurent's development of function of a complex variable. Singularities – isolated essential singularity and non isolated singularity. Poles, evaluation of residues. Residue theorem and its application to evaluate real integrals.	11	22
	Total	50	100

Text Books:

1. P.N.Wartikar & J. N. Wartikar, Elements of Applied Mathematics, 1st edition, Pune Vidyarthi Griha Prakashan, 1995. (Rs. 110/-)

References Books:

1. B. S. Grewal, Higher Engineering Mathematics, 34th edition, Khanna Publishers, 1998. (Rs. 170).
2. Edwin Kreyszig, Advance Engg. Mathematics, 5th Edition, New Age International (P) Ltd; 1997. (Rs. 295/-)

COMPUTER ORIENTED NUMERICAK METHODS			
Branch :CST/IT	**Sem: III**	**Lectures: 4 Hr**	**Credit: 4**

Objective :

- **Upon completion of this course, students will be able to understand the basic concepts used in evolving numerical methods.**
- **And will be able to develope computational algorithms for solving problems in algebra and calculus on a computer.**

Sr. No	Topic and Details	No. of Lectures assigned	Weightage in %
1	**Computer Arithmetic:** Floating-point representation of numbers, arithmetic operations with normalized floating point numbers, consequences, and errors in numbers, Binary representation of numbers, conversions and conclusions.	6	12
2	**Iterative Methods: I**ntroduction, starting an iterative method, method of successive bisection, False-position method, Newton Raphson method, Secant method, Successive approximation method, comparison of iterative methods, solution of non-linear equations (By Newton Raphson method)	8	16
3	**Solution Of Simultaneous Algebraic Equations:** Introduction, Matrices, Transpose of a Matrix Eigen Values and Eigen Vectors, Gauss-elimination method, pivoting, Gauss-seidel iterative method, comparison of direct and iterative methods.	8	16
4	**Interpolation:** Introduction, Lagrange's interpolation, difference tables, and truncation error in interpolation.	4	8
5	**Least Squares Approximation Of Functions:** Introduction, fitting a straight line, polynomial regression, fitting geometric and exponential functions, multiple linear regressions.	8	16
6	**Approximation Of Functions:** Introduction, Taylor series representation Differentiation**:** Introduction, formulae for numerical differentiation, numerical integration, Trapezoidal rule, Simpson's 1/3 rd and 3/8 th rules, Gaussian quadrature formulae, comparison of integration formulae.	6	12
7	**Numerical Solution Of Differential Equations:** Introduction, Euler's method, Taylor series method, Runge-kutta (R-K) second & fourth order formulae, Predictor-corrector (P-C) method, higher order differential equations, comparison of R-K and P-C methods.	6	12
8	**Linear Programming:** Transportation problems, PERT/CPM, current issues on above topics	4	8
	Total	50	100

Text Books:

1. E. Balagurusamy, Numerical Methods, Tata McGraw- Hill, 2001. (Rs.150/-)

Reference Books:

1. V. Rajaraman, Computer Oriented Numerical Methods, 3rd Edition, PHI, 1997. (Rs.59/-)

2. John H. Mathews, Numerical Methods for Mathematics, Science & Engineering, 2nd Edition, PHI, 1998. (Rs.175/-)
3. C. R. Kothari, Quantitative Techniques, 3rd revised Edition,Vikas, 1978.
4. Steven C Chapra, Raymond P Canale, "Numerical Methods for Engineers", 5th Edition, Tata McGraw Hill Publication, Special Indian Edition.
5. 4. S. S. Sastry, Introductory Methods of Numerical Analysis, 2nd Edition, PHI, 1997. (Rs.75/-)

DIGITAL LOGIC CIRCUITS			
Branch : CST/IT	**Sem: III**	**Lectures: 4 Hr**	**Credit: 4**

Objective : The learner will be able to

- **To learn the basics of number systems, Boolean algebra and the methods for simplifying Boolean expressions**
- **To understand the concept of the logic gates, the procedures for the analysis and design of combinational circuits and sequential circuits**
- **To discuss the various applications of flip-flops and study the different shift registers**
- **To understand the concept of memories, various logic families, programmable logic devices**

Sr. No	**Topic and Details**	**No. of Lectures assigned**	**Weightage in %**
1	**Concept of Digital and Analog circuit** Diodes and transistors as switch in Digital Circuits, Applications of Digital Logic circuits, Positive and negative logic.	2	4
2	**Logic Gates:- OR, AND, NOT, NOR, NAND, EX-OR, EX-NOR.** Realization of Boolean expression using gates. De- Morgan's Theorems. Reduction Techniques: Laws of Boolean algebra, K-map reduction technique SOP & POS using universal gates, K-map using two, three, four and five variables, Duality theorem (pairs, quads, ,rolling, overlapping etc)	6	12
3	**Combinational Circuits** (Data Processing Circuits) Encoders and Decoders IC7445,IC 7448 Decoder drivers :-seven segment display IC 7446, IC 7447, IC 7448.decimal to BCD encoder IC 74147. **Multiplexers and Demultiplexers:** IC 74150,IC 74151 and IC 74155	8	8
4	**Arithmetic Circuits:-**Half and full adder, Half and full subtractor. B421 adder-subtractor, BCD adder subtractor, XS-3 adder, 4 bit parallel binary adder-subtractor.8421 adder-subtractor using IC 7483, BCD adder using IC7483,XS-3 adder using IC 7483 comparator.	4	8
5	**Sequential Circuit**:- Flip-flops R-S, JK, D, T, master slave JK FF their Properties and truth tables conversion of one type of FF into another without using K-maps. Timing diagrams, Design of sequential circuits.	6	12
6	**Applications of flip flops**: Counters- Principles of working of a 3-bit ripple counter, synchronous counter, preset table counter, mod-3, mod-6, mod-5, mod-7, mod-10, mod-12, using decoding gates. Ring counter, Twisted ring counter, Glitch and gating of a counter. IC7490, IC7493, IC7495, IC74193.	6	12

7	**Shift registers**:-Principles of working of buffer register, shift-left, shift-right register. Four types of register: SISO, SIPO, PISO, PIPO, Typical shift register. Mode controlled shift register.	6	12
8	**Memories:** Classification of characteristics of memories. Methods of address decoding, memory cells.ROM memories:-Masked ROM, PROM, EPROM, EEPROM RAM memories:- TTL RAM, NMOS RAM, Dynamic RAM, SRAM(Asynchronous, Synchronous burst, Zero Bus Turnaround (ZBT)) **Logic families**:- Various logic families, their properties, comparison **Implementation using programmable devices**(ROM,PLA,PAL,FPGA)	12	24
	Total	50	100

Text Books/ Reference Books

1. H. Taub and D.Schilling,"Digital Integrated Electronics",McGraw Hill 1977
2. MalvinoLeach."Digital Electronics"4th Edition,PHI
3. WillamGotmann,"Digital Electronics-An Intro. to theory & Practice", 2nd edition,PHI,
4. Tocci ,DigitalSystems:"Principles and Applications",6th edition,PHI.
5. R,.P. Jain,"Modern Digital Electronics" 4th edition, Tata McGraw-Hill Education, 2010
6. F.J.Hill and G.L.Peterson,"Switching Theory and logic Design",John Wiley,1981
7. Kumar AnandA.,"Fundamentals of Digital Circuits", 2nd edition, PHI., 2009

DISCRETE STRUCTURE AND COMBINATORICS			
Branch: CST/IT	**Sem: III**	**Lectures: 4 Hr**	**Credit: 4**

Objective:

- **To introduce a number of Discrete Mathematical Structures (DMS) found to be serving as tools even today in the development of theoretical computer science.**
- **Students should be able to understand substructures of discrete (finite or countable) structures such as graphs and Combinatorics.**

Sr. No	**Topic and Details**	**No. of Lectures assigned**	**Weightage in %**
1	Set theory: Introduction, Definitions, Inclusion-Exclusion principle and examples, Logic: Connectives, Connectives with examples, WFF, Tautologies with examples, Logical equivalence with examples, Logical implications, Functionally complete set, CNF, DNF, PCNF, PDNF, Predicate calculus, Mathematical induction, Counting,	10	12
2	Relations: reflexive, symmetric, antisymmetric, Equivalence relations, Equivalence class, closures, Transitive closure, Wars hall's algorithm.	10	12
3	Functions and types of functions, Permutations, Even and odd Permutations, Posets, Hasse Diagram,	5	12
4	Lattices and isomorphism, Types of Lattices,	5	14
5	Algebric structure, Binary operations,	6	12
6	Semigroup and monoid,	4	12
7	Groups, Rings and Fields	4	14
8	counting techniques; recurrence relation; generating functions	6	12
	Total	50	100

Text Books:

1. J. P. Tremblay, and R. Manohar, Discrete mathematical structures with applications to computer science, Tata McGraw Hill,
2. Bernard Kolman, Robert C. Busby, and Sharon Ross, Discrete mathematical structures, 4th edition, PHI, 2002.

Reference Books:

3. Narsing Deo, Graph theory and applications to engineering and computer science, PHI, 1999.
4. Alan Doerr and Kenneth Levasseur, Applied discrete structures for computer science, Galgotia Publication, 1998.
5. C. L. Liu, Elements of Discrete Mathematics, 2nd edition, Tata McGraw Hill, 2000.
6. Frank Harary, Graph theory, Narosa Publication, 1998.
7. Douglas B. West, Introduction to graph theory, PHI, 1999

DATA STRUCTURES AND FILE PROCESSING			
Branch : CST/IT	**Sem: III**	**Lectures: 4 Hr**	**Credit: 4**

Objective :

- **Students will be able to Choose the data structures that effectively model the information in a problem.**
- **Students Judge trade-offs among alternative data structure implementations or combinations.**
- **Students will be able to Implement and know when to apply standard algorithms for searching and sorting.**
- **Students will be able to Design, implement, test, and debug programs using a variety of data structures.**
- **Students will be able to select appropriate methods for organizing data files and implement file-based data structures.**

Sr. No	Topic and Details	No. of Lectures assigned	Weightage in %
1	**The Stack and Queues:** Definition, and Examples, Representing stacks in C, operations on stack, Infix, Postfix, and Prefix. Queue and its sequential representation, operations on queue, circular queue and its operations.	6	12
2	**List** :Linked lists, Lists in C, simulation using linked lists, Doubly linked list, Threaded linked list.	8	16
3	**Trees**: Tree, Binary trees, Binary Tree Representations, The Huffman coding, Representing lists as Binary trees, Trees and their applications.	6	12
4	**Sorting and Searching** : Introduction , Insertion sort , Quick sort , Merge sort. Heap sort , Comparison of four sorting algorithms , Shell sort , Radix sort, Basic search technique, General search trees, Hashing , binary search tree.	8	16
5	**Directed and Undirected Graph** :Basic definition , Representation of directed graph, Single - source shortest path problem, All – Pairs Shortest path problem, Traversal of directed graph , Directed a cyclic graphs , Strong components, A flow problem. Definition of undirected Graph, Minimum cost spanning tree , Traversals BFS, BFT, DFS, DFT , Articulation points and bi-connected components , Graph matching.	10	20

6	**AND / OR graphs and Game Tree:** Algorithm for determining the AND / OR tree T is solvable, breadth first generation of a solution tree, Game trees, post order evaluation of a game tree using different methods.	4	8
7	**File Processing and File management:** Storage Management: Storage devices, General lists, Automatic list management, and Dynamic memory, Types of files, Different file processing operations-Open, close, Read, Write, Seek.	4	8
8	Current issues of above topics.	4	8
	Total	50	**100**

Text Book:

1. Ellis Horowitz, and Sartaj Sahani, "Fundamentals of Computer Algorithms", Galgotia, 1999, (Rs. 195/-)
2. Aho, Hopcroft, Ullman, "Data Structures and Algorithms", Addison-Wesley, 2000. (Rs.225/-)

Lab Objectives:

- Implement and know when to apply standard algorithms for searching and sorting.
- Design, implement, test, and debug programs using a variety of data structures.

Reference Books:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, "Introduction to Algorithms", PHI, 1988. (rs. 275/-)
2. Knuth, "Fundamentals of Algorithms", 2nd edition, Narosa Publication, 1998. (Rs. 185/-)
3. Kruse, Leung, Tondo, "Data Structure and Program Design in C", Pearson Education, 2001. (Rs. 250/-)
4. Aho, Hopcroft, Ullman, "Design and analysis of Algorithm", Addison-Wesley, 2000. (Rs. 251/-)
5. David Harrel, "Algorithmics-The spirit of computing", 2nd edition, Addison-Wesley, 2000. (Rs. 275/-)
6. Mary E.S. Loomis, "Data Management and File Structures", 2nd Edition, PHI, 2001.
7. Michael J Folk, Bill Zoellick, Greg Riccardi, "File Structures", Student edition, Addison Wesley Publication, 1999.

PRINCIPLES OF COMMUNICATION			
Branch : CST/IT	**Sem: III**	**Lectures: 4 Hr**	**Credit: 4**

Objective : The learners will be able to understand

- **The fundamentals of basic communication system**
- **Different modulation and demodulation schemes used in analog communication**
- **Working principles of transmitter and receiver of modulation schemes used in analog communication**
- **The basics of sampling and pulse modulation techniques**

Sr. No	Topic and Details	No. of Lectures assigned	Weightage in %
1	**Basic communication system:-**Block diagram, electromagnetic spectrum, signal bandwidth and power, types of communication channels, wave propagation concept. Noise:-Types of noise, signal to noise ratio, noise figure and noise temperature	02	04
2	**Amplitude modulation:-** Basic concept, signal representation ,need for modulation, Frequency spectrum, waveforms, modulation index, bandwidth, voltage distribution and power calculation	08	12
3	**Double sideband full carrier(DSBFC)**:-Principles, modulating circuits, low level and high level transmitters **DSBSC**:-Multiplier modulator, nonlinear modulator and switching modulator **Single sideband (SSB)**:-Principle, Generation of SSB by using Filter method, phase shift method and third method Independent sideband(ISB) and vestigial sideband (VSB)	08	16
4	**Amplitude demodulation**:-Diode detector,practical diode detector and square law detector Application of AM and use of VSB in broadcast television	04	08
5	**Frequency modulation(FM):-**Basic concept ,mathematical analysis, frequency spectrum of of FM wave, modulation index, frequency deviation and percent modulated waves, bandwidth requirement of FM, narrowband and wideband FM **Generation of FM:-**Varactor diode modulator, FET reactance modulator, stabilized reactance modulator, stabilized reactance modulator-AFC, Direct FM transmitter, indirect FM transmitter, noise triangle in FM, pre-emphasis and de-emphasis.	08	16
6	**Phase modulation(PM):-**Principle and working of transistor direct PM modulator and comparison between FM and PM **FM Demodulation:-**Balanced slope detector ,Foster -Seeley discriminator ,ratio detector, phase lock loop(PLL) FM demodulator, amplitude limiting and thresholding, comparison between AM , FM and PM Applications of FM and PM	08	16
7	**Radio receivers:-**TRF, Superhetrodyne receiver, receiver parameters and selection of IF AM receiver circuits and analysis, simple AGC, delayed AGC, forward AGC and communication receiver. FM receiver circuits, comparison with AM receiver	04	08
8	**Sampling techniques:-**Theorem for low pass and band pass signals, Nyquist criteria Aliasing error and aperture effect Pulse modulation and demodulation: PAM,PWM and PPM generation and detection, PCM, Delta modulation, Adaptive delta modulation, principle, generation and detection TDM and FDM basic concept with block diagram Application of pulse communication Recent trends in communication.	08	16

	Total	50	100

Text Books:

1. George Kennedy, Electronic Communication Systems, 4th Edition,Tata Mcgraw. Edition.
2. Roody Collin, Electronic Communication, 4th Edition,PHI.

References:

1. Singh and Sapre, Communication Systems,1st Edition,McGraw Hill.
2. Blake,Electronic Communication Systems,2nd Edition, Thomson.
3. Wayne Tomasi, " Electronic Communication System ",Pearson Education ,Fifth Edition.
4. Taub,Schilling and Saha, " Taub's Principles of Communication systems",Tata McGraw Hill,Third Edition.

DATA STRUCTURE AND FILE PROCESSING LAB			
Branch : CST/IT	**Sem: III**	**Practical Hrs: 2Hr**	**Credit: 2**

Sr. No	**Detail Syllabus**		
1	**Programs based on stacks** Insertion, Deletion		
2	**Programs based on queue** Insertion, Deletion		
3	**Programs based on Linked List** Insertion, Deletion, copy		
4	**Programs based on Graph** BFS, DFS		
5	**Programs based on Tree** Inorder, preorder, postorder		
6	**Programs based on searching** Linear, binary		
7	**Programs based on sorting** Shell, quick, merge		

COMPUTER ORIENTED NUMERICAL METHODS LAB			
Branch : CST/IT	**Sem: IV**	**Practical Hrs: 2Hr**	**Credit: 2**

Sr. No	**Detail Syllabus**		

	Programme on bisection method Programme on false position method Programme on sceant method Programme on newton raphson method Programme on Gauss elimination method Programme on simson's 1/3rd and 3/8th rule method Programme on Trapezoidal method Programme on bisection method		

DIGITAL LOGIC CIRCUITS LAB			
Branch : CST/IT	**Sem: III**	**Practical Hrs: 2Hr**	**Credit: 2**

Sr. No	**Detail Syllabus**		
	To implement basic gates To implement universal gates To implement adder (half and full) To implement subtractor (half and full) To implement multiplexer To implement decoder To implement flip flop To implement counter To implement shift register		

PRINCIPALS OF COMMUNICATIONS LAB			
Branch : CST/IT	**Sem: III**	**Practical Hrs: 2Hr**	**Credit: 2**

PROBABILITY AND RANDOM THEORY			
Branch : CST/IT	**Sem: IV**	**Lectures: 4 Hr**	**Credit: 4**

Objective : Student will be able to understand

- **The concepts of probability marginal probability.**
- **The concepts of Random variables and Standard distribution.**
- **Know Hypotheses testing, correlation.**

Sr. No	**Topic and Details**	**No. of Lectures assigned**	**Weightage in %**
1	**Probability:** Basic concept, definition, problems based on probability, theorems on probability, Conditional probability, Baye's theorem, Application(The Binary Communication channel, Measuring information and coding add it).	10	20
2	**Random Variables:** Definition, Probability mass function, probability density function, Applications(Optimal signal detection, Object classification)	05	10

3	**Standard univariate and multivariate distributions:** Joint distribution, Joint distribution function, Marginal probability distribution, Conditional probability distribution, Joint PMF and Joint PDF Mathematical expectation, Uniform distribution, Bernoulli distribution, Binomial distribution, Poisson distribution, Normal distribution, Gamma distribution, Exponential distribution ,Moment Generating Function Expectation of a Random variable(Discrete Random variable, continuous Random variable),Moment of Distribution,(Entropy and source coding)., Application to signal detection,	10	20
4	**Hypothesis testing:** Definition of Population, Random sample, Hypothesis, Parameter, Statistic, Level of significance, Null hypothesis, Alternative hypothesis, Testing of hypothesis, Cases of large sample, Point of estimation, Internal estimation.	08	15
5	**Correlation:** Correlation, Covariance, Correlation coefficient	05	10
6	**Simple Linear Regression:** Method of least square, Coefficient of regression	07	15
7	**Stochastic Process:** Definition, Types of process, Poisson process, Queuing theory, Random Process(The ensemble),First and second moment of a Random process(Mean, Autocorrelation and autocovaraince functions),Power spectral density(Properties of Power spectral density, Cross power spectral density,White noise,An application),Noise sources(Thermal noise, Quantization noise. Markov and poisson Random processes: The poisson model(Derivative of the poisson model, Poisson process, An application of the Poisson process. Basic Queueing theory:M/M/1 Queue,M/G/1 Queue,Linear algebra approach.	05	10
	Total	50	100

Text Books:

- M. O'Flynn, Harper & Row, Probabilities, Random Variables and Random Processes
- S. P. Gupta, Fundamental Statistics, Sultan Chand, 1998. (Rs.165/-)

Reference Book:

1. Papoulis, Probability, Random Variables and Stochastic Processes, 3rd Edition, McGraw Hill, 1991. (Rs.285/-)
2. H. Stark and J. W. Woods, Probability, Random Processes and Estimation Theory for Engineers.

ANALYSIS OF ALGORITHM AND COMPLEXITY			
Branch : CST/IT	**Sem: IV**	**Lectures: 4 Hr**	**Credit: 4**

Objective :

- **Students will be able to analyze the asymptotic performance of algorithms.**
- **Students will be able to write rigorous correctness proofs for algorithms.**
- **Students will be able to demonstrate a familiarity with major algorithms and data structures.**
- **Students will be able to apply important algorithmic design paradigms and methods of analysis.**
- **Students will be able to synthesize efficient algorithms in common engineering design situations.**

Sr. No	Topic and Details	No. of Lectures assigned	Weightage in %
1	Algorithm, Different study area's in algorithm, Asymptotic notations. General rule to find complexity & examples.	2	4
2	**Divide and Conquer**:The general method, control abstraction for divide and conquer, Binary search, different algorithms for binary search, Finding the maximum & minimum, analysis of max-min, Straightforward & Recursive algorithm, Mergesort, recursive algorithm for mergesort, analysis of mergesort, Quicksort, analysis of quicksort, sorting by partitioning, Selection, analysis of select, slection of element using median of median rule, Strassen's matrix multiplication, and its analysis.	8	16
3	**Greedy Method:**The general method, control abstraction, Optimal storage on tapes Knapsack problem, algorithm for greedy knapsack, Job sequencing with deadlines, A faster implementation of job sequencing, Algorithm for JS & FJS, Optimal merge patterns	6	12
4	**Dynamic Programming:**The general method, principle of optimality, Multistage graphs, Algorithm for forward & backward approach, Optimal binary search trees, 0/1-knapsack, Reliability design, The traveling salesperson problem, Flow shop scheduling.	8	16
5	**Backtracking:**The general method, recursive backtracking algorithm, estimating the efficiency of backtracking, The 8–queens problem, n-queens problem, Sum of subsets, recursive backtracking algorithm, Graph coloring, algorithm for finding m-colorings of a graph and generating a next color, Hamiltonian cycles, algorithm for generating a next vertex and finding all Hamiltonian cycles, Knapsack problem, algorithm for a bounding function and backtracking solution to the 0/1 knapsack, modified knapsack algorithm.	8	16
6	**Branch and Bound:** The Method, LC-search, control abstraction for LC-Search, properties of LC-Search, LC-Search for least cost answer node, The 15-puzzle problem, Bounding, a FIFO branch and bound algorithm for job sequencing problem, LC Branch-and-bound, LC branch and bound to find minimum cost answer node, Zero-one-knapsack problem, function u(.) for knapsack problem, LC branch and bound solution, algorithm to compute lower and upper bounds, algorithm for creating a new node and printing the answer, LC branch and bound algorithm for knapsack problem, Traveling salesperson .	8	16

7	**NP-Hard and NP-Complete:** Introduction, Class P, Class NP, Nondeterministic algorithm, 0/1 Knapsack problem, Cook's theorem, Directed Hamiltonian cycle(DHC), Traveling Salesperson Decision Problem(TSP), AND/OR Graph Decision Problem(AOG), Job shop scheduling, NP-Hard code generation problems.	8	16
8	Use of different data structures in current application.	2	4
	Total	50	100

Text Books:

1. Ellis Horowitz, and Sartaj Sahani, "Fundamentals of Computer Algorithms", Galgotia, 1999. (Rs. 195/-)
2. Aho, Hopcroft, Ullman, Data Structures and Algorithms, Addison-Wesley, 2000. (Rs. 225/-)

Reference Books:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, "Introduction to Algorithms", PHI, 1988. (rs. 275/-).
2. Knuth, "Fundamentals of Algorithms", 2nd edition, Narosa Publication, 1998. (Rs. 185/-)
3. Kruse, Leung, Tondo, Data Structure and Program Design in C, Pearson Education, 2001. (Rs. 250/-)
4. Aho, Hopcroft, Ullman, "Design and analysis of Algorithm", Addison-Wesley, 2000. (Rs. 251/-)
5. David Harrel, "Algorithmics-The spirit of computing", 2nd edition, Addison-Wesley, 2000. (Rs. 275/-)
6. Herbert S. Wilf, "Algorithms and Complexity", PHI, 1986. (Rs. 205/-)
7. S. E. Goodman and S. T. Hedetniemi, "Introduction to the Design and Analysis of Algoritms", McGraw Hill, 1988. (Rs. 371/-)
8. Sara Baase, Alan Van Gelder, "Computer Algorithms Introduction to Design and Analysis", 3rd ediditon, Addison-Wesley, 2000. (Rs. 325/-)
9. Gilles Brassard, Paul Bratley, "Fundamentals of Algorithmics", 4th edition, PHI, 2000. (Rs. 225/-)

Lab Objectives:

5. Identify the suitable programming strategy for the problem.
6. Implement the above problem using chosen strategy and analyses it.

OPERATING SYSTEM			
Branch : CST	**Sem: IV**	**Lectures: 4 Hr**	**Credit: 4**

Objective : The students will be able to

- **To understand the services provided by and the design of an operating system.**
- **To view some of the major tasks of the operating system of a computer system, focusing on internal working of the hardware and software interface of a typical system**

Sr. No	Topic and Details	No. of Lectures assigned	Weightage in %
1	Operating System : Definition, functions of OS, Different types of Operating Systems, Kernel	2	10
2	Process states & Transitions, operations on Processes, interrupts Processing,.	6	10
3	Job & Processor Scheduling: Scheduling levels, objectives & Criteria, Different types of scheduling & their comparisons, process synchronization	6	10
4	Asynchronous Concurrent process: Its graphical as well as algorithmic representations, Critical Section & its different algorithms, Semaphores & its applications.	10	12
5	Deadlock: Necessary conditions for deadlock, Prevention & Avoidance, Deadlock detection & recovery.	6	12
6	Storage Management : Storage Organization, Different types of real & virtual storage management schemes.	6	12
7	File & Database System: File System function, File organization, Different access methods.	4	10
8	Disk Scheduling management and their comparision	4	12
9	Case Studies : Linux, Windows	6	12
	Total	50	100

Text Books:

1. Peter Galvin, Silbreschatz, Gagne, Operating System Concept, and Sixth Edition, WSE Wiley publication. (Rs.459/-)
2. John Donovan, System Programming, Tata McGraw Hill, (Rs.180/-)

Reference Books:

3. H. M. Deitel, Operating Systems, Second Edition, Addison Wesley. (Rs.253.60/-)
4. Dhamdhere, System Programming and Operating system, second revised Edition, Tata McGraw Hill. (Rs. 85/-).

5. William Stalling, Operating System, Second Edition, PHI publication. (Rs.250/-)
6. Charles Crowley, Operating Systems A design oriented approach, Tata McGraw Hill. (Rs.275/-)
7. Tanenbaum, Modern operating system, PHI. (Rs.195/-)

COMPUTER ARCHITECTURE AND ORGANIZATION			
Branch : ENC/EE/CST/IT	**Sem: IV**	**Lectures: 4 Hr**	**Credit: 4**
Objective : **3. To understand the basic building blocks of computer and their interconnection** **4. To study various input output devices, memories and CPU structures**			

Sr. No	**Topic and Details**	**No. of Lectures assigned**	**Weightage in %**
1	**Introduction:** Brief history of computers, basic building blocks of computer, organization & architecture, structure & functions, evolution of Pentium & power PC, various generations of computer evolutions, impact of VLSI on computer systems.	02	04
2	Buses: Concept of buses, types of buses, concept of system bus, overview of various bus architectures used in computer, Peripheral Component Interconnect (PCI) bus, interconnection structures and bus interconnection, Bus control logic, bus arbitration techniques.	04	08
3	Internal memory: Concept of memory, size, unit, and its organization, computer memory systems overview, hierarchy of memory in computer, memory device characteristics, random access memory, serial access memory, multilevel memories, address translation, memory allocation, advanced DRAM organization. Cache memory: – concept of cache, performance of cache, types of cache architectures, memory mapping techniques, and page replacement policies	08	16
4	External memory: Construction and working principles of magnetic memories, magnetic disk, hard disk, magnetic tape, optical memory.	04	08
5	I/O Devices: Role of I/O devices in computer, overview of commonly used I/O devices such as keyboard, VDU, mouse. External devices, I/O module and its organization, various data transfer techniques – Programmed I/O, Interrupt driven I/O, Direct memory access (DMA), I/O channels and I/O Processors.	04	08
6	Operating System Support: Operating system overview, role of operating systems in computer, scheduling, memory management, concept of virtual memory.	04	08
7	**CPU Organisation:** The role of CPU, functions of CPU, CPU structure and CPU functions, processor organization, register organization inside CPU, instruction cycle, instruction pipelining, branch penalty, branch prediction, overview of Pentium processor	04	08
8	**Data path design:** Concept of data processing unit, Fixed-point arithmetic: addition, subtraction, multiplication, and division. Designing aspects related to arithmetic operations, combinational ALU and sequential ALU, advanced ALU.	06	12

9	Control Circuit Design: Basic concepts related to control unit, types and design of control circuit such as micro-programmed control unit, and hard wired control unit, microinstruction formats, microinstruction sequencing, microinstruction execution, applications of microprogramming.	08	16
10	System Organisation: Use of computer in commutations, serial communications and parallel communication, network topologies, LAN and WAN in brief, various ways to improve the speed of computer, concept of parallel processing, Flynn's classification of parallel computers, benefits of parallel processing, multiprocessing.	06	12
	Total	50	100

Text Books:

1. William Stallings, Computer Organization and Architecture, 4th Edition, PHI, 1998.(Rs.325/-)
2. John P Hayes, Computer Architecture and Organization, 3rd Edition, McGraw Hill, 1998. (Rs. 314/-)

Reference Books:

3. Andrew C. Tanenbaum, Structured Computer Organization, 3rd Edition, PHI. (Rs. 150/-)
4. M. Morris Maw, Computer System Architecture, 3rd Edition, PHI, 1998. (Rs. 150/-)

DATABASE MANAGEMENT SYSTEMS			
Branch : CST/IT	**Sem: IV**	**Lectures: 4 Hr**	**Credit: 4**

Objective : Students should be able to

- **Understand the role of a database management system in an organization.**
- **Understand basic database concepts, including the structure and operation of the relational data model.**
- **Construct simple and moderately advanced database queries using Structured Query Language (SQL).**
- **4. Understand and successfully apply logical database design principles, including E-R diagrams and database normalization.**
- **Design and implement a small database project using Microsoft Access.**
- **Understand the concept of a database transaction and related database facilities, including concurrency control, journaling, backup and recovery, and data object locking and protocols.**

Sr. No	**Topic and Details**	**No. of Lectures assigned**	**Weightage in %**

1	Introduction **:** Database System Applications ,Database Systems versus File Systems, View of Data, Data Models, Database Languages, Database Users and Administrators, Database System Structure.	2	10
2	Entity –Relational Model **:** Basic Concepts, Constraints, Keys, Entity-Relationship Diagram, Weak Entity Sets, Extended E-R features, Design of E-R Database Schema, Reduction of an E-R Schema to Tables, Relational Model **:** Structure of Relational Databases, Relational Algebra, Tuple Relational Calculus, Domain Relational Calculus.	10	14
3	SQL **:** SQL commands, Functions, Data Constraints, Grouping Data, Subqueries, Joins, Performance Tuning, Security Management, PL/SQL, Triggers, Integrity & Security **:** Domain Constraints, Referential Integrity, Assertions, Triggers, Privileges in SQL.	10	14
4	Relational Database Design **:** Functional Dependencies, Decomposition, Normalization – 1NF –5NF , BCNF.	8	12
5	Storage & File Structure **:** RAID , Improvement of Reliability & Performance Indexing & Hashing – Basic Concepts, Ordered Indices, B+ & B Tree Index Files, Static & Dynamic Hashing , Comparison of Ordered Indexing & Hashing.	6	14
6	Transactions**:** Transaction Concept & State, Implementation of Atomicity & Durability, Serializability.	5	12
7	Recoverability, Testing for Serializability, Concurrency Control**:** Protocols- Lock Based, Timestamp-based, Validation Based, Deadlock Handling & Concurrency.	6	12
8	Object – Oriented Databases **:** New Database Applications, Object – Oriented Data Model, Object-Oriented Languages, Persistent Programming Languages, Persistent C++ Systems.	3	12
	Total	**50**	**100**

Text Book:

1. Database System Concepts : Henry Korth, Silberschatz, Sudarshan 5th Edition

2. Fundamentals of Database Systems: Elmasri & Navathe 3rd Edition .

Reference Books:

- Database Management Systems : Raghu Ramkrishnan , 2nd Edition
- Database Systems: Design Implementation & Management : Rob & Coronel ,4th
- An Introduction Database Systems : Bipin Desai
- An Introduction to Database System : C.J. Date
- Database Processing : Dolan , Maxwell

6. Oracle 8i The Complete Reference : Loney, Koch
7. Oracle 8i PL/SQL Programming : Scott Urman

OBJECT ORIENTED PROGRAMMING			
Branch : CST/IT	**Sem: IV**	**Lectures: 4 Hr**	**Credit: 4**
Objective : **Students should be able to use object oriented concepts in programming.** **Students should be able to implement projects using C++.**			

Sr. No	**Topic and Details**	**No. of Lectures assigned**	**Weightage in %**
1	Introduction, Tokens, expression, and control structures, Operators in C++. Console I/O Streams, predefined streams, hierarchy of stream classes, unformatted and formatted console I/O operations, user defined manipulators, insertion and extraction, operators. Functions in C++ parameter passing techniques such as call by value, call by address, and call by reference, return by reference, inline functions, default arguments, function overloading, function overriding. Pointers pointer definition, de-referencing of pointer, parameter passing, void pointer, precedence of * and [ ] operators, pointer to function, pointer to constant object, constant pointer, wild pointers.	10	20
2	Classes and objects Introduction to classes and objects, programming with member functions and classes, access specifiers such as public, protected, and private. Classes and objects constant member function, static data members, friend function, and friend classes. Classes and objects static member functions, local classes	6	12
3	Constructor and destructor Definition of constructor and destructor, benefits of constructors, default constructor, default argument constructor, dynamic initialization, dynamic constructor, copy constructor, parameterized constructor, constructor overloading, constant objects. Constructor and destructor dynamic objects, pointer to object definition, creation and deletion of dynamic objects, reference to an object, live objects, array of objects, pointer to object members, accessing members through objects, and object pointers, function set_new_handler ( ), this pointer	6	12

4	Operator overloading Operator overloading, rules for overloading operators, syntax, process of operator overloading, unary operator overloading, binary operator overloading, Data conversion conversion between user defined data type to basic data type, conversion between basic data type to user defined data type, overloading of special operator such as subscript, function call, member access, comma, assignment, new and delete operators, overloading with friend functions, benefits of operator overloading	6	12
5.	Inheritance Introduction, derived class declaration, visibility of class members, different types of inheritances such as single, multiple, hierarchical, multilevel, hybrid, multipath, inheritance and member accessibility, constructor in derived class, order of invocation of constructor. Inheritance destructor in derived class, constructor invocation and data member initialization, ambiguity in member access, virtual base class, object composition and delegation, relationship between classes such as is-kind-of, is-analogous-of, and is-part-of.	4	8
6	Virtual Function Introduction, pointer to derived class, array of pointers to derived class, pure virtual function, abstract class, virtual destructors, dynamic binding. Generic programming Introduction, generic functions, syntax, overloading function template, class template, syntax, class template with multiple arguments Generic programming , inheritance of class template, class template containership, class template with overloaded operators.	6	12
7	File Handling Introduction, classes for stream operation, opening and closing of file File Handling file I/O with fstream classes, file pointer manipulators, file modes.Coupling and Cohesion, Collaborations. Exception Handling Different techniques of building reliable models such as fault avoidance and fault tolerance**,** error handling, types of exceptions such as synchronous and asynchronous, exception handling model, exception handling constructs such as throw, catch, and try, handler throwing same exception again, list of exceptions, raising an unspecified exception, exceptions in no-exception function Exception Handling catch all exceptions, method of handling uncaught exceptions, exception in constructors, destructors, operator overloaded function, inheritance tree, and class template, fault tolerant design techniques such as N-version programming and recovery block.	10	20
8	Relation of C++ with other programming languages. Connectivity of C++ with other languages. Introduction of other high level languages.	2	4
	Total	50	100

Textbook:

1.Venugopal, Rajkumar, Ravishankar, “Mastering C++”, Tata McGraw Hill, 2001. (Rs.235/-)

References:

1.Rebecca Wirfs-Brock, Brian Wilkerson, Lauren Wiener, “Designing Object Oriented Software”, PHI, 2000, (Rs.150/-)

2.Timonthy Budd, “An Introduction to Object Oriented Programming”, Pearson Education, 2000. (Rs.275/-)

8. E. Balagurusamy, Object oriented programming with C++, 2nd edition, Tata McGraw Hill, 2000.
9. (Rs.165/-)
10. Herbert Schildt, The complete reference C++, 2nd edition, Tata McGraw Hill, 2000.

(Rs.325/-)
11. Bjarne Stroustroup, the C++ programming language, 3rd edition, Addison-Wesley, 1997. (Rs. 508/-)
12. Cohoon, Davidson, C++ program design, 3rd edition, Tata McGraw Hill, 1999. (Rs.295/-)
13. Robert Lafore, Object oriented programming in Turbo C++, 3rd edition, Galgotia Publication, 2001, (Rs.320/-)
14. Gary J. Bronson, A first book of C++, 2nd edition, Books / Cole publishing company, 2001. (Rs.342/-)
15. D. Ravichandran, Programming with C++, Tata McGraw Hill, 2001 (Rs.190/-)
16. Deitel and Deitel, C++ how to program, 2nd, Prentice Hall, 1998. (Rs.650/-)

OBJECT ORIENTED PROGRAMMING LAB			
Branch : CST/IT	**Sem: IV**	**Practical Hrs: 2Hr**	**Credit: 2**

Sr. No	**Detail Syllabus**		

	1.WAP to call the area () function for computing the area of square, rectangle and circle using function overloading.
	
	2.WAP using constructor to declare a class *employee*, consisting of data members *emp_no* and *emp_name*. Write the member function to accept and display the data for five employees.
	
	3.WAP to declare a class and implement passing objects by value, passing objects by reference and passing objects by pointer.
	
	4.WAP to implement the manipulation of live objects.
	
	5.WAP to implement operator overloading for matrices and stream operators.
	
	6.Design classes such that they supports the following statements: Rupees r1, r2; Dollar d1, d2; d1 = r1; //converts rupees into dollars r2 = d2; // converts dollar into rupees WAP which does such conversions according to the world market value.
	
	7.WAP to implement multiple inheritance to find the area of rectangle and total cost to paint the complete area.
	
	8.WAP to implement object composition and delegation.
	
	9.Write a class template based program to implement stack.
	
	10. Write a interactive program to print the salary slip in the following formats: Refer Q.17.10 on page number: 721 from “K R Venugopal, mastering C++”.
	11. WAP to implement virtual classes having their derived classes invoking their base class’s constructors through the initialization section. 12. Design classes using Class Template such that they supports the following statements: Rupees r1, r2; Dollar d1, d2; d1 = r1; //converts rupees into dollars r2 = d2; // converts dollar into rupees WAP which does such conversions according to the world market value.		

ANALYSIS OF ALGORITHM AND COMPLEXITY LAB

Branch : CST/IT	Sem: III	Practical Hrs: 2Hr	Credit: 2

Sr. No	Detail Syllabus		
	1. Implement programme of maximum and minimum. 2. Implement programme of optimal storage on tape 3. Implement programme of binary search (one comparison) 4. Implement programme of greedy Knapsack. 5. Implement programme of job sequencing with dead line. 6. Implement programme of Optimal merge pattern. 7. Implement programme of sum of subset problem. 8. Implement programme of Graph coloring. 9. Implement programme of Hamiltonian cycles. 10. Implement programme of TSP		

DATABASE MANAGMENT SYSTEMS			
Branch : CST/IT	**Sem: IV**	**Practical Hrs: 2Hr**	**Credit: 2**

Sr. No	Detail Syllabus		
	1.Draw ER diagrams (Approximately 5) for different schemas & Convert them into tables (Assume any suitable schema). Apply normalization. Display constraints. 2. Study of Query Language. 3. Design the relational database for any of the ER Model from assignment No.1 using SQL. 4. Insert and Modify Database: Write a SQL to insert data in tables created in assignment 3 and store data in separate File / Table. Implement insert operation as transaction. 5. View Data: Write SQL to view table data. Accept table attribute for ordering dynamically. 6. Create Views, Indexes, Sequences, and Synonyms. 7. Design SQL queries using at least 5 different operators. 8. Design SQL queries using all types of Joins. 9. Design SQL queries using all types Sub-Query and View. 10. Write a PL/SQL block to calculate the grade of minimum 10 students. 11. Write a PL/SQL block to implement all types of cursors. 12. Write a PL/SQL stored procedure and function. 13. Write a database Trigger (Row level and Statement level). 14. Canonical cover & Closure: For given a set of functional dependencies find canonical cover & closure. 15. Write program to implement B+ Tree Index (n=3 or n = 5). 16. Write program to implement Static Hashing. 17. Write program to implement Dynamic Hashing. 18. Write program to implement Embedded SQL. 19. Write program to implement Recursive Queries. 20.Create users in database environment and provide privileges to them.		

SOFTWARE SYSTEMS LAB			
Branch : CST/IT	**Sem: III**	**Practical Hrs: 2Hr**	**Credit: 2**

MICROPROCESSOR AND MICROCONTROLLER			
Branch : CST/IT	**Sem: V**	**Lectures: 4 Hr**	**Credit: 4**

Objective: The learners will be able to:

- **Study Architecture of microprocessor 8085**
- **Details of all the Peripherals**
- **Study the interfacing of the peripherals with 8085**

Sr. No	Topic and Details	No. of Lectures assigned	Weightage in %
1	**Architecture of Microprocessors:** General definitions of mini computers, microprocessors, micro controllers and digital signal processors. Overview of 8085 microprocessor. Overview of 8086 microprocessor. Signals and pins of 8086	8	**16**
2	**Assembly language of 8086 and Interfacing with 8086:** Description of Instructions. Assembly directives. Assembly software programs with algorithms, Interfacing with RAMs, ROMs along with the explanation of timing diagrams. Interfacing with peripheral ICs like 8255, 8254, 8279, 8259, 8259 etc. Interfacing with key boards, LEDs, LCDs, ADCs, and DACs etc	8	16
3	**Interfacing with 8086:** Interfacing with RAMs, ROMs along with the explanation of timing diagrams. Interfacing with peripheral ICs like 8255, 8254, 8279, 8259, 8259 etc. Interfacing with key boards, LEDs, LCDs, ADCs, and DACs etc.	6	12
4	**Coprocessor 8087:** Architecture of 8087, interfacing with 8086. Data types, instructions and programmi	6	12

5	**Module 3: Architecture of Micro controllers:** Overview of the architecture of 8051 microcontroller. Overview of the architecture of 8096 16 bit microcontroller.	6	12
	Assembly language of 8051: Description of Instructions. Assembly directives. Assembly software programs with	4	8
6	**Interfacing with 8051:** Interfacing with keyboards, LEDs, 7 segment LEDs, LCDs, Interfacing with ADCs. Interfacing with DACs, etc.	4	8
7	**Module 4: High end processors:** Introduction to 80386 and 80486	4	8
8	**Module 5: Pentium Processor:** Features of Pentium Processor, comparision of pentium with earlier processors, functitionl units of Pentium processor, instuction pipeling for integer instruction and floating point instruction, concept of prefetch, branch prediction, cache overview for pentium.	4	8

Text Books:

1. R. S. Gaonkar, "Microprocessor", 3rd edition, Penram International Publications.
2. Borole and Vibhute, "Microprocessor", 2nd edition, Technova Publications.
3. Tribel, "The 80386 DX microprocessor hardware, softwae and interfacing", PHI.
4. Tom Shanley, " Pentium Processor System Architecture", Addison Wesley.

Reference Books:

1. A. P. Godse , "Microprocessor", 1st edition, Nirali Publications. (Rs.275/-)
2. A .P. Godse, Gilmore , "Microprocessor", 2nd edition, McGraw Hill International.
3. Kenneth J. Ayala, 'The 8051Microcontroller", 2nd edition, Penram International. (Rs.225/-)
4. 80386 Hardware reference manual - Intel Corporation.

- Tom Shanley, " Pentium Processor System Architecture", Addison Wesley.

- 5. Bary Brey, "The Intel Microprocessor" , 4th edition, PHI. (Rs. 325/-)

ENVIRONMENTAL SCIENCE			
Branch : CST/IT	**Sem: V**	**Lectures: 4 Hr**	**Credit: 4**

- To create awareness about the environment and its allied problems
- To identify and solve environmental problems as engineers
- Develop social responsibility towards environmental protection

- Inculcate attitude and values towards understanding and interdependence of man and nature and work towards sustainable development**.**

Sr. No	Topic and Details	No. of Lectures assigned	Weightage in %
1	The multidisciplinary nature of environmental studies, definition, scope and importance, need for public awareness.	02	04
2	Natural resource:- rsenewable and non-renewable resources, associated problems with the resources such as Forest, water, minerals, food, energy, land	08	12
3	Ecosystem:- concept, structure, functions, producers, consumers and decomposers, energy, ecological succession, forest ecosystem, grass land ecosystem, Desert ecosystem, aquatic ecosystem.	08	16
4	Biodiversity and its conservation: Introduction, definition, genetic species and ecosystem diversity, biogeographical classification of India, value of biodiversity.	04	08
5	Environmental pollution:- Causes effects and control measures in Air pollution, water pollution, soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear Hazards	08	16
6	Social issues and environment:- From unsustainable to sustainable development, Urban problem related to energy, Environmental ethics issues and problem solution, climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, consumerism and waste products, environment protection act and various acts related to Air pollution, water pollution and wild life protection, forest conservation, public awareness	08	16
7	Introduction to Green IT, internal assessment for organization for green IT policy, understanding carbon footprints, carbon offsetting, carbon neutrality and carbon trading, audit of organization for existing IT functions and process, risk issues and opportunities, sustainable IT procurement process, reuse, recyle and reprocess of IT assets, development of green IT action plan, roles and responsibilities with green IT,	04	08
8	Electronics waste and its disposals	08	16
	Total	50	100

Text Books:

1. George Kennedy, Electronic Communication Systems, 4thEdition,Tata Mcgraw. Edition.
2. Roody Collin, Electronic Communication, 4thEdition,PHI.

References:

1. Singh and Sapre, Communication Systems,1st Edition,McGraw Hill.
2. Blake,Electronic Communication Systems,2nd Edition, Thomson.
3. Wayne Tomasi, " Electronic Communication System ",Pearson Education ,Fifth Edition.
4. Taub,Schilling and Saha, " Taub's Principles of Communication systems",Tata McGraw Hill,Third Edition.

OBJECT ORIENTED METHODOLOGY AND DESIGN			
Branch : CST/IT	**Sem: V**	**Lectures: 4 Hr**	**Credit: 4**
Objective: The learners will be able to • **Different models to represent the analysis and design of project.**			

Sr. No	Topic and Details	No. of Lectures assigned	Weightage in %
1	**Introduction to Object modeling:** Object oriented approach, Object oriented themes, and Object oriented methodologies, three models, Objects and classes, Links and association, multiplicity, Advanced link and association concepts, Generalization and inheritance, Grouping constructs, problems on object modeling.	6	8
2	**Advanced Object Modeling:** Aggregation, Abstract classes, Generalization as an extension and restriction, Multiple inheritance, Metadata, Candidate key, Constraints, Homomorphism, problems using concepts of Advanced Object Modeling.	6	12
3	**Dynamic modeling:** Events and states, scenarios and event trace diagrams, state diagrams, operations, Nested state diagrams, concurrency, Advanced Dynamic Modeling concepts, Relation of object and dynamic models, problems on dynamic modeling or state diagrams.	4	8
4	**Functional Modeling and Analysis:** Functional models, Data Flow Diagrams, Specifying Operations, Relation of functional to object and dynamic models, Problems on functional modelling, Overview of analysis, Problem statement, steps to design object model, Steps to construct dynamic model, steps to build functional model. Adding operations, iterating the analysis, Problems.	8	16
5	**System Design:** Overview of system design, Breaking a system into subsystem, Identifying concurrency, Allocating subsystems to processors and tasks, Management of data stores, Handling global resources, Choosing software control implementation, Handling boundary conditions, Setting trade-off priorities, Common Architectural Frameworks	8	16
6	**Object Design**: Overview of object design, Combining the three models, Designing algorithms, Design optimization, Implementation of control, Adjustment of Inheritance, Physical packaging, problems, Comparison of methodology- Structured analysis/Structured design, approach of SA/SD, Comparison with OMT, Jackson structured development (JSD) approach, comparison with OMT.	8	16
7	**From design to implementation**: Implementation using a programming language, database system, outside a computer. Programming Style: Object oriented style, reusability, extensibility, robustness, programming in large.	6	12

8	**UML Concepts**: Goals of UML, UML views, Use case View, Interaction view, Collaboration diagram, Sequence diagram, State machine view, Activity view, Activity diagram, Physical view, Model management view.	4	8
	Total	**50**	**100**

Text Book

1. James Rumbaugh, "Object oriented Modeling and Design", PHI Publication, 2001. (Rs.175).

Reference Books:

1. Grady Booch, "Object Oriented Analysis and Design",Second Edition, Addison Wesley Publication, 1994. (Rs.439/-)
2. Peter Coad, Edward Yourdon "Object Oriented Analysis", Second Edition, Pearson Education publication, 2001. (Rs.275/-)
3. Andrew T.F. Hutt "Object Analysis and Design, Description of methods", Second Edition, A Wiley QED Publication, 1994. (Rs.1264/-)
4. Andrew T.F. Hutt "Object Analysis and Design, comparison of methods", Second Edition, A Wiley QED Publication, 1994. (Rs.1264/-)
5. Rebeca Brokes, **"**Designing object oriented software", Second Edition, PHI, 1997 (Rs.125/-)

COMPUTER NETWORKS			
Branch : CST/IT	**Sem: V**	**Lectures: 4 Hr**	**Credit: 4**

Objective: The learners will be able to

- To understant the basics of networking and protocols required in the field of Internetworking. Students should be able to write the application based on networking and protocol concepts. It also instruct the students about application layer protocol and security issues in network.

Sr. No	Topic and Details	No. of Lectures assigned	Weightage in %
1	**Introduction**:Uses of Computer networks, Network hardware, and Network software, Reference Models: OSI, TCP/IP.	4	10
2	**The Physical Layer:** Theoretical basis for data communication, Multiplexing, Transmission Media: Twisted pair, coaxial cable, optical fiber, wireless transmission etc., Switching: Circuit switching, Packet switching, X.25, Frame Relay.	6	14
3	**The Data Link Layer:** Design Issues Error detection and correction-hamming codes, CRC, bit stuffing, character stuffing etc. Elementary data link Protocols: A simplex Stop and Wait (Noiseless and Noisy channel) Sliding Window Protocols: 1 bit SWP, Go Back n protocol, Selective Reject protocol . High Level Data Link Control protocol (HDLC), PPP	8	18
4	**The Medium Access Sub-layer:** Multiple Access Protocols: ALOHA, CSMA, CSMA/CD, Wavelength Division multiple access, wireless LAN protocols. IEEE standards 802 for LANs, MANs etc.: IEEE 802.3, IEEE 802.4, IEEE 802.5, IEEE 802.11, IEEE 802.15, IEEE 802.15.4 , High Speed LANs , Fast/Gigabit Ethernet.	10	18
5	**Network Layer:** Study of TCP/IP suite, Design Issues, Routing Algorithms, and Congestion Control Algorithms: Leaky bucket algorithm, Token bucket algorithm. IP addressing and subneting concept	10	16
6	**Transport layer:** Issues of the Transport Layer and The Presentation Layer.TCP datagram format, Connection establishment and connection release.UDP datagram format and its applications	4	10
7	ATM, ISDN, Gateways, and Application Layer Protocols: HTTP, DNS, and SMTP etc.	6	10
8	Network Security issues- brief study	2	4
	Total	50	100

Text Books:

1. Andrew S. Tannenbaum, Computer Networks, 3rd Edition, PHI.
2. Larry Peterson & Davie, Computer Networks- A systems approach, 3nd Edition.

Reference Books:

1. William Stallings, Data and Computer Communications, 6th Edition, Pearson Education Asia.
2. Dimitri Bertsekar & Robert Gallegar, Data Networks, 2nd Edition, PHI.
3. Widjaja Garcia, Communication Networks, 2nd Edition.

4. Behrouz A. Forouzan, Data Communication and Networking, 2nd Edition,Tata McGraw Hill.
Richard Stevens, Networking Programming in UNIX, 2nd Edition, Addison-Wesley.

DISCRETE TIME SIGNAL PROCESSING			
Branch : CST/IT	**Sem: V**	**Lectures: 4 Hr**	**Credit: 4**

Objective:

- Examine trends and patterns in the use of discrete signals for various applications.
- Give the students a useful skill base that would allow them to carry out further study should they be interested and to work in the field.
- To know the relation to signal processing and other fields.

Sr. No	Topic and Details	No. of Lectures assigned	Weightage in %
1	**Discrete time signals & systems:** Classification and some operation on discrete time signals, Discrete time systems, LTI systems, Analysis of LTI systems, DT system analysis by difference equation, realization of the system, Convolution, Correlation and auto correlation of the signals.	07	15
2	**Z-transform:** Z-transform and properties , Rational Z Transform, Inverse Z Transform by power series and partial fraction expansion. Analysis of LTI system in Z domain	7	15
4	**Discrete Fourier transform and FFT Algorithms:** Fourier Transform, DFT, DFT properties, DFT as a linear transformation, Linear convolution using DFT, Linear filtering methods based on DFT. Frequency analysis of signals using DFT, Direct computation of DFT, Divide & Conquer approach, Radix -2 DIT and DIF FFT algorithms.	4	28
5	**Digital Filter Design & Implementation :**Design of FIR filters using window method. Design of IIR filters using impulse invariance and bilinear Transformation.	06	10
6	**Realization of DTS:** Structures for the Realization of DTS, Structures for FIR Systems, Structures for IIR Systems: Direct Form I and II, Cascade Form, Parallel Form.	06	10
7	**Digital Signal Processing Hardware:** either TMS320CXX based or ADSPXXX based System.	06	10
8	Current research trends and applications in the field of signal processing.	04	10
	Total	50	100

Text Book :

1. John G. Prokis, Dimitris G. Manolakis, " Digital Signal Processing. Principles, Algorithms, and Applications", Fourth Edition , Pearson Education, 2007.

Reference Books:

1. Oppenham & Scafer , " Discrete time signal processing", PHI, 1989.
2. Sanjit K. Mitra, "Digital Signal Processing ", Third Edition, TMH, 2006.
3. Ashok Ambardar, "Digital Signal Processing: A Modern Introduction", Thomson Publication, 2007

COMMUNICATION SKILLS - II			
Branch : ENC/EE/IT/CST	**Sem: V**	**Lectures: 4 Hr**	**Credit: 4**
Objective : The learners will be able to ● Select appropriate mediums for effective communication ● Appreciate the importance of non-verbal aspects of communication ● Strengthen understanding of communication and soft skills ● Use communication and soft skills to achieve professional goals			

Sr. No	**Topic and Details**	**No. of Lectures assigned**	**Weightage in %**
1	**Communication in a Business Organization** Internal (upward, downward, horizontal, grapevine), External Communication, Strategies for conducting successful business meetings, documentation of meetings, Introduction to modern communication techniques, legal and ethical issues in communication (intellectual property rights, patents).	5	10
2	**Advanced technical Writing:** Report writing and presentation: Definition and importance of reports, qualities of a good report, language and style in reports, types of reports, formats, methods of compiling data. A computer aided presentation of a project report based on technical, survey-based, reference based or campus related topic. Topics to be assigned to a group of 8-10 students. The written report should not exceed 20 printed pages.	10	20
3	**Technical paper writing** **I**EEE format of writing a technical paper. Choosing the right topic, collecting information, Importance of visual aids, making a good presentation.	5	10
4	**Writing Proposals** Formats of proposal writing, style and language.	10	20

5	**Interpersonal Skills:** Introduction to emotional intelligence, motivation negotiation and conflict-resolution. Assertiveness, leadership, team building, decision making, time management.	5	10
6	Exercises in Vocabulary and comprehension to improve reading and writing skills	5	10
7	**Interview Techniques:** Preparing for job interviews, verbal and non-verbal communication during interviews. Role play project to be taken up by the entire class.	5	10
8	**Group Discussion:** Dynamics of group behaviour, techniques for effective participation**.**	5	10
		50	100

Text book:

1. Fred Luthans, 'Organizational Behavior, Mcgraw Hill International Edition.
2. Lesiker and Petit, 'Report writing for Business', Mcgraw Hill International edition.

Reference Books:

1. Huckin and Olsen, ' Technical Writing and Professional Communication", Mcgraw hill International Edition.
2. Wallace and Masters, 'Personal Development for life and work' Thomson Learning
3. Lewicki, saunders, Minton 'Essentials of Negotiation' Mc Graw hill
4. Hartman Lemay 'Presentation Success" Thomson Learning.

MICROPROCESSOR & MICROCONTROLLER LAB			
Branch : CST/IT	**Sem: V**	**Practical Hrs: 2Hr**	**Credit: 2**

DISCRETE TIME SIGNAL PROCESSING LAB			
Branch : CST/IT	**Sem: V**	**Practical Hrs: 2Hr**	**Credit: 2**

UML WITH JAVA LAB			
Branch : CST/IT	**Sem: V**	**Practical Hrs: 2Hr**	**Credit: 2**

DATA MINING AND DATA WAREHOUSING			
Branch : CST/IT	**Sem: VI**	**Lectures: 4 Hr**	**Credit: 4**

Objective :

- **Understand the techniques contributing to recent development in data Warehousing**
- **Understand the On Line Analytical Processing(OLAP)**
- **Prepare data models**
- **Understand conceptual design methodologies and storage techniques**
- **Understand data mining process.**

Sr. No	Topic and Details	No. of Lectures assigned	Weightage in %
1	**Data warehousing**:Overview And Concepts: Need for data warehousing, Basic elements of data warehousing, Trends in data warehousing.	05	15
2	**Data Design And Data Representation**: Principles of dimensional modeling, Dimensional modeling advanced topics, data extraction, transformation and loading, data quality.	10	15
3	**Information Access And Delivery**: Matching information to classes of users, OLAP in data warehouse, Data warehousing and the web.	05	10
4	**Implementation And Maintenance:** Physical design process, data warehouse deployment, growth and maintenance.	05	10
5	**Data Mining: Introduction:** Basics of data mining, related concepts, Data mining techniques.Data Mining Algorithms: Classification, Clustering, Association rules.	10	15
6	**Knowledge Discovery:** KDD Process Web Mining: Web Content Mining, Web Structure Mining, Web Usage mining	05	15
7	**Advanced Topics**: Spatial mining, Temporal mining.	5	10

8	**Visualisation:**Data generalization and summarization-based characterization, Analytical characterization: analysis of attribute relevance, Mining class comparisons: Discriminating between different classes, Mining descriptive statistical measures in large databases	05	10
	Total	50	100

T**ext Books:**

- Ralph Kimball, "The Data Warehouse Lifecycle toolkit', 2nd edition, Wiley India.
- Han, Kamber, "Data Mining Concepts and Techniques", 2nd edition ,Elsevier
- Reema Theraja “Data warehousing”, Oxford University Press.
- “Introduction to Data Mining”, 1/e Pang-Ning Tan, Vipin Kumar, Michael Steinbach
- Pearson Education
- M.H. Dunham, "Data Mining Introductory and Advanced Topics", Pearson Education.

Reference Books :

- Paulraj Ponniah, "Data Warehousing Fundamentals", Wiley Student edition.
- Galit Shmueli, Nitin Patel, Peter Bruce, “Data mining For Business intelligence”; Wiley
- Student Edition.
- Alex ber son & Stephen J Smith ,“Data Warehousing, Data Mining & OLAP”, Tat McGraw Hill.
- Jamie McLennan & others ,“Data Mining with SQL Server 2008”, Wiley Indian Edition.
- ”, M Berry and G. Linoff,,"Mastering Data Mining Wiley Student Edition.
- R. KimballI, "The Data Warehouse Toolkit', John Wiley.

INFORMATION AND CYBER SECURITY			
Branch : CST/IT	**Sem: VI**	**Lectures: 4 Hr**	**Credit: 4**
Objective : ● Students will learn the need of security in the field of information system which includes hardware, software, data and network. They also understand the threat to the system and what all countermeasures and protocols that can be applied to secure the computer resources.			

Sr. No	**Topic and Details**	**No. of Lectures assigned**	**Weightage in %**
1	**Introduction**: Security, Attacks, Computer criminals, Method of defense	04	06
2	**Cryptography:** Basic Cryptography: Classical Cryptosystems, Public key Cryptography and Cryptographic checksum, Key Management: Key exchange, Key generation, Cryptographic key infrastructure, Storing and revoking keys, Hash algorithm, Digital signature, Cipher Techniques Problems, Stream and block ciphers: AES, DES and RC4.	10	20

3	**Program Security:** Secure programs, Non-malicious program errors, Viruses and other malicious code, Targeted malicious code, Controls against program threats .	10	18
4	**Operating System Security**: Protected objects and methods of protection, Memory address protection, Control of access to general objects, File protection mechanism, Authentication:Authentication basics, Password, Challenge-response, Biometrics	08	14
5	**Database Security:** Security requirements, Reliability and integrity, Sensitive data, Interface, Multilevel database, Proposals for multilevel security.	04	10
6	**Security in Networks**: Threats in networks, Network security control, Firewalls, Intrusion detection systems, Secure e-mail, Networks and cryptography, Example **protocols:** PEM, SSL, Ipsec.	08	16
7	**Security Administration**: Security planning, Risk analysis, Organizational security policies, Physical security, Introduction to disaster management.	03	08
8	**Legal, Privacy, and Ethical Issues in Computer Security:** Protecting programs and data, Information and law, Rights of employees and employers, Software failures, Computer crime,Privacy, Ethical issues in computer society Case studies of ethics.	03	08
	Total	50	100

Text Books:

1. Stallings, "Cryptography And Network Security: Principles and practice".
2. P. Pfleeger and S. L. Pfleeger, "Security in Computing", Pearson Education.
3. Matt Bishop, "Computer Security : Art and Science", Pearson Education

Reference Books:

- Kaufman, Perlman, Speciner, "Network Security"
- Eric Maiwald, "Network Security: A Beginner's Guide", TMH
- Bruce Schneier, "Applied Cryptograph"", John Wiley.
- Whitman, Mattord, "Principles of information security", Thomson

IMAGE PROCESSING			
Branch :CST/IT	**Sem: VI**	**Lectures: 4 Hr**	**Credit: 4**

Objective :

- **To know and understand how computers can process digital images.**
- **To know the basic operations (their basis, implementation and consequences) in image processing.**
- **To know the relation to image processing and other fields.**
- **Give the students a useful skill base that would allow them to carry out further study should they be interested and to work in the field.**

Sr. No	Topic and Details	No. of Lectures assigned	Weightage in %\
1	Image fundamentals: Introduction to Digital Image Processing, Examples of fields that use DIP, Gray scale and colour images, Image sampling and quantization, Some basic relationship between pixels .	7	15
2	Image Transforms: Discrete Fourier Transform (DFT), Walsh Hadamard Transform (WHT), Haar Transform, Karhunen-Loeve Transform (KLT), Discrete Cosine Transform (DCT).	7	15
3	Image Enhancement: Enhancement in Spatial Domain : Some basic Gray Level Transformations, Histogram Processing, Enhancement using Arithmetic/Logic operations, Basics of Spatial Filtering, Smoothing Spatial Filtering, Sharpening Spatial Filtering. Enhancement in Frequency Domain: Smoothing frequency domain filters, Sharpening frequency domain filters and Homomorphic filtering.	7	15
4	Image Compression: Introduction, redundancy, types of redundancies, Fidelity criterion, Image compression models- Source encoder and Source Decoder, Channel Encoder and Decoder. Lossless compression: Variable length coding, Bit plane coding, Lossless Predictive coding techniques. Lossy Compression: Lossy coding, Transform coding.	7	15
5	Image Segmentation: Detection of discontinuities (Point, Line, Edge and Combined), Edge Linking and Boundary Detection, Thresholding, Region growing, Split and merge.	6	10
6	Representation and Description: Representation, Boundary descriptors, Regional descriptors. Morphological Image Processing: Dilation and Erosion, Opening and Closing,	6	10
7	Image texture analysis: Co-occurrence matrix, Measures of textures, Statistical models for texture.	4	10
8	Current research trends and applications in imaging such as Geo-patial echnologies and Medical Images.	6	10

Text book:

- Rafael C. Gonzalez, Richard E. (Richard Eugene) Woods, and Steven L. Ed-dins. Digital Image processing using MATLAB. Pearson Prentice Hall, 2004.

Reference Books:

7. R. M. Haralick and L. G. Shapiro.Computer and Robot Vision, volume 1, chapter 7, pages 303{370. Addison-Wesley, 1992.
8. Anil K. Jain. Fundamentals of Digital Image Processing. Prentice-Hall, 1989.
9. W. K. Pratt. Digital Image Processing. Wiley-Interscience, 1978.
10. A. Rosenfeld and A. C. Kak. Digital Picture Processing. Academic Press, 1976.

SOFTWARE ENGINEERING			
Branch : CST/IT	**Sem: VI**	**Lectures: 4 Hr**	**Credit: 4**

Objective :

5. In this course, students will gain a broad understanding of the discipline of software engineering and it application to the development and management of software systems.
6. Knowledge of basic SW engineering methods and practices, and their appropriate application.
7. A general understanding of software process models such as the waterfall and evolutionary models.
8. An understanding of the role of project management including planning, scheduling, risk management, etc.
9. An understanding of software requirements and the SRS document, architectural styles.
10. An understanding of implementation issues such as modularity and coding standards.
11. An understanding of approaches to verification and validation including static analysis, reviews and testing.

Sr. No	Topic and Details	No. of Lectures assigned	Weightage in %
1.	**Software Engineering Process:** Introduction to software engineering, various definition, goals, software characteristics, application, classic life cycle, prototyping model, Evolutionary software process model, fourth generation techniques, software measurement, size-oriented metrics, factors that affect the quality.	4	8
2.	**Software project planning:** Defining the problem, developing a solution strategy, planning a development process, factors to be considered in project planning, format of SRS, factors to be considered in setting a goal, project planning objectives, software scope, feasibility study, economical analysis, technical analysis, alternatives, resources, human resources, reusable software, environmental resources, software project estimation, various estimation techniques, COCOMO model, Putnam estimation techniques, Decomposition technique, LOC based technique, FP based estimation, effort estimation, empirical estimation models, make-buy decision tree.	8	16

3.	**Project management**: Project management concepts, project team structure, risk analysis, identification, projection, assessment, monitoring the risk, software project scheduling, people work relationship, task definition and parallelism, effort distribution, scheduling methods, project tracking and control, software acquisition, software re-engineering, Software quality assurance- Quality concepts, quality control, quality assurance, cost of quality, TQM, SQA activities, software reviews, cost impact of software defects, defect amplification and removal, technical reviews, software reliability, mistake proofing for software, the ISO 9000 quality standards, SQA plan,	8	16
4	**Conventional methods for software engineering:** System engineering, computer system engineering, human factors and human engineering, cost benefit analysis, requirement engineering, requirement analysis, specification, system modeling, and requirement management, Analysis concepts and principles: Requirement analysis, requirement elicitation for software, analysis principles, software prototyping, specification and specification principles, the elements of analysis model, data modeling, functional modeling, and information flow, behavior modeling, the mechanics of structured analysis, the data dictionary.	8	16
5.	Design concepts and principles: Software design and software engineering, the design process, design principles and design concepts, effective modular design approach, design model, design documentation, architectural design, data design, architectural style, mapping requirements, into a software architecture, user interface design, the golden rules, interface design model, user interface design process, task analysis and modeling, interface design activities, implementation tools.	6	12
6.	Software testing techniques: Software testing fundamentals, test case design, white-box testing, basis path testing, control structure testing, black box testing, software testing strategies, unit testing, integration testing, verification and validation techniques, software maintenance, maintainability, maintenance tools and techniques, system testing.	8	16
7.	Introduction to object oriented software engineering : Object oriented concepts and principles, object oriented analysis, and object oriented design**.**	4	8
8.	Computer-Aided Software Engineering: Introduction to CASE, building blocks of CASE, CASE tools, Integrated CASE environment, Introduction to Software Engineering standards IEEE 12207, SWEBK-Software engineering Body of Knowledge	4	8
	Total	50	100

Text Book:

- Roger S. Pressman, “Software Engineering, A Practioners Approach”, 5th edition, McGraw Hill Publication, 1999. (Rs.323.54/-)
- Shari Lawrence Peleeger, “Software Engineering, Theory and Practice”, 5th Edition, PHI publication, 1998. (Rs.633.35/-).

Reference Books:

1. Carlo Gheezi, Mehdi Jazayeri, “Fundamentals of Software Engineering”, 2nd Edition, PHI publication, 1995. (Rs.150/-)
2. Richard Fairly, “Software Engineering Concepts”, 3rd Edition, Tata McGraw Hill Publication, 1997. (Rs.255/-)
3. Ian Sommerville, “Software Engineering”, 6th Edition, Low Price Edition Publication, 2002.

(Rs.275/-)
4. Watts S. Humphrey, **"**Managing Software Process", 2nd Edition, Addison Wesley Publication, 1989. (Rs.786.39/-)
5. Boris Beizer, " Software Testing Techniques", Dreamtech

THEORITICAL COMPUETR SCIENCE			
Branch : CST	**Sem: VI**	**Lectures: 4 Hr**	**Credit: 4**

Objective :

- **Identify finite automata, non-finite automata and regular languages of Theoritical computer science.**
- **Analyze theorem for regular expression and algorithms for regular sets.**
- **Classify context free language and different types of automata.**
- **Design machines and models for languages in theoretical computer science.**
- **Application of finite automata**

Sr. No	**Topic and Details**	**No. of Lectures assigned**	**Weightage in %**
1	Finite Automata and Regular Language: basic definition, representation. DFA: formal definition, construction of different DFA models (examples). NFA: formal definition, construction of different NFA models (examples). Equivalence of DFA's and NFA's NFA with □-moves: formal definition, □-CLOSURE of a state, construction of different NFA with □-moves model (examples). Equivalence of NFA's with and without □-moves. Regular Expression: definition, language generated by regular expression, different operation on regular language such as concatenation, closure, union, interaction with corresponding DFA designs.	08	16
2	Kleene's Theorem: 1) To each regular expression there corresponds a finite automata, different designing problems. 2) To each finite automata there corresponds a regular expression, different designing problems. Minimal State Finite Automata: neccesity and advantages of minimization, minimization algorithm	02	08
3	Finite automata with output: basic concept, advantages, different models. Moore m/c: formal definition, construction of different Moore m/c models (examples). Mealy m/c: formal definition, construction of Mealy m/c models (examlpes) Equivalence of Moore and Mealy m/c	03	08

4	Applications of finite automata: lexical analyzer, text editor. Properties of regular sets: the pumping lemma for regular sets, application of the pumping lemma, closure properties of regular sets. Boolean operation: substitution and homomorphism, quotients of language. Decision algorithms for regular sets: 1) emptiness, finiteness, and infiniteness, 2) equivalence of FA.	03	08
5	Context free language: Grammar: definition, grammar constituents, need of grammar. Phrase structure grammar: formal definition, sentential form. Context free grammar: definition, notations. Derivation: left most derivation, right most derivation, derivation tree, ambiguous context free grammar, and removal of ambiguity from CFG. Simplification of CFG: live variable, reachable variable, useful and useless production, removal of useless variables and useless productions, Nullable variable, □-production, removal of □-productions, unit production, removal of unit productions. Normal forms: Comsky normal form, Greibach normal forms. Context free language: definition, construction of CFG for given CFL, CFL for CFG. Closure properties of CFL's: substitution and homomorphism, Boolean operation, use of closure properites, applications of CFG. Chomsky Hierarchy: left and right linear grammar, equivalence of regular grammar and finite automata.	10	10
6	Push Down Automata: formal definition, instantaneous description, accepted language, construction of PDA for given CFG and CFL, deterministic and non-deterministic PDA, construction of CFG for given PDA.	04	10
7	Turing Machine: formal definition, instantaneous description, construction of TM for given language (examlpe) computable languages and functions with a TM. Techniques for TM construction: storage in the finite control, multiple tracks, checking off symbols, shifting over, subroutines combining Turing machines Modification / Variations of Turing machine: Two way infinite tapes, multi tape Turing machines, off line Turing machine, Church's hypothesis, simulation of RAM by TM, Universal Turing Machine	06	20
8	Undecidability: decidable and undecidable problem. Recursive and recursively enumerable language: definition, properties. UTM and an undecidable problem: Tm codes, A non-recursive enumerable language, the universal language, halting problems, other unsolvable problems about TM. Post's correspondence problems: an instance of PCP modified version of PCP, undecidablity of PCP, applications of PCP.	06	10

9	Deterministic Context Free Language: definition, purpose. LR (0) Grammar: definition, LR- items such as item, handle, viable prefix, valid item, complete item, closure of item, GOTO, collecting set of LR (0) items. SLR parser construction: follow, finding follow of a non-terminal, first, finding first, parser construction method, working of SLR parser. LR (1) Grammar: definition, different properties. Canonical LR parser. LR (k) Grammar: definition, properties.	08	10
	Total	50	100

Text Books

1. John C. Martin, Introduction To Languages And Theory Of Computation, 2nd Edition, Tata McGraw Hill, 1998. (Rs. 185/-)
2. John E. Hopcroft, Jeffery D. Ullman, Introduction To Automata Theory, Languages And Computation, Narosa Publication House, 1998. (Rs. 165/-)
3. Harry R. Lewis, Christos H. Papadimitriou, Elements Of The Theory Of Computation, PHI, 1996. (Rs. 125/-)

MOBILE COMPUTING AND APPLICATON			
Branch : CST	**Sem: VI**	**Lectures: 4 Hr**	**Credit: 4**
Objective : •			

DATA MINING AND DATA WAREHOUSING LAB			
Branch : IT/CST	**Sem: VI**	**Practical Hrs: 2Hr**	**Credit: 2**

Sr. No	**Detail Syllabus**		
	1. Study Data Warehousing open source tools. 2. Solve a particular Case Study for Data Warehouse. 3. Study Data Transformation Services (DTS) in SQL Server . 4. Study Data Mining open source tools. 5. OLAP Operations using MS Excel Pivot Table. 6. Study of WEKA tool for Data Mining. 7. Implementation of K-MEANS algorithm. 8. Implementation of Naive Bayes classification. 9. Implementation of Apriori algorithm.		

INFORMATION AND CYBER SECURITY LAB			
Branch : IT/CST	**Sem: VI**	**Practical Hrs: 2Hr**	**Credit: 2**

IMAGE PROCESSING LAB			
Branch : IT/CST	**Sem: VI**	**Practical Hrs: 2Hr**	**Credit: 2**

Sem VII

ADVANCE OS AND SYSTEM PROGRAMMING			
Branch : CST/IT	**Sem: VII**	**Lectures: 4 Hr**	**Credit: 4**

Objective :

-Define, explain, and apply operating systems concepts: process management, CPU scheduling, synchronization, memory management, file system, and the like.

-Use the operating system interface.

-Gain experience in implementing and debugging operating system components, including the kernel module, system call, synchronization primitives, and the file system.

Sr. No	Topic and Details	No. of Lectures assigned	Weightage in %
1.	Abstractions: Hardware Resources OS Functionality Managing the CPU and Memory OS Structure • The SPIN Approach • The Exokernel Approach • The L3 Micro-Kernel Approach	4	8

2.	Virtualization • Intro to Virtualization • Memory Virtualization • CPU and Device Virtualization Parallelism • Shared Memory Machines • Synchronization • Communication	8	16
3.	Distributed Systems • Definitions • Lamport Clocks • Latency limits Distributed Object Technology • Spring Operating System • Java RMI • Enterprise Java Beans	8	16
4	Design and Implementation of Distributed Services • Global Memory System • Distributed Shared Memory • Distributed File System System Recovery • Lightweight Recoverable Virtual Memory • Rio Vista • Quicksilver	8	16
5	Overview of System Software: Introduction , Software Hierarchy, Systems Programming, Machine Structure, Interfaces, Address Space, Computer Languages, Tools, Life Cycle of a Source Program, Different Views on the Meaning of a Program, System Software Development, Recent Trends in SoftwareDevelopment, Levels of System Software	6	12

6	Macro and Macro Processors Introduction, Macro Definition and Call, Macro Expansion, Nested Macro alls, Advanced Macro Facilities, Design Of a Macro Pre-processor, design f a Macro Assembler, Functions of a Macro Processor, Basic Tasks of a Macro Processor, Design Issues of Macro Processors, Features, Macro Processor Design Options, Two-Pass Macro Processors, One-Pass Macro Process Linkers and Loaders Introduction, Relocation of Linking Concept, Design of a Linker, Self-Relocating Programs, Linking in MSDOS, Linking of Overlay Structured Programs, Dynamic Linking, Loaders, Different Loading Schemes, Sequential and Direct Loaders, Compile-and-Go Loaders, General Loader Schemes, Absolute Loaders, Relocating Loaders, Practical Relocating Loaders, Linking Loaders, Relocating Linking Loaders, Linkers v/s Loaders	8	16
7	Scanning and Parsing Programming Language Grammars, Classification of Grammar, Ambiguity in Grammatic Specification, Scanning, Parsing, Top Down Parsing, Bottom up Parsing, Language Processor Development Tools, LEX Compilers Causes of Large Semantic Gap, Binding and Binding Times, Data Structure used in Compiling, Scope Rules, Memory Allocation, Compilation of Expression, Compilation of Control Structure, Code Optimization	4	8
8	Interpreters & Debuggers Benefits of Interpretation, Overview of Interpretation, The Java Language Environment, Java Virtual Machine, Types of Errors, Debugging Procedures, Classification of Debuggers, Dynamic/Interactive Debugger	4	8
		50	100

Textbooks:

1. System Programming

Author :D M Dhamdhere by McGraw Hill Publication

2. System Programming and Compi ler Construction

Author : R.K. Maurya & A. Godbole

ADVANCED DATABASES			
Branch : CST/IT	**Sem: VII**	**Lectures: 4 Hr**	**Credit: 4**

Objectives:

- **To understand fundamental transaction processing, concurrency and recovery**
- **control issues associated with database management system.**
- **To develop understanding of database systems theory in order to apply that**
- **knowledge to any particular database implementation using SQL and XML.**
- **To learn and understand various database architectures**.

Module	Sr. No	Topic and Details	No. of Lectures assigned	Marks assigned
UNIT I	1	The Extended Entity Relationship Model & Object Model: The ER Model revisited, Motivation for complex data types, user defined abstract data types & structured types, sub classes, super classes, inheritance, Specialization & generalization, relationship types of degree higher than two.	6	10
	2	Object-Oriented databases: Overview of object-oriented concepts, object identity, object structure, & type constructors, encapsulation of operation, methods & persistence, type hierarchies & inheritance, type extends & queries, complex objects; database schema design for OODBMS; OQL, persistent programming Languages; OODBMS architecture & storage issues; transactions & concurrency control, example of ODBMS.	10	14
UNIT II	3	Object Relational & Extended Relational Databases: Database design for an ORDBMS-Nested relations and collections; Storage and access methods, Query processing and Optimization; An overview of SQL3, Implementation issues foe extended type; Systems comparison of RDBMS, OODBMS, ORDBMS.	10	14
	4	Parallel and Distributed Databases & client –server architecture: Architecture for parallel databases, parallel query evaluation; parallelizing individual operations, sorting, joins; distributed database concepts, data fragmentation, replication & allocation techniques for distributed database design; query processing in distributed databases; concurrency control & recovery in distributed databases. An overview of client server architecture.	10	14

UNIT III	5	Databases on the web & semi structured data: WEB interfaces to the WEB, overview of XML, structure of XML data, document schema, querying XML data; storage of XML data, XML application; the semi structured data model, implementation issues, indexes for text data.	8	14
UNIT IV	6	Enhanced data model for advanced applications: Active database concepts, Temporal database concepts; Spatial Data Management: Types of Spatial Data and Queries Application involving Spatial data. Introduction to spatial Indexes, Indexing based on space filling Curves, Grid files, R trees, High command Indexing	5	12
	7	Deductive Databases: Recursive Queries, Theoretical foundation, Recursive Queries with Negation, Efficient evaluation of Recursive Queries, Additional Transaction Processing. Advance transaction processing Integrated access to Multiply data sources, Mobile database, multiplying database, Geographic Information systems. Temporal and Sequence database, Information Visualization.	6	12
	8	New trends in distributed databases, mobile database. Case study of android.	5	10
		Total	60	100

Text Books:

1.Elmasri and Navathe, “Fundamentals of Database Systems”, Pearson Education.
2.Raghu Ramakrishnan, Johannes Gehrke, “ Database Management systems”, McGraw-Hill

Reference Books:

1. Korth, Silberchatz, Sudarshan, “Database System Concepts”, McGraw-Hill.
2. Peter Rob and Coronel, ”Database systems, Design, Implementation and Management”, Thomson learning.
3. J. Date, Longman, “Introduction to Database systems”, Pearson Education.

DEEP LEARNING			
Branch : CST/IT	**Sem: VII**	**Lectures: 4 Hr**	**Credit: 4**

Objective :

This course introduces several fundamental concepts and methods for machine learning.

The objective is to familiarize the audience with some basic learning algorithms and techniques and their applications, as well as general questions related to analyzing and handling large data sets.

Sr. No	Topic and Details	No. of Lectures assigned	Weightage in %
1	**DeepLearning fundamentals:** - What is deep learning: AI, ML and Deep Learning, History of Machine Learning - Mathematical Building Blocks Neural Networks: Data Representations, Tensor operations, gradient based optimization,	10	25
2	**Neural networks and Machine Learning:** - Binary classification, multiclass classifiation, regression - Four branches of ML, Evaluating ML models, Data processing, feature engineering and feature learning, Overfitting and Underfitting, The Universal workflow of ML	15	25
3	**Deep Learning in Practice:** Introduction to Convnets, Training a convnet on small datasets, Using pretrained convnets, Working with text data, Understanding recurrent neural networks(RNNs), Advanced use of RNNs, Sequence processing with convnets	15	25
4	**Advances in Deep Learning:** - Advanced Deep Learning best practices: Beyond the Sequential Model, Inspecting and Monitoring deep-learning models -Generative Deep Learning: Text generation, DeepDream, Neural style transfer, generating images with autoencoders, generative adverserial networks(GANs) -Limitations and future of Deep Learning	10	25
	Total	**50**	**100**

References:

1. Bishop, C. (2006). Pattern Recognition and Machine Learning. Berlin: Springer-Verlag.

COMPILER CONSTRUCTION			
Branch : CST	**Sem: VI**	**Lectures: 4 Hr**	**Credit: 4**

Objective : The learners will be able to understand

- **Identify merits of compiler construction algorithms and suggest suitable algorithm for the application.**
- **Implement the lexical analysis, syntax analysis using Matlab /Octave / Python.**
- **Create the structure of Intermediate code generation for the given application.**
- **Learn about the most effective compiler construction techniques, and gain practice implementing them and getting them to work for yourself.**

Sr. No	Topic and Details	No. of Lectures assigned	Weightage in %
1	Compiler structure: analysis-synthesis model of compilation, various phases of a compiler, tool based approach to compiler construction.	2	5
2	Lexical analysis: interface with input, parser and symbol table, token, lexeme and patterns, difficulties in lexical analysis, error reporting, and implementation. Regular definition, Transition diagrams, LEX.	6	15
3	Syntax analysis: context free grammars, ambiguity, associativity, precedence, top down parsing, recursive descent parsing, transformation on the grammars, predictive parsing, Bottom up parsing, operator precedence grammars, LR parsers (SLR, LALR, LR), YACC.	10	20
4	Syntax directed definitions: inherited and synthesized attributes, dependency graph, evaluation order, bottom up and top down evaluation of attributes, L- and S-attributed definitions.	6	10
5	Type checking: type system, type expressions, structural and name equivalence of types, type conversion, overloaded functions and operators, polymorphic functions.	5	7
6	Run time system: storage organization, activation tree, activation record, parameter passing, symbol table, dynamic storage allocation.	4	8
7	Intermediate code generation: intermediate representations, translation of declarations, assignments Intermediate Code generation for control flow, boolean expressions and procedure calls, implementation issues.	5	15
8	Code generation and instruction selection: issues, basic blocks and flow graphs, register allocation, code generation, DAG representation of programs, code generation from dags, peep hole optimization, code generator generators, specifications of machine.	6	10
9	Code optimization: source of optimizations, optimization of basic blocks, loops, global data flow analysis, solution to iterative data flow equations. Code improving transformations, dealing with aliases, data flow analysis of structured flow graphs	6	15
	Total	50	100

Text Books:

1. Aho, Ullman, Sethi " Compilers : Principles, Techniques and Tools", Prentice Hall, 2nd Edition
2. D. M. Dhamdhere, " Compiler Construction", Macmillan Publishers India, 2nd Edition
3. R. K. Maurya, "System Programming and Compiler Construction", Wiley-dreamtech
4. Torben, Mogensen, " Basics of Compiler Design", University of Copenhagen,2010

ELECTIVE- I			
Branch : CST/IT	**Sem: VII**	**Lectures: 4 Hr**	**Credit: 4**

Data Science & Business Analytics				
Branch: CST/IT		**Sem: VII**	**Lectures:**	**Credit:**
Sr. No	**Topic and Details**		**No. of Lectures assigned**	**Weightage in %**
1	**Introduction to Data Science:** What is Data Science, Applications of Data Science in our day-to- day life, Role of Data Scientist and Challenges, Introduction to Python.		2	5
2	**Visualization of Data:** Matplotlib, Bar Charts, Line Charts, Scatter Charts.		5	10
3	**Review of Linear Algebra, Matrices Operation:** Vectors, Matrices, Operations on Vectors and Matrices, Statistics and Probability.		5	10
4	**Hypothesis & Inferences:** Statistical Hypothesis Testing, Bayesian Inference.		5	10
5	**Working with Data:** Reading and writing data, Scraping the web, Exploring data, Cleaning and Munging, Manipulating data, Rescaling, Dimensionality Reduction.		8	15
6	**Naive Bayes:** What is Naive Bayes algorithm, How Naive Bayes Algorithms works, What are the Pros and Cons of using Naive Bayes, Applications of Naive Bayes Algorithm, building a basic Naive Bayes Model.		5	10

7	**Operations on Datasets** Clustering : The model, choosing k, Bottom up Hierarchical clustering Introduction to Network Analysis: Betweenness and Eigen Vector Centrality, Directed Graph and Page Rank Decision Trees: What is a Decision tree, Entropy ,Random Forests Map Reduce:Why MapReduce, Combiners.	8	15
8	**Various Business Analytic Models.**	12	25
	Total	**50**	**100**

CLOUD COMPUTING			
Branch : CST/IT	**Sem: VIII**	**Lectures: 4 Hr**	**Credit: 4**

Objective :

Students should be able to :

- **Identify key elements of the cloud computing**
- **Understand and appreciate the need for cloud computing, and identify their use in industrial applications**
- **Analyse the current issues in cloud computing**

Sr. No	**Topic and Details**	**No. of Lectures assigned**	**Weightage in %**
1	Introduction to Cloud Computing, Definition, Characteristics, Components, Cloud provider, SAAS, PAAS, IAAS and Others, Organizational scenarios of clouds, Administering & Monitoring cloud services, benefits and limitations, Deploy application over cloud.	8	16
2	Cloud computing platforms: Infrastructure as service: Amazon EC2,Platform as Service: Google App Engine, Microsoft Azure, Utility Computing, Elastic Computing ,Comparison among SAAS, PAAS, IAAS Cloud computing platforms	6	12
3	Introduction to Cloud Technologies, Study of Hypervisors Compare SOAP and REST Webservices, AJAX and mashups-Web services: SOAP and REST, SOAP versus REST, AJAX: asynchronous 'rich' interfaces, Mashups: user interface services.	6	12
4	Virtualization Technology: Virtual machine technology, virtualization applications in enterprises, Pitfalls of virtualization Multitenant software: Multi-entity support, Multi-schema approach, Multi-tenance using cloud data stores, Data access control for enterprise applications,	6	12
5	Data in the cloud: Relational databases, Cloud file systems: GFS and HDFS, BigTable, HBase and Dynamo. Map-Reduce and extensions: Parallel computing, The map-Reduce model, Parallel efficiency of Map-Reduce, Relational operations using Map-Reduce, Enterprise batch processing using Map-Reduce, Introduction to cloud development, Example/Application of Mapreduce, Features and comparisons among GFS,HDFS etc, Map-Reduce model	6	12

6	Data in the cloud: Relational databases, Cloud file systems: GFS and HDFS, BigTable, HBase and Dynamo. Map-Reduce and extensions: Parallel computing, The map-Reduce model, Parallel efficiency of Map-Reduce, Relational operations using Map-Reduce, Enterprise batch processing using Map-Reduce, Introduction to cloud development, Example/Application of Mapreduce, Features and comparisons among GFS,HDFS etc, Map-Reduce model	6	12
7	Issues in cloud computing, Implementing real time application over cloud platform Issues in Intercloud environments, QOS Issues in Cloud, Dependability, data migration, streaming in Cloud. Quality of Service (QoS) monitoring in a Cloud computing environment. Cloud Middleware. Mobile Cloud Computing. Inter Cloud issues. A grid of clouds, Sky computing, load balancing, resource optimization, resource dynamic reconfiguration, Monitoring in Cloud	6	12
8	Cloud computing platforms, Installing cloud platforms and performance evaluation Features and functions of cloud platforms: Xen Cloud Platform, Eucalyptus, OpenNebula, Nimbus, TPlatform, Apache Virtual Computing Lab (VCL), Enomaly Elastic Computing Platform,	6	12
	Total	50	100

Text Books:

1. Judith Hurwitz, R.Bloor, M.Kanfman, F.Halper, “Cloud Computing for Dummies”, Wiley India Edition
2. Gautam Shroff,“Enterprise Cloud Computing”,Cambridge.
3. Ronald Krutz and Russell Dean Vines “Cloud Security” , Wiley-India.

Reference Book:

1. Scott Granneman, “Google Apps” ,Pearson.
2. Tim Malhar, S.Kumaraswammy, S.Latif, “Cloud Security & Privacy” (SPD,O’REILLY).
3. Antohy T Velte, “Cloud Computing : A Practical Approach”, McGraw Hill.
4. Barrie Sosinsky,”Cloud Computing Bible “, Wiley India.

ELECTIVE- II			
Branch : CST/IT	**Sem: VII**	**Lectures: 4 Hr**	**Credit: 4**

CLOUD COMPUTING LAB			
Branch : IT/CST	**Sem: VIII**	**Practical Hrs: 2Hr**	**Credit: 2**

Sr. No	**Detail Syllabus**		

	1. Study of cloud environment- Types of cloud and company service provider. 2. Set up the client server environment. 3. Set up simple cloud (public/ private/ hybrid). 4. Store data on one cloud and give access to multiple clients. 5. Store multiple data on multiple cloud and share the details. 6. Provide security mechanism for cloud. 7. Perform data migration operation on multiple cloud.		