DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SYLLABUS

FOR

M.TECH (CSE) 5 year

(Master of Technology)
In
Computer Science & Engineering

5 YEAR COURSE

Sri Guru Granth Sahib World University, Fatehgarh Sahib

Batch: 2011-16

M. TECH Integrated CSE (5 Year)

1. Structure and Duration of the Programme :

(i) The course for the Degree of M.Tech 5 Year shall be spread over 5 years to be called Semester I, II, III, IV, V,VI,VII,VIII,IX and X . The examination for the I ,III,V,VI and IX Semesters shall be held in the month of November/December and for the II,IV,VI Semester and VIII Semesters in the month of April/May or on such other dates as may be fixed by the Academic Council.

(ii) The normal duration of M.Tech programme including Thesis will be 5 academic years (10 semesters). The maximum period of completion of the programme including Thesis shall be 7 academic years (14 semesters) only if extension in genuine hardship cases is allowed by the Vice-Chancellor of Sri Guru Granth Sahib World University.

2. Examination Scheme for Theory Modules:

Each Theory Paper will be of 100 marks of which 50 marks will be for internal assessment and 50 marks for the external end semester exam.

a) Internal Paper Assessment Distribution

The internal assessment will carry 50 marks & it will be distributed as follows:

1. First sessional test (15 marks)
2. Second sessional test (15 marks)
3. Seminar/assignment & Quiz (10 marks)
4. Attendance (5 marks)
5. Class behavior (5 marks)

b) External Assessment Marks Distribution

The external paper will carry 50 marks and will be of 3 hours duration. The question paper will be divided into three sections (A, B and C). Section A will be Compulsory which consists of 5 short answer type questions of 2 mark. Section B will consist of 6 questions of 5 marks each. Student will be required attempt any 4 questions from section B. Section C will consist of 3 questions of 10 marks each. Students will be required to attempt any 2 questions. The question paper should be spread uniformly over the whole of the syllabus.

3. Examination Scheme for Practical Modules:

Each Practical exam will be of 50 marks based on the assessment by internal and external examiners jointly. The external practical exam will carry 50 marks as per following distribution:

1. Viva (15 marks)
2. Written exam (15 marks)
3. File Work (10 marks)
4. Attendance (5 marks)
5. Class behavior (5 marks)

4. Preliminary Thesis/Thesis

Four neatly typed or printed copies of Thesis hard bound, shall be submitted to University through Guide, as per the prescribed format.

SRI GURU GRANTH SAHIB WORLD UNIVERSITY
SCHEME & EXAMINATION SCHEME

M.TECH COMPUTER SCIENCE & ENGINEERING — FIRST SEMESTER

COURSE CODE	TITLE	SCHEDULE OF TEACHING			CREDIT	Marks	
		LECTURE	TUTORIAL	PRACTICAL		Internal	External
MCEF 101	Applied Mathematics I	3	1	-	4	50	50
MCEF 102	Applied Physics I	3	1	-	4	50	50
MCEF 103	Chemistry I	3	1	-	4	50	50
MCEF 104	Communication Skills	2	0	-	2	50	50
MCEF 105	Computer Fundamental & Programming in C	3	1	-	4	50	50
MCEF 106	Engineering Mechanics	3	1	-	4	50	50
MCEF 107	Engineering Drawing	0	0	6	3	50	50
MCEF 102 L	Applied Physics Lab	-	-	2	1	-	50
MCEF 103L	Applied Chemistry Lab	-	-	2	1	-	50
MCEF 105L	Computer Fundamental & Programming in C Lab	-	-	2	1	-	50
ETHV I	Ethics and Values	2	-	-	0	50	-
	Total	19	5	12	28	400	500

SRI GURU GRANTH SAHIB WORLD UNIVERSITY

SCHEME & EXAMINATION SCHEME

M.TECH COMPUTER SCIENCE & ENGINEERING SECOND SEMESTER

COURSE NO.	TITLE	SCHEDULE OF TEACHING				Marks	
		LECTURE	TUTORIAL	PRACTICAL	CREDIT	Internal	External
MCEF-201	Applied Mathematics II	3	1	-	4	50	50
MCEF -202	Applied Physics II	3	1	-	4	50	50
MCEF -203	Chemistry II	3	1	-	4	50	50
MCEF -204	Fundamentals of Nano science & Technology	3	0	-	3	50	50
MCEF -205	Introduction to Biotechnology	3	0	-	3	50	50
MCEF -206	Electrical & Electronics Engineering	3	0	-	3	50	50
MCEF -207	Manufacturing Processes	3	0	0	3	50	50
MCEF-202 L	Applied Physics II Lab	-	-	2	1		50
MCEF-203 L	Applied Chemistry II Lab	-	-	2	1		50
MCEF- 206L	Electrical & Electronics Engineering Lab	-	-	2	1		50
MCEF-208 L	Workshop Practice	0	0	4	2	50	50
	Total	21	3	10	29	400	550

SRI GURU GRANTH SAHIB WORLD UNIVERSITY

SCHEME & EXAMINATION SCHEME

M.TECH COMPUTER SCIENCE & ENGINEERING THIRD SEMESTER

Course No.	Title	Schedule Of Teaching			Credit	Marks	
		LECTURE	TUTORIAL	PRACTICAL		Internal	External
MCEF-301	Data Structures	3	1	0	4	50	50
MCEF -302	Object Oriented Programming using C++	3	1	0	4	50	50
MCEF -303	Digital Electronics	3	1	0	4	50	50
MCEF -304	System Software	3	1	-	4	50	50
MCEF -305	Organizational behavior	3	-	-	3	50	50
MCEF-306	Environment Studies	3	-	-	3	50	50
MCEF-301 L	Data Structure Lab			2	1	25	25
MCEF -302 L	OOPS Lab	0	0	2	1	25	25
MCEF -303 L	Digital Electronics Lab	0	0	2	1	25	25
	Total	18	4	6	25	375	375

SRI GURU GRANTH SAHIB WORLD UNIVERSITY

SCHEME & EXAMINATION SCHEME

M.TECH COMPUTER SCIENCE & ENGINEERING <u>FOURTH SEMESTER</u>

Course No.	Title	Schedule Of Teaching			Credit	Marks	
		LECTURE	TUTORIAL	PRACTICAL		Internal	External
MCEF-401	Programming Language	3	1	0	4	50	50
MCEF -402	Operating System	3	1	0	4	50	50
MCEF -403	Database Management System	3	1	0	4	50	50
MCEF -404	Data Communication	3	1	0	4	50	50
MCEF -405	Human Resource Management	3	1	0	4	50	50
MCEF-406	Discrete Mathematics	3	1	0	4	50	50
MCEF -401L	Programming Language Lab	0	0	2	1	25	25
MCEF -403L	Database Management System Lab	0	0	2	1	25	25
	Total	18	6	4	26	350	350

SRI GURU GRANTH SAHIB WORLD UNIVERSITY

SCHEME & EXAMINATION SCHEME

M.TECH COMPUTER SCIENCE & ENGINEERING FIFTH SEMESTER

Course No.	Title	Schedule Of Teaching				Marks	
		LECTURE	TUTORIAL	PRACTICAL	CREDIT	Internal	External
MCEF-501	Relational Database Management System	3	1	0	4	50	50
MCEF -502	Computer Networks	3	1	0	4	50	50
MCEF -503	Computer Architecture & Organization	3	1	0	4	50	50
MCEF -504	Web Technology	3	1	0	4	50	50
MCEF -505	Principal & Practice of management	3	1	0	4	50	50
MCEF-506	Industrial Training Viva	0	0	0	4	50	50
MCEF -501 L	Relational Database Management System Lab	0	0	2	1	25	25
MCEF -504L	Web Technology Lab	0	0	2	1	25	25
	Total	15	5	4	26	350	350

SRI GURU GRANTH SAHIB WORLD UNIVERSITY

SCHEME & EXAMINATION SCHEME (Batch 2011-2016)

M.TECH COMPUTER SCIENCE & ENGINEERING SIXTH SEMESTER

Course No.	Title	Schedule Of Teaching			Credit	Marks	
		LECTURE	TUTORIAL	PRACTICAL		Internal	External
MCEF-601	Linux System and Administration	3	1	0	4	50	50
MCEF-602	Artificial Intelligence	3	1	0	4	50	50
MCEF-603	Software Engineering	3	1	0	4	50	50
MCEF-604	Microprocessor and applications	3	1	0	4	50	50
MCEF-605	Design and Analysis of Algorithms	3	1	0	4	50	50
MCEF-601 L	Linux Administration Lab	0	0	2	1	25	25
MCEF-604 L	Microprocessor Lab	0	0	2	1	25	25
MCEF-605 L	Design and Analysis of Algorithms Lab	0	0	2	1	25	25
	Total	15	5	6	23	325	325

SRI GURU GRANTH SAHIB WORLD UNIVERSITY

SCHEME & EXAMINATION SCHEME

M.TECH COMPUTER SCIENCE & ENGINEERING SEVENTH SEMESTER

Course No.	Title	Schedule Of Teaching			Credit	Marks	
		LECTURE	TUTORIAL	PRACTICAL		Internal	External
MCEF 701	Java Programming	3	1	0	4	50	50
MCEF 702	Software Quality Models And Testing	3	1	0	4	50	50
MCEF 703	Compiler Design	3	1	0	4	50	50
MCEF 704	Theory Of Computation	3	1	0	4	50	50
MCEF 705	Distributed Operating System	3	1	0	4	50	50
MCEF 706	Industrial training Viva	0	0	0	4	50	50
MCEF 701L	Java Lab	0	0	2	1	25	25
	TOTAL	15	5	2	25	325	325

SRI GURU GRANTH SAHIB WORLD UNIVERSITY

SCHEME & EXAMINATION SCHEME

M.TECH COMPUTER SCIENCE & ENGINEERING EIGHT SEMESTER

Course No.	Title	Schedule Of Teaching			Credit	Marks	
		LECTURE	TUTORIAL	PRACTICAL		Internal	External
MCEF-801	Computer Graphics	3	1	0	4	50	50
MCEF -802	Wireless Communication And Networks	3	1	0	4	50	50
MCEF -803	Data Warehouse and Mining	3	1	0	4	50	50
MCEF -804/805/806 /807	Elective I	3	1	0	4	50	50
MCEF -808	Major Project	0	0	10	5	100	100
MCEF -801L	Computer Graphics Lab	0	0	2	1	25	25
		12	4	12	22	325	325

List of Elective

Elective I	MCEF 804	Natural Language Processing
	MCEF 805	Information Retrieval
	MCEF 806	Topics in Design and Analysis of Algorithm
	MCEF807	Object Oriented Software Development

SRI GURU GRANTH SAHIB WORLD UNIVERSITY

SCHEME & EXAMINATION SCHEME

M.TECH COMPUTER SCIENCE & ENGINEERING NINTH SEMESTER

Course No.	Title	Schedule Of Teaching				Marks	
		LECTURE	TUTORIAL	PRACTICAL	CREDIT	Internal	External
MCEF-901	Research Methodology	3	1	0	4	50	50
MCEF -902	Digital Image Processing	3	1	-	4	50	50
MCEF - 903/904/905 /906	Elective II	3	1	0	4	50	50
MCEF - 902L	Digital Image Processing Lab	0	0	2	1	25	25
MCEF -907	Synopsis/Pre-Thesis	0	0	0	10	100	150
	Total	9	3	2	23	275	325

List of Elective

Elective II	MCEF 903	Parallel and Randomized Algorithms
	MCEF 904	Multimedia Systems
	MCEF 905	Embedded Systems
	MCEF 906	Network Security

SRI GURU GRANTH SAHIB WORLD UNIVERSITY

SCHEME & EXAMINATION SCHEME

M.TECH COMPUTER SCIENCE & ENGINEERING <u>TENTH SEMESTER</u>

COURSE NO.	TITLE	SCHEDULE OF TEACHING			CREDIT POINTS	Marks	
		LECTURE	TUTORIAL	PRACTICAL		Internal	External
MCET1001	THESIS	-	-	-	30	300	300

Thesis (Thesis May be done in the Department or in Collaboration with National Lab/University/CSIR Labs and seminar organization)

Two seminars (one at the time of initial Stage of Progress and Another before Submission of the Thesis

The examination in the subject of Thesis is to be conducted jointly by two examiners, one of which will be the thesis supervisor, and the other an external examiner.

Semester -I

Course Code: MCEF-101 **Title: Applied Mathematics- I**
[SGGSWU–DCSE] **L/T/P: 3/1/0**

UNIT-I **(20 hrs)**

COMPLEX NUMBERS AND INFINITE SERIES: De Moivre's theorem and roots of complex numbers. Euler's theorem ,Logarithmic Functions ,Circular, Hyperbolic Functions and their Inverses, c+is method. Convergence and Divergence of Infinite series, Comparison test, d' Alembert ratio test.Higher ratio test, Cauchy's root test. Alternating series, Leibnitz test , Absolute and conditional convergence.

UNIT –II **(10 hrs)**

INTEGERAL: Double integrals ,Change of order of integration, double integrals in polar coordinates, Area enclosed by plane curves, triple integrals ,volume of solids, change of variables, area of curved surface and beta-gamma function.

UNIT-III **(15 hrs)**

MATRICES:Rank of matrix ,Linear transformations ,hermitian and skew-Hermitian forms, Inverse of matrix by elementary operations. Consistency of linear simultaneous equations, Diagonalisation of a matrix , Eigen values and eigenvectors. Cayley-Hamilton theorem (without proof),similar matrices.

UNIT-IV **(15 hrs)**

CALCULUS OF SEVERAL VARIABLES: Partial differentiation ,ordinary derivatives of first& second order in terms of partial derivatives ,Euler's theorem on homogeneous functions, change of variables ,Taylor's theorem of two variables and its application to approximate errors. Maxima& Minima of two variables , Lagrange method of undetermined multipiers and jacobians.

Textbooks:

1. Ram Babu , Engineering Mathematics, Pearson Education(2009).

References:

1. Kreyzig,E, Advanced Engineering Mathematics, John Wiley and sons(latest edition)
2. 2 .B.S.Grewal , Advanced Engineering Mathematics, Khanna publishers(latest edition)
3. 3.R.K.Jain,S.R.KIyengar, Advanced Engineering Mathematics ,Narosa publisher(latest edition)

Course Code: MNTF102 **Title: Applied Physics I**
[SGGSWU –DCSE] **L/T/P: 3/1/1**

UNIT I (11 hrs)

Phenomena of Interference, Diffraction and Polarization: Interference, Principle of Superposition,Young's Double Slit Experiment ,Interference from parallel thin films, wedge shaped films, Newton rings, Michelson interferometer. Fresnel Diffraction, Diffraction at a straight edge, Fraunhoffer diffraction due to N slits, Diffraction grating, absent spectra, dispersive power of Grating, resolving power of grating, Introduction, production of plane polarized light by different methods, Brewster and Malus Laws.

UNIT II (10 hrs)

Laser: Introduction, Einstein's Coefficients**,** temporal and spatial coherence, principle of Laser, stimulated and spontaneous emission, He-Ne Laser, Ruby Laser, Application of Lasers.

Fibre Optics: Introduction, numerical aperture, step index and graded index fibres, attenuation & dispersion mechanism in optical fibers (Qualitative only), application of optical fibres, optical communication (block diagram only)

UNIT III (10 hrs)

Solid State Physics: Formation of energy bands in metals, semiconductors and insulators; intrinsic and extrinsic semiconductors, Fermi energy levels for doped, undoped semiconductors and pn junction; Tunnel diode, Zener diode, LED, Laser Diode.

UNIT IV (11 hrs)

Magnetic Materials and Superconductivity: Terminology, Units and Classification of magnetic materials, Types of magnetic materials – Dia, Para, Ferro, Ferri and Antiferro, Intrinsic properties of magnetic materials, Applications of hard and soft magnetic materials, Ferrites and their applications, Meissner Effect, Type I and Type II Superconductors, BCS theory (Qualitative only), London's equation, properties of superconductors & applications.

Reference:

1. Optics: AjoyGhatak (Tata McGraw-Hill Education, 2009).
2. A Text Book Optics: N. Subrahmanyam and BrijLal (S.Chand, 2004).
3. Fundamentals of Optics: Jenkins and White (McGraw-Hill Education, 2001).
4. Engineering Physics: H.R. Verma (Modern's ABC)
5. Concepts of Modern Physics: A. Beiser, S. Mahajan, S. RaiChoudhry (McGraw-Hill, 6th Ed. 2002).
6. Solid State Physics: R. L. Singhal (KedarNath, Ram Nath Co. 2003).
7. Introduction to Solid State Physics: Charles Kittel (John Wiley & Sons, 2007).

Course Code: MCEF103 **Title: Chemistry-I**

[SGGSWU-DCSE] **L/T/P: 3/1/1**

UNIT-I (15 hrs)

Phase Equilibria: Phase boundaries, phase diagrams of one component system-water, carbon, helium and carbondioxide.Twocomponentsystems-Lead-silver.Potassiumiodide-water, phenol-water, triethylamine-water and nicotine-water, mixture of volatile liquids. Thermodynamic description of mixture colligative properties.

UNIT-II (15 hrs)

Water & its treatment: Sources of water, impurities in water, hardness of water and its determination, units of hardness, alkalinity of water and its determination, Related numerical problems, scale and sludge formation(composition properties and methods of prevention). Water and its treatment: Part II – Treatment of water for domestic use, coagulation, sedimentation, filtration and dis-infection, water softening, Ion-exchange process, mixed bed demineralization, Desalination (reverse osmosis) (electrodialysis).

Fuels: Classification,calorificvalueoffuel,(grossandnet),Determinationofcalorificvalueof fuels,Boy'sGascalorimeter,High&Lowtemperaturecarbonization,LiquidFuels–Petroleum-Chemicalcomposition,fractionaldistillation,Cracking-Thermal&catalyticcracking,Octane&CetanceNo.and its significance, LPG as a fuel.

UNIT-III (15 hrs)

Corrosion: Corrosion and its prevention - Galvanic &concentration cell, Dry and wet corrosion, Electrochemicaltheoryofcorrosion,Galvaniccorrosion,pittingcorrosion,water- line corrosion, differential aeration corrosion, stress corrosion, factors affecting corrosion, Preventive measures (proper design, Cathodic protection, protective coatings).

UNIT-IV (15 hrs)

Polymers: Polymers and nomenclature of polymers, various types of polymerization, mechanism of polymerization, preparation properties and technical applications of thermo- plastics (PVC,PVA), thermosets (PF,UF), and elastomers (GR-S,GR-A,GR-M), Silicones, Introduction to polymeric composites, Molecular weight of polymer, vulcanization of rubber.

Text Books:

1.Engineering Chemistry, P.C. Jain, Monica Jain(DhanpatRai&Co.).

2.Chemistryin Engineering&Tech., Vol. I &II, Rajaram, Kuriacose(TMH).

3.Instrumentalmethods of Chemical Analysis, MERITT&WILLARD(East-West Press).

4.Physical Chemistry, P.W. Atkin(ELBS, OxfordPress).

5.Physical Chemistry,W.J. Moore(Orient-Longman).

Syllabus forPractical:

Implementation ofstudied concepts.

Course Code: MCEF -104 **Title: Communication Skills**
[SGGSWU-DCSE] **L/T/P: 2/0/0**
Theory (written): 50 marks **Assessment: 50 marks**

UNIT I (10 hrs)

Basic Concepts in Communication: Communication as Sharing; Concept of Communication; The Speaker/Writer and The Listener/Reader; Medium of Communication; Barriers to Communication;, Brevity, Clarity And Appropriateness in Communication, Requirement of Effective Communication. Importance of Feedback, Stage Confidence.

UNIT II (10hrs)

Personality: Meaning, Determinants, How to cultivate Good Personality, Positive Thinking, Mental Blocks and solutions, Leadership and Decision Making, Motivation and Time Management. Art of Living.

UNIT III (10hrs)

Writing Skills: 1)Report writing on

a) Current trends
b) Event
c) Business report

2) Application for Job or letter writing or preparing advertisement for products and services.

UNIT IV (20hrs)

Language and Grammar:

1) Use of tenses
2) Use of verbs
3) Voice
4) Narration
5) Fill in the blanks with appropriate preposition &determiners
6) One word substitution
7) Idioms and phrases
8) Correction of spellings
9) Common errors
10) Using same words as different parts of speech

Suggested Books:

1. Bansal, R.K. and Harrison, J. B.*Spoken English for India: A Manual of Speech and Phonetics*, Hyderabad:Orient Longman.
2. Best, Wilfred D. *The Student's Companion*, New Delhi: Rupa& Co.
3. Courtland, B. L. and Thill, J.V., *Business Communication Today*, Noida: Pearson Education.
4. Forsyth, Sandy & Lesley Hutchison. *Practical Composition.* Edinburgh: Oliver & Boyd.
5. Sharma, R.S. *Technical Writing*. Delhi: Radha Publication.
6. Sides, Charles H. *How to Write & Present Technical Information*. Cambridge: CUP.
7. Singh, Achhru. *Personality Development & Soft Skills*. Jalandhar: New Academic publishing House co.
8. Singh, Achhru. *University English Grammar and Vocabulary Study*. Chandigarh: Unistar publishers.

Instructions for Paper setting:

External Paper: 50 Marks

Instructions for Paper setter: The external question paper will carry 50 marks and will be of three hours duration. It will consist of four sections. All questions are compulsory. Section A, B and C will have three essay type questions (one each) with internal choice from Unit I, II and III respectively (Each question carries ten marks). Section D will have ten parts (each having two subparts) corresponding to ten segments of Unit IV. Section D comprises 20 marks.

The Internal Assessment: 50 Marks (First MST: 15 marks; Second MST: 15 marks; Assignments/ Presentations/ Viva = 15;Class Attendance = 5 marks)

Course Code: MCEF 105 **Title: Computer Fundamental & Programming in C**
[SGGSWU-DCSE] **L/T/P: 3/1/1**

UNIT-I (12 hrs)

Introduction to Computer:-Definition, Characteristics, Generation of Computers, Capabilities and Limitations. Introduction to Operating System.Concept of Bios, Booting Files.Basic Components of a Computer System-Control Unit, ALU, Input/output functions and characteristics. Memory Introduction, Classifications- Volatile Memory and Non- Volatile , Flash Memory, ROM, RAM, EPROM, PROM, EEPROM other types of memory.Input, Output and storageUnits, Hard Copy Devices: Impact and Non- Impact Printers- Daisy Wheel, Dot Matrix, Line Printer, Chain Printer, Comb Printers, Non Impact Printers- DeskJet, Laser Printer and Plotters.

UNIT-II (10 hrs)

Booting process details of Dos and Windows: - DOS system files, Internal and External Commands, Difference between External and Internal Commands. Internal Commands:- MD, CD, RD, COPY CON, TYPE, DATE & TIME, VOLUME VERSION, REN, PROMPT, CLS, DIR/P/W, COPY , DEL Etc. External commands:- FORMAT , DISKCOPY, DISKCOMP, XCOPY, CHKDISK, SCANDISK, HELP, DEBUG, PRINT etc.
Introduction to Algorithm, flowcharts.

UNIT-III (15 hrs)

C Language preliminaries: C character set, Identifiers and keywords, Data types, Declarations, Expressions, statement and symbolic constants

Input-Output: getchar, putchar, scanf, printf, gets, puts

Pre-processor commands: #include, #define, #if def

Preparing and running a complete C program

Operators and expressions: Arithmetic, unary, logical, bit-wise, assignment and conditional operators

Control statements: While, do-while, for statements, nested loops, if else, switch, break, Continue, and goto statements, comma operators

Storage types: Automatic, external, register and static variables.

UNIT IV (15 hrs)

Functions: Defining and accessing, passing arguments, Function prototypes, Recursion, Library functions, Static functions

Arrays: Defining and processing, Passing arrays to a function, Multi dimensional arrays.

Strings: Defining and operations on strings.

Structures: Defining and processing, Passing to a function, Unions, typedef, array of structure, and pointer to structure

Syllabus for Practical:

Implementation of studied concepts.

Books Recommended

1. Fundamentals of computers by V. Rajaraman
2. Computer Fundamentals by P.K. Sinha
3. Fundamentals of Computers by E. Balaguruswamy.
4. Complete reference with C Tata McGraw Hill
5. C – programming E.Balagurusamy Tata McGray Hill
6. The C programming language : Kerninghan and Ritchie
7. Mastering C by Venugopal, Prasad – TMH
8. Let Us C by kanetkar

Course Code: MCEF -106 **Title: Engineering Mechanics**
[SGGSWU- DCSE] **L/T/P: 3/1/0**

UNIT – I

Force System: Various types of force systems, Free Body diagram, Equilibrium equations and its applications in the plane of concurrent force system.

Friction: Introduction, Dry friction and its laws, Co-efficient of friction, Angle of friction, Angle of repose, Cone of friction, Applications of friction – Screw jack and Open flat belt drive.

UNIT – II

Structure: Plane truss, Perfect and imperfect truss, Assumption in the truss analysis, Analysis of perfect plane trusses by the method of joints, Method of section.

Centroid, centre of mass and centre of gravity: Introduction, Centre of gravity of a body: Determination by the methods of moments, Concept of Centroid, Centroid Of two dimensional bodies, Determination of Centroid and Centre of gravity: Integration method, Centroid of a composite plane figure.

UNIT – III

Kinematics of Rigid Body: Introduction, Plane Motion of Rigid Body, Velocity and Acceleration under Translation and Rotational Motion, Relative Velocity.

Kinetics of Rigid Body: Introduction, Force, Mass and Acceleration, Work and Energy, D'Alembert's Principles and Dynamic Equilibrium.

UNIT – IV

Simple stress and strains: Concept of stress and strains, Generalized Hooke's law, Stress-strain diagram of ductile and brittle materials, Mechanical properties of materials, Extension of uniform bar under its own weight, Compound and composite bars, Thermal stresses.

Shear force and Bending Moment: Types of load on beam, Classification of beams, Shear force and Bending Moment diagrams for Cantilevers, Simply supported beams with or without overhang and Calculation of maximum B.M. and S.F. and the point of Contraflexture under concentrated loads, uniformly distributed loads (UDL) and combination of concentrated loads and UDL.

References:

(1) Engg. Mechanics by A.K.Tayal (Umesh Publications).

(2) Engg. Mechanics by S.S. Bhavikatti (New Age Publications)

(3) Engg. Mechanics by Irving H. Shames (PHI Publications).

(4) Engg. Mechanics by Beer and Johnston (TMH Publications).

(5) Strenght of Materials by Sadhu Singh.

(6) Strength of Materials by S. Ramamrutham (Dhanpat Rai & Sons Publications).

(7) Engg. Mechanics by U.C. Jindal (Galgotia Publications)

Course Code: MCEF -107 **Title: Engineering Drawing**
[SGGSWU – DCSE] **L/T/P: 1/0/6**

UNIT – I

General: Importance, Significance and scope of engineering drawing, Drawing Instruments and sheets, Lettering techniques – Vertical and inclined lettering in single stroke, Various types of Lines and their applications, Principles of Dimensioning, Drawing exercises pertaining to Symbols and Conventions, Scales (Plane and diagonal), and B.I.S. Specifications for Engineering Drawing.

UNIT – II

Projections of Point and Lines: Introduction of planes of projection, Reference and auxiliary planes, projection of points and Lines in different quadrants, traces, inclinations, and true lengths of lines (Rotation and Auxiliary Plane Method).

Projections of Plane Figures: Projection of lamina Parallel to one and perpendicular to other, Perpendicular to one and inclined to other, Inclined to both reference planes. Auxiliary Projections.

UNIT – III

Projections of Solids: Simple cases when solid are placed in different positions, Axis faces and lines lying in the faces of the solid making given angles.

Sectioning of Solids: Principles of Sectioning and their practice on projection of Solids, Sectioning by auxiliary planes.

UNIT – IV

Isometric Projections: Principle of Isometric projection, Isometric scale, Isometric projection of solids such as cube, prism, pyramid, cone and cylinder, and assignments on isometric projection

Orthographic Projections: Orthographic system of projections, Method of obtaining Orthographic projections and their exercises.

References:

(1) Engineering Drawing by N.D. Bhatt (Charotar Publications).
(2) Engineering Drawing by P.S. Gill
(3) Engineering Drawing by Venugopalan
(4) Engineering Drawing by S.C. Sharma & Navin Kumar (Galgotia Publications).

Course Code: ETHV I **Title: The Sikh Religious Tradition**
[SGGSWU- DCSE] **L/T/P: 2/0/0**

Section- A (15 hrs)

1. **Sikhism:** An Introduction
2. **Sikh Institutions**: Miri-Piri, Akal Takhat, Langar (Free Kitchen), 2 Manjis and Gurdwara.
3. **Unique Sikh Concept**: Word-Guru, Creation of Khalsa, Contents of Scripture, Baptism (AmritChakkna) &Five beloveds.
4. Contribution of Sikh Gurus for Sikhism and Humanity.
5. **Sikh Martyas**: Guru ArjanDevJi, Guru TegBahadurJi, BhaiTaru Singh, Banda Singh Bahadur, BhaiMati Das, Bhai Sati Das, BhaiDayala.

Section – B (15 hrs)

Sri Guru Granth Sahib

1. Sri Guru Granth Sahib: Form and Importance.
2. Sri Guru Granth Sahib: Collection and Compilation
3. Contributors of Sri Guru Granth Sahib
4. Concepts of Sri Guru Granth Sahib

    a) Akal Purkh
    b) Simran
    c) Seva
    d) Sangat&Pangat

Semester -II

Course Code: MCEF-201 **Title: Applied Mathematics II**
[SGGSWU-DCSE] **L/T/P: 3/1/0**

UNIT-I **(15 hrs)**

Ordinary Differential Equations: First order differential equations-exact and reducible to exact form. Leibinitz linear and Bernoulli's equation, Linear differential equations of higher order with constant coefficients. Solution of simultaneous differential equations. Variation of parameters , Solution of homogeneous differential equations-Cauchy and Legendre forms.

UNIT –II **(15 hrs)**

Functions of Complex Variables: Derivatives of complex functions ,Analytic functions ,Cauchy- Riemann equations, Necessary and sufficient conditions for a function to be analytic(Without proof), Harmonic functions ,Complex line integral ,Cauchy's integral theorem ,Cauchy's integral formula, Zeros and singularities, Taylor series ,Laurent series Calculation of residues ,Residue theorem Evaluation of real integrals ,Conformal mapping, Standard mappings and bilinear.

UNIT-III **(20hrs)**

Vector Calculus: Scalar and Vector point functions ,Gradient, Divergence, Curl with geometrical and physical interpretations ,Directional derivatives ,Properties, Line integrals and application to work done, Surface integrals and Volume integrals ,Greens theorem, Stoke's theorem and Gauss divergence theorem(without proofs)

UNIT-IV **(10 hrs)**

Statistics Sampling and Testing of Hypothesis: Discrete and Continuous probability distributions,Binomial,Poisson and Normal Distributions. Sampling methods, Student's t-test,Chi square test, F-test and fisher's z-test, curve fitting.

Textbooks:

1. Ram Babu, Engineering Mathematics, Pearson Education(2009).

References

1. Kreyzig, E, Advanced Engineering Mathematics, John Wiley and sons(latest edition)
2. B.S.Grewal ,Advanced Engineering Mathematics, Khanna publishers(latest edition)
3. R.K.Jain,S.R. KIyengar, Advanced Engineering Mathematics ,Narosa publisher(latest edition)

Course Code: MEPF - 202 **Title: Applied Physics - II**
[SGGSWU – DCSE] **L/T/P: 3/1/1**

Unit I (12hrs)

Electrodynamics: Motion of Charged Particles in crossed electric & magnetic fields, Velocity selector & Magnetic focusing, Gauss law, continuity equation, inconsistency in Ampere's Law, Poynting Vector, Poynting Theorem (statement only),

EM waves: Maxwell's equations (Differential and integral forms), Significance of Maxwell's equations, Electromagnetic wave equation in free space and discussion, Wave equations for plane polarized electromagnetic wave, Electromagnetic waves in conducting medium and its solution, Skin depth.

Unit II (14 hrs)

Special theory of Relativity: Michelson-Morley experiment, Basic postulates of special relativity, Lorentz transformations (space-time coordinates and velocity only), Concept of Length contraction and Time-dilation, Mass-Energy relationship.

Quantum mechanics and Statistical Physics: De Broglie hypothesis, Davisson-Germer experiment, Wave function and its properties, Expectation value, Wave packet, Uncertainty principle, Schrödinger equation for free particle, Time-dependent Schrödinger equation, Particle in a box (1-D), Tunneling effect, Qualitative features of Maxwell-Boltzman, Bose-Einstein and Fermi-Dirac Statistics.

Unit III (09 hrs)

Dielectrics: Dielectrics: Capacitance**,** Field vectors & polarization, Types of polarization, Frequency dependence of dielectric constant, Dielectric strength, dielectric materials, Claussius-Mossotti relation, Ferroelectricity, Piezoelectricity. **Ceramic Materials:** Definition, Classification of Ceramics, Examples and applications

Unit IV (07 hrs)

X-rays: Production, Continuous and characteristics X-rays and their origin, Moseley's law, Properties and Applications of X-rays, Bragg's law**. Ultrasonics**: Introduction, Modes of Ultrasonic waves, Properties and Production of Ultrasonics (Magnetostriction and Piezoelectric methods), Applications.

References*:*

1. Concepts of Modern Physics: A. Beiser, S. Mahajan, S. RaiChoudhry (McGraw-Hill, 6th Ed. 2002).
2. Atomic physics: J. B. Rajam (S. Chand, 2012).
3. Quantum Physics: W. Greiner (Springer, 2004)
4. Quantum mechanics: L.I. Schiff (Tata McGraw-Hill, 1968).
5. Introduction to Solid State Physics: Charles Kittel (John Wiley & Sons, 2007)
6. Introduction to Electrodynamics: D. J. Griffth (Pearson Edu. 4th Ed. 2012).
7. Electromagnetic waves and radiating systems: Jordan and Balmain (Prentice Hall 1968).
8. Callister's Materials Science and Engineering: R. Balasubramaniam (Wiley India 2010)

Course Code: MCEF-203 **Title: Chemistry-II**

[SGGSWU-DCSE] **L/T/P: 3/1/1**

UNIT-I (15 hrs)

Chromatography: Introduction to Chromatography, Classificationof Chromatographic Techniques, Types of Liquid Chromatography, Thin Layer Chromatography,Paper Chromatography, Adsorption Column Chromatography, Chromatographic Development, Applications.

IUPAC Nomenclature: Systematic IUPAC nomenclatureof different classes of aromatic, bicyclic, and spirocompounds and polyfunctionalcompounds.

Dyes: Definition,classifications,Structuresofphenolphthalein,methylorange,alizarin,congored and theiruses.

UNIT-II (15 hrs)

UV/VisibleSpectroscopy: Principleandinstrumentation,Selectionrules,Factorsaffectingλ_{max} andintensityof spectrallines,Linewidthandintensityofspectrallines,Electronictransitions, Chromophoresand auxochromes,Franck-Condon principle, Woodward-Fischer rules, applications.

I.RSpectroscopy: Principleandinstrumentation,Vibrationalfrequency,Fundamentalmodesof vibrations and types, Factors affectingvibrationalfrequency, applications.

NMRSpectroscopy: Principleandinstruction,ChemicalShift,Resonance,Spin-spinsplitting, High resolution NMRspectrum.

UNIT-III (15 hrs)

Photochemistry: Introduction, Photophysicaland Photochemical Processes, Light Source in Photochemistry, Lambert-Beer'sLaw,FundamentalLawsofPhotochemistry,QuantumYield (Primary And Overall), Primary and secondary photochemical reactions, JablonskiDiagram, Semiconductorphotochemistry,Photovoltaiccells,Introductiontoopticalsensors,Introductionto Supra-molecularphotochemistry, Photochemical Kinetics: Hydrogen andChlorineReaction.

UNIT-IV (15 hrs)

Green Chemistry and its Applications: Introduction, definition and concepts of green Chemistry,Emergency ofGreenChemistry,TwelveprinciplesofGreenChemistrywithemphasis ontheuseofalternative feedstock(Bio-fuels),Useofinnocuousreagentsinnaturalprocesses, Alternativesolvents,Designofthesaferchemicals,Designingalternativereactionmethodology, Microwaveand ultrasonic radiation ingreen synthesis-Minimizingenergyconsumption.

Syllabus forPractical:

Implementation ofstudied concepts.

Text Books:

1. *S.S Dara, A text BookofEngineering Chemistry, S. Chand&Co., Ltd, New Delhi.*
2. *Engineering Chemistryby Jain and Jain.*
3. *Organic Chemistryby I.L. Finar.*
4. *Organic ChemistryReaction Mechanism byJerryMarch.*
5. *William Kemp, OrganicSpectroscopy, PalgraveFoundations 1991.*
6. *M. Lancaster, Green Chemistry an IntroductroryText, Royal Society of Chemistry, Cambridge,UK, 1st Edition, 2010.*
7. *Nicholas J Turro, Modern Molecular Photochemistry, University Science Books, Sausalito, California 2010.*
8. *IntrectiveEngineering Chemistry, R.P Singh Grewal,Kalyani Publishers.*
9. *Applied Chemistry, Prof. (Dr. S.K. Bhasin, AjayPublishers.*
10. *Engineering Chemistry, ShashiChawla, DhanpatRai&Co. Pvt. Ltd.*

Course Code: MNTF204 **Title: Fundamentals of Nanoscience & Technology**
[SGGSWU-DCSE} **L/T/P: 3/0/0**

UNIT I (10 hrs)

BASICS AND SCALE OF NANOTECHNOLOGY: Introduction- Scientific revolutions-Time and length scale in structures-Definition of a nano system - Top down and bottom up approaches - Evolution of band structures and Fermi surface – Dimensionality (0D,1D,2D), exciton, bohrexcition radius and size dependent phenomena, Fraction of surface atoms, Surface energy and surface stress, Misnomers and misconceptions of Nanotechnology.

UNIT II (10 hrs)

FORCES BETWEEN ATOMS AND MOLECULES: Thermodynamic aspects of intermolecular forces – Strong intermolecular forces - Covalent and coulomb interactions – interactions – Interactions involving polar molecules – Interactions involving the polarization of molecules – Vander Waals forces – Repulsive forces, total intermolecular pair potentials, and liquid structure – Special Interactions – hydrogen bonding, Hydrophobic, and Hydrophilic interactions.

UNIT III (12 hrs)

POLYMER TECHNOLOGY: Basic concepts of polymer science – Type of polymerization – condensation – addition – copolymerization – order in crystalline polymers – hydrocarbon plastics – natural and synthetic elastomers – polyamides – polyesters - thermosetting resins – Conducting polymers – Macromolecular properties – dendrimers.

UNIT IV (14 hrs)

Industrial Application of Nanotechnology Nanomaterials

Nanoparticles and Micro-organism, Food and Costmetic applications, Textiles, Paints, Catalysis, Drug delivery and its applications, Biochips-analytical devices, Biosensors, Nanophophors.

References:

1 .Wilson M, Kannangara K., Smith G., Simmons M. and Raguse B., "nanotechnology: basic science and emerging technologies", Overseas Press 2005.

2. Poole C.P. and Owens J.F., "introduction to nanotechnology" Wiley-Interscinece 2003.

3. Ratner M.A. and Ratner D., "Nanotechnology: A Gentle Introduction to the Next Big Idea", First Edition, Prentice Hall PTR 2002.

4. Billmeyer, F.W. Textbook of Polymer Science, John-Wiely and Sons (Asia) Pte.Ltd, 2003.

5. Michael K. and wolfgang F., "Nanotechnology: An introduction to Nanostructuring Techniques", Wiley-VCH, 2007.

6. Paul. H Chu "Biomaterials fabrication and processing handbook" Taylor Francis group, 2008.

7. Jacob N. Israelachili "Intermolecular and surface forces" Academic Press, 2008.

8. K. Goser, P. GloseKotter, J.Dienstuhl, nanoelectronics And Nano Systems, Springer International Edition, 2004.

9. Bingzhou, Sophie Herman And Gabor. A. Somorajai, nanotechnology In Catalysis Kluwer academic/Plenum Publishers New York (volum 1 and 2), 2004.

10. Dr.ParagDiwan and AshishBharadwaj, Nano Robotics, Pentagon press, 2005.

11. Guozhong Cao, NANOSTRUCTURRES & NANOMATERIALS, Synthesis, Properties & Applications, Imperial College Press.

Course Code: MCEF–205 **Title: Introduction to Biotechnology**
[SGGSWU – DCSE] **L/T/P: 3/0/0**

Unit I (10 hrs)

Introduction to life: Characteristics of living organisms, Hierarchy of organization and factors responsible for regulating different levels of organizations, Structure of Prokaryotic and Eukaryotic cell, plant cells and animal cells, Basic concept of State and Homeostasis.

Unit II (12 hrs)

Introduction to Biomolecules: Definition, general classification and important functions of carbohydrates, lipids, proteins, nucleic acids and vitamins.

Enzymes as biocatalysts: General characteristics, nomenclature and classification of enzymes, Effect of temperature, pH, enzyme and substrate concentrations on the activity of enzymes, Elementary concept of cofactors and coenzymes.

Unit III (14 hrs)

Evolution: Theories of evolution; Variation and speciation.

Cell division: Mitosis and Meiosis

Genetics: Evidence of nucleic acids as a genetic material; Central Dogma; Chromosome theory of heredity, Mendel's laws of inheritance.

Unit IV (14 hrs)

Introduction to Biotechnology: Definition, scope and achievements.

Genetic Engineering: Tools used in biotechnology, Elementary knowledge of Recombinant DNA Technology, Bioinformatics and Genomics.

Applications of Biotechnology in Agriculture, Medicine and Environment – an elementary knowledge.

Prospects and public perception of Biotechnology.

References:

1. *Cell Biology and Genetics, 9th edition by Starr C and Taggard R, Thomson Learning USA, 2001.*
2. *Life Science of Biology, 6th edition by Purves WK, Sadava D, Orians GH and Heller HC, W.H. Freeman & company, USA, 2001.*
3. *Basic Biotechnology by Ratledge C and Kristiansen B, Cambridge University Press, 2001.*
4. *Basic Biotechnology by Ignacimuthu SJ, Tata McGraw-Hill Pub, New Delhi, 2001.*
5. *Genes VII by Lewis Benjamin, Oxford Univ. Press Oxford, 2002.*
6. *Biotechnology 3rd Edition by Smith JE, Cambridge University Press, 2003.*
7. *Introduction to Biotechnology by Ravi Pathak Atlantic Publishers & Dist, 2007.*
8. *Introduction to BiotechnologyWilliam J. Thieman, Michael Angelo Palladino, Pearson College Division, 2009.*
9. *Introduction to Biotechnology by Dr. B.L. Saini, Laxmi Publications, 2010.*
10. *Introduction to Biotechnology and Genetic Engineering by A. J. Nair, Infinity Science Press, 2008.*

Course Code: MCEF -206 **Title: Electrical & Electronics Engineering**
[SGGSWU – DCSE] **L/T/P: 3/0/1**

UNIT I (12 hrs)

D.C. Circuit Theory: Nature of electricity, Ohm's Law, resistivity, conductance & conductivity, work, power & energy, temp. dependences of resistance, heating effect of current, joules law of electric heating. , D.C. Circuits, Series & Parallel connection, Voltage & Current division, Kirchhoff's Voltage & Current Laws. D.C. Circuit Theorems: Thevenin's theorem, Norton's theorem, Superposition theorem, Maximum power transfer theorem **(Only Independent Voltage & Current Sources**)

UNIT II (12 hrs)

A.C. CIRCUIT Theory: Sinusoidal signal, instantaneous, RMS and average value, Form Factor, Peak Factor, R, L and C components ,behaviors of these components in A.C. circuits. Series and parallel A.C. circuits, Transients in DC Series R-L & R-C circuits, Transients in AC Series R-L & R-C circuits, series and parallel resonance, Q factor, cut-off frequencies and bandwidth.

UNIT III (13 hrs)

Semiconductor Theory: Semiconductor materials, energy levels,Mobility & Conductivity Hall Effect,intrinsic & extrinsic semiconductor, p-type, n-type, pn junction, diodes theory, Diode as a circuit element, its characteristics, half wave and full wave rectifier, and Bridge type rectifier circuits, basic filter circuits, Diode as voltage multiplier. Zener diode theory, Zener diode as Voltage stabilizer.

UNIT IV (13 hrs)

Theory, Construction and Characteristics of different types of diodes; LED, Step Recovery, Back Diode, Tunnel Diode, Varactor Diode, Schottkay diode and Photo diode.
Theory, Construction and Characteristics of BJT (NPN & PNP), FET, MOSFET.

Text Books:

1. Electrical Technology (Vol-I) by B.L Theraja& A K Theraja, S.Chand, 2011.
2. Basic Electricity by J.B. Gupta and R. Manglik, S.K. Kataria& Sons, 2011.
3. Electronic Principles by Malvino ,Mc-Graw Hill Pub, 2007.
4. Electrical & Electronics Engineering by J.B. Gupta, S.K. Kataria& Sons, 2011.

References Books:

1. Basic Electrical Engg. by Kothari &Nagarath, TMH, 2010.
2. Integrated Electronics by Millman&Halkias, Mc-Graw Hill Pub, 2001.

Course Code: MCEF-207 **Title: Manufacturing Processes**
[SGGSWU – DCSE] **L/T/P: 3/0/0**

Instructions: The external paper will carry 50 marks and will be of 3 hours duration. The question paper will be divided into three sections (A, B and C). Section A will be Compulsory which consists of 5 short answer type questions of 10 marks. Section B will consist of 6 question 5 marks each. Student will attempt 4 questions from section B. Section C will consist of 3 questions 10 marks each. Candidate will be required to attempt 2 questions.

UNIT I

Casting Process: Principles of metal casting, Types of pattern, Pattern allowances, Study of moulding processes&materials; Sand moulding:tools & equipment, classification of sand moulds, terms related to sand moulding, types of moulding sand;Description and operations of cupola; Special casting processes : Permanent mould casting, Die-casting, Centrifugal casting , Investment casting, Shell mould casting; Casting defects.

UNIT II

Smithy and forging: Forging operations, Tools and appliances;Forging methods: Smith, Drop, Press, Machine forging; Forging defects.

UNIT III

Metal joining: Welding principles, Classification of welding processes,Types of electrodes; Arc-welding:Metal arc welding, Carbon arc welding, Gas metal arc welding, Gas Tungsten arc welding, submerged arc welding; Electric resistance welding: Spot and Seam welding; Gas welding: Oxyacetylene gas welding; Brazing and Soldering.

UNIT IV

Machining: Cutting tool materials, Single-point Tool geometry; Lathe: Types (engine, capstan & turret), specifications,various parts of lathe, its accessories, Lathe operations, Cutting speed, feed and depth of cut.

References:

(1) Manufacturing Process by B.S Raghuwanshi, DhanpatRai& Co.
(2) Manufacturing Technology by P.NRao, TataMcGraw Hill, New Delhi.
(3) Principles of Manufacturing Materials and Processes by J.S. Campbell, TataMcGraw Hill.
(4) Workshop Technology by HazraChowdhury, MPP.
(5) Principles of metal casting,Heine R.W. C.R. Loper and P.C. Rosenthal, McGraw Hill.

The internal paper will carry 50 marks & it will be distributed as follows:

1. First sessional test 15 marks
2. Second sessional test 15 marks
3. Seminar/assignment & tests 10 marks.
4. Attendance 5 marks
5. Class behavior 5 marks

Course Code: MCEF -208 **Title: Workshop Practice**
[SGGSWU –DCSE] **L/T/P: 0/0/4**

Instructions: The external will carry 50 marks, 20 marks for job and 30 marks for external viva-voce.

UNIT I

Carpentry/Wood working shop: Types of timber, wood working tools, operations, seasoning of wood.
Practice: Mortise and tenon joint**,** lap-dove tail joint and cross lap joint.

UNIT II

Foundry shop: Tools and equipment, types of sands, types of pattern, bench moulding.
Practice: Mould making with solid, split and cope & drag pattern.
Core making Practice: Making and baking of dray sand cores for placing in horizontal, vertical and hanging positions in the mould cavity.

Fitting shop: Fitting tools and operations.
Practice: Jobs made out of MS flats, making saw-cut, filling, V-cut, taper at corners, circular cut, fitting square in a square, triangle in a square.

UNIT III

Welding shop: Electric arc welding, edge preparations, Oxy-Acetylene welding and cutting of ferrous metals. Soldering & Brazing.
Practice: Making butt and lap joints.

UNIT IV

Sheet metal shop: Learning to use sheet metal tools,
Practice: Making jobs out of GI sheets; cylindrical, conical and prismatic shapes.

Machine shop: Operations on lathe, drilling and planning machine tools.
Practice: Job on lathe with operations; turning, taper turning, threading, chamfering and knurling.

Forging: Tools used in forging and forging operations.
Practice: Making cross cut chisel from a round bar.

References:

1. *Manufacturing Practice by B.S Raghuwanshi, DhanpatRai& Co.*
2. *Workshop Practice by Swarn Singh, Kataria& Sons, New Delhi.*
3. *Manufacturing Technology byP.NRao, TataMcGraw Hill, New Delhi.*

The internal will carry 50 marks & it will be distributed as follows:

1. Jobs 35 Marks
2. Practical file 10 marks
3. Attendance 5 marks

SEMESTER-III

Course Code: MCEF 301 **Title: Data Structures**
[SGGSWU-DCSE] **L/T/P: 3/1/1**

UNIT-I (10 hrs)

Introduction: Basic concepts and notations; Data structures and Data Structure operations; Algorithmic complexity and time-space trade off.

Arrays: Introduction; One dimensional array – storage, Traversing, Insertion, Deletion, Searching; Multidimensional arrays – Two dimensional arrays, General multidimensional arrays

UNIT-II 10 hrs)

Linked List: Introduction; Basic concepts of linked list – Memory representation, Building a linked list, Traversing, Insertion, Deletion, Searching; Double linked list; Header linked list; Circular linked list.

Stacks & Queues: Stack: Representation of stack, Implementation of stack; Polish Notation; Tower of Hanoi, Queues; Implementing queues; Circular queues; Double ended queue; Priority Queues.

UNIT-III (10 hrs)

Binary Trees: Introduction; types of Binary trees; Complete Binary trees; extended binary tree; Representation of Binary trees in memory; Operations of Binary Trees; Traversing, Searching, insertion and deletion of nodes in a binary Tree; Application of Binary trees: Threaded Binary Trees.

UNIT-IV (12 hrs)

Graphs: Basic concepts & definitions; Representation of Graphs: Path Matrix, Adjacency list; Single source shortest path Algorithm: Dijkstra algorithm, Graph Traversal: BFS ,DFS.

Sorting & Searching: Linear search; Binary search; Bubble sort; Insertion sort; Quick sort; Selection sort; Merge sort; Heap sort; Radix sort.

Syllabus for Practical:

Implementation of studied concepts.

Text Books:

1. *Data Structures using C and C++ by A.M. Tanenbaum, PHI Publisher.*
2. *Data Structures by Lipschutz, TMH.*
3. *Data Structures and algorithms in C++ by Frouzen.*

Course Code: MCEF302 **Title: Object Oriented Programming Using C++**
[SGGSWU-DCSE] **L/T/P: 3/1/1**

UNIT- I (10 hrs)

Introduction: Procedure- Oriented Programming Concept, Object Oriented Programming Paradigm, Overview of OOP principles: Objects, Classes, Data Abstraction and Encapsulation, Inheritance and Polymorphism, Dynamic binding and Message Passing. Benefits of Object Oriented Programming.

C++ Basics: Structure of a C++ program, Tokens, Keywords, Identifiers, Data types, Declaration of variables, Expressions, Operators, Operator Precedence, evaluation of expressions, Type conversions.

Control Structure: Sequence Structure: if, if-else, nested-if; Selection Structure: switch statement, break, continue and Loop Structure: for, while, do-while.

Array and Function: Single and Multi-dimensional arrays, main function, Function Prototyping, Parameter passing, Default arguments, inline functions, Recursive functions.

UNIT-II (08 hrs)

Object & Classes: Definition of object and class, Class structure, Access Specifier: private, public and Protected, Class objects, Class scope, Static class members, Constant member function,

Constructor and Destructor: Constructor concept, types of constructor: Default, Parameterized, Constructor with default arguments, Copy Constructor, Destructors.

Function and Operator Overloading: function overloading, constructor overloading, friend function, Difference between Function Overloading and Function Overriding, Overloading using unary and binary operator.

UNIT-III (12 hrs)

Inheritance: Concept of Reusability, Defining Derived Classes, Types of Inheritance: Single, Multiple, Multi-Level, Hybrid, Hierarchical Inheritance, Virtual Base Class, Abstract Class, Nesting of Classes

Pointers, Virtual Functions and polymorphism: Declaring and initializing pointers, this pointer, Compile time and Runtime Polymorphism, Virtual Function, Pure Virtual Function.

UNIT-IV (12 hrs)

File Handling: Classes for File Stream Operations: ifstream, ofstream, fstream; Opening and Closing files, Detecting end of file, File modes.

Exception handling: Benefits of exception handling, catching an exception, throwing an Exception.

Text Books:

1. *Balagurusamy E., Object Oriented Programming in C++, Tata McGraw Hill*
2. *Object Oriented Programming in C++ by Robert Lafore Tec media Publications*
3. *Complete Reference C++ 4th Edition by Herbert Schild Tata McGraw Hill Publications*
4. *Object Oriented Programming in C++ Saurav Sahay Oxford University Press*
5. *Bjarne Stroustrap, The C++ Programming Language, Pearson*
   Problem Solving with C++, The OOP, 4th Edition, Walter Savitch, Pearson Education

Course Code: MCEF303 **Title: Digital Electronics**
[SGGSWU –DCSE] **L/T/P: 3/1/1**

UNIT I (15 hrs)

Number System and Binary Code: Introduction, Binary, decimal, Octal, hexadecimal, BCD number system. Signed and unsigned number, binary operations - Addition, Subtraction. Multiplication and division. Subtractions using 1's and 2's compliment; ASCII code. Excess 3 codes and Gray code. Minimization of logic function:-OR, AND, NOT, NOR, NAND, Ex-OR gates, Basic theorem of Boolean Algebra sum of products and product of sums. Minimisation using theorems, minimisation using K-map up to 4 variables

UNIT II (12 hrs)

Combinational logic circuits: Combinational circuit design, multiplexer, demultiplexer, encoders, decoders, adders (Half adder, full adder), substracters .and code converters, parity checker, BCD display drive, magnitude comparators.

UNIT III (14 hrs)

Sequential circuits: Flip Flop fundamentals, bistable multivibratoras flip flop, different flip flop configurations; SR.JK, D, T. Edge triggered and clocked flip flop, Registers. Types of Registers; series & parallel shift, circuit diagram, timing wave form and operations, counter, synchronous & asynchronous, Johnson counter.

UNIT IV (13 hrs)

D/A and A/D Converters: Introduction, Weighted register D/A converter, binary ladder D/A converter, D/A accuracy and resolution, parallel A/D converter Counter type A/D converter, Successive approximation A/D converter, Single and dual slope A./D converter, A/D accuracy and resolution.

References:

1. *Digital principles by RPJain, PHI.*
2. *Digital Principals & Applications by Malvino & Leach, TMH*
3. *An Engg. Approach to digital design by Fletcher, PRI.*
4. *Digital Computer Electronics by A.P.Malvino, TMH*
5. *Analog and Digital Electronics by Peter.H.Beards.*
6. *Integrated Electronics by Millman & Halkias, McGraw Hill*
7. *Digital Electronics by Goth man, Prentice-Hall.*

Course Code: MCEF304 **Title: System Software**
[SGGSWU-DCSE] **L/T/P: 3/1/0**

UNIT-I (08 Hours)

Introduction: Definition and Role of System Software, Examples of System Software, Evolutions of System Software, System Software and Machine Architecture, Some common architecture – SIC, CISC and RISC Machines.

UNIT-II (10 Hours)

Assemblers: Basic assembler functions, Machine dependent Assembler features, Machine Independent Assembler features. Assembler Design Options: One Pass assemblers and Multi Pass Assemblers and Implementation.

UNIT-III (15 Hours)

Macro Languages & Macro Processors: Macroinstructions, arguments: Keyword and positional arguments, expansion different forms of Macros – macro defined inside another macro, nested macro calls etc., Macro Processor & Macro Pre- Processor, Macro Processor Design options: One Pass macro processor and Multi Pass macro processor and Implementation.

Loaders & Linkers: Basic Loader Functions, Machine dependent and Machine independent Loader features, Loader schemes: Compile & Go or Assemble & Go, General Loaders, Absolute loaders, subroutine linkages, relocating loaders, Direct Linking Loaders, Binders Linking Loaders, Overlays, Dynamic binders, Implementation of Loaders.

UNIT-IV (10 Hours)

Other common System Software's : Introduction and brief discussion on Editors: Types and Structure; Operating System: Definition and types e.g. single, multi -Tasking, multi – user (referring to MS-DOS,LINUX and UNIX); Device Drivers: Definition, role and types; Basic concepts of Compiler Design and it's Functions.

Text Books:

1. *System programming by Donovan, J.J., McGraw-Hill,*
2. *System Programming by Dhamdhere, TMH.*
3. *Compiler construction for digital computers by Ullman, J.D. Wiley-Eastern*

Course Code: MCEF305 **Title: Organizational Behavior**
[SGGSWU-DCSE] **L/T/P: 3/0/0**

UNIT-I

Organizational Behavior – Definition, Importance, Functions; Fundamental concepts of OB; Personality - Meaning & Concept of personality, Personality theories- Type & Trait, Development of personality; Perception – Concept of Perception, Perceptual Process, Attribution Theory, Managerial applications of Perception: Hello effect, Stereotyping, Developing Perceptual skills.

UNIT-II

Learning – Concept of Learning, Components of Learning Process, Factors affecting Learning & Theories of Learning; Attitudes & Values –Concept of Attitude, Attitude & behavior, Components or ABC Model of Attitude, Factors in Attitude Formation, Major Job Attitudes, Values: Meaning, Types and importance, Attitude Vs. Values; Motivation - Concept, Theories of Motivation: Hierarchy of need theory, Theory X & Theory Y, Two Factor, Application of Motivation theories.

UNIT-III

Foundation of Group Behavior: Formal and Informal Groups, Stages of Group Development, Group thinking & Group shift, understanding work teams: Difference between Group & Team, Types of teams, Team Creation; Leadership – Concept of Leadership, Leadership theories: Trait & Behavioral; Power & Politics - Concept of Power and Politics in Organization; Communication – Concept, Process, Barriers, Steps for making Communication effective.

UNIT-IV

Organisational Conflict – Concept of Organizational Conflict, Conflict Management Process and strategies ; Stress Management – Concept, Sources of stress, Consequences of stress, Coping Strategies; Organizational Change – Nature, Forces for change, Resistance to change, Overcoming resistance to change; Organizational Culture: Concept, Creating a Positive organizational culture.

Books Recommended

1. Robbins S P, Timothy A. Judge & Sanghi Seema, Organizational Behaviour, Pearson Education, New Delhi, 2009.
2. Ivancevich, Konopaske & Maheson, Oranisational Behaviour & Management, 7th edition, Tata McGraw Hill, 2008.
3. Schermerhorn, Hunt and Osborn, Organisational behavior, John Wiley, 9th Edition, 2008.
4. Mc Shane & Von Glinov, Organisational Behaviour, 4th Edition, Tata Mc Graw Hill, 2007.
5. Hellrigal, Slocum and Woodman, Organisational Behavior, Cengage Learning, 11th Edition 2007.

Course Code: MCEF-306 **Title: Environment Science**

[SGGSWU-DCSE] **L/T/P: 3/0/0**

UNIT-I (10 hrs)

The multidisciplinary nature of environmental studies: Definition, scope and importance, Need for public awareness.

Natural Resources: Renewable and non-renewable resources: Natural resources and associated problems.

(a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
(b) Water resources: Use and over-utilization of surface and ground water, floods, drought, on conflicts over water, dams-benefits and problems.
(c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
(d) Food resources: World food problems, changes caused by agriculture and overgrazing, Effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
(e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, Use of alternate energy sources, case studies.
(f) Land resources: Land as a resource, land degradation, man induced landslides, soil

Erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyle.

UNIT II (14 hrs)

Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains,food webs and ecological pyramids, Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

Biodiversity and its conservation: Introduction – Definition: genetic, species and ecosystem diversity, Bio-geographical classification of India, Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values, Biodiversity at global, national and local levels, India as a mega-diversity nation, Hot-spots of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts, Endangered and endemic species of India, Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT III (15 hrs)

Environmental Pollution: Definition, Causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear pollution. Solid waste management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution, Pollution case studies, Disaster management: floods, earthquake, cyclone and landslides.

Social Issues and the Environment: From unsustainable to sustainable development, Urban problems and related to energy, Water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions, Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents, and holocaust. Case studies. Wasteland reclamation, Consumerism

and waste products, Environmental Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public awareness.

UNIT IV (11 hrs)

Human Population and the Environment: Population growth, variation among nations, Population explosion – Family Welfare Programmes, Environment and human health, Human Rights, Value Education, HIV / AIDS, Women and Child Welfare, Role of Information Technology in Environment and Human Health, Case Studies.

Field Work:

- Visit to a local area to document environmental assets river/forest/grassland/hill/mountain
- Visit to a local polluted site – Urban / Rural / Industrial / Agricultural
- Study of common plants, insects, birds
- Study of simple ecosystems-pond, river, hill slopes, etc.

Suggested Books and Texts

1. *Bharucha, E. 2005. Textbook of Environmental Studies, Universities Press, Hyderabad.*
2. *Bharucha, E. 2004. The Biodiversity of India, Mapin Publishing Pvt. Ltd. Ahmedabad.*
3. *Brunner, R. C. 1989. Hazardous Waste Incineration, McGraw Hill Inc. New York.*
4. *Clark, R. S. 2000. Marine Pollution, Clanderson Press Oxford.*
5. *Cunningham, W. P., Cooper, T. H., Gorhani, E. & Hepworth, M. T. 2001. Environmental Encyclopedia, Jaico Publications House, Mumbai.*
6. *De, A. K. 1989. Environmental Chemistry, Wiley Eastern Ltd.*
7. *Hawkins, R. E. 2000. Encyclopedia of Indian Natural History, Bombay Natural History Society.*
8. *Heywood, V. H & Waston, R. T. 1995. Global Biodiversity Assessment, Cambridge House, Delhi.*
9. *Jadhav, H. & Bhosale, V. M. 1995. Environmental Protection and Laws. Himalaya Pub.*
10. *Miller, T. G. Jr. 2000. Environmental Science, Wadsworth Publishing Co.*
11. *Odum, E. P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA.*
12. *Sharma, B. K. 2001. Environmental Chemistry. Geol Publishing House, Meerut.*

SEMESTER-IV

Course Code: MCEF401 **Title: Programming Languages**
[SGGSWU-DCSE] **L/T/P: 3/1/1**

UNIT-I (15 hours)

Introduction: Syntactic and semantic rules of a Programming language, Characteristics of a good programming language, Programming language translators compiler & interpreters, Elementary data types – data objects, variable & constants, data types, Specification & implementation of elementary data types, Declarations ,type checking & type conversions , Assignment & initialization, Numeric data types, enumerations, Booleans & characters.

Implementation Issues: Introduction – Structured Coding techniques: single entry and single exit constructs, Efficiency consideration, Validation of single entry and single exit, Coding Style.

UNIT-II (12 hours)

Structured data objects, Subprograms and Programmer Defined Data Type : Structured data objects & data types , specification & implementation of structured data types, Declaration & type checking of data structure ,vector & arrays, records Character strings, variable size data structures , Union, pointer & programmer defined data objects, sets, files. Evolution of data type concept, abstraction, encapsulation & information hiding, Subprograms, type definitions, abstract data types.

UNIT-III (12 hours)

Sequence Control and Data Control: Implicit & explicit sequence control, sequence control within expressions, sequence control within statement, Subprogram sequence control: simple call return, recursive subprograms, Exception & exception handlers, co routines, sequence control. Names & referencing environment, static & dynamic scope, block structure, Local data & local referencing environment, Shared data: dynamic & static scope. Parameter & parameter transmission schemes.

UNIT-IV (15 hours)

Storage Management & Programming languages: Major run time elements requiring storage ,programmer and system controlled storage management & phases , Static storage management , Stack based storage management, Heap storage management ,variable & fixed size elements. Introduction to procedural, nonprocedural, structured, functional and object oriented programming language, Comparison of C & C++ programming languages, **Object Oriented Programming:** The class notion - Information hiding and data abstraction using classes, derived classes and inheritance, Polymorphism, Parameterized types.

Syllabus for Practical:

Implementation of studied concepts.

Text Books:

1. *Fundamentals of Programming languages by Ellis Horowitz, 1984, Galgotia publications (Springer Verlag),*
2. *Programming languages concepts b y C. Ghezzi, 1989, Wiley Publications.,*
3. *Programming Languages – Principles and Pradigms Allen Tucker , Robert Noonan 2002, T.M.H.*
4. ***P**rogramming languages Design & implementation by T.W. .Pratt, 1996, Prentice Hall Pub.*
5. *Programming Languages – Principles and Paradigms by Allen Tucker & Robert Noonan, 2002, TMH,*

Course Code: MCEF402 **Title: Operating Systems**
[SGGSWU-DCSE] **L/T/P: 3/1/0**

UNIT-I

Introduction: Operating System, Operating System classifications: Single user, multi-user, Batch Processing, Multiprogramming, Multiprocessor Systems, Multitasking/time sharing, real time operation system, Operating System Services.

UNIT-II

Process Management: Process Overview, Process states, Process Control Block, Process Scheduling, Schedulers, Context Switch, Operations on Processes, Co-operating Processes, and Inter process Communication.
Threads: Overview, Multithread Models, Threading Issues.

CPU Scheduling: Introduction, CPU-I/O burst Cycle, CPU Scheduler, Preemptive Scheduling, Dispatcher, Scheduling Criteria, and Scheduling Algorithms: First Come First Serve, Shortest Job First Scheduling, Priority Scheduling, Round Robin Scheduling, Multilevel Queue Scheduling, and Multilevel Feedback Scheduling.

UNIT-III

Process Synchronization: The Critical Section Problem, Semaphores: Usage, Deadlock and Starvation, Binary Semaphores. Critical Regions.
Deadlocks Characteristics: System Model, Characterization, Methods of handling, Prevention, avoidance, detection and recovery.

Memory Management: Address binding, logical & physical address space, Dynamic Loading, Swapping, Continues memory allocation, Paging: Hierarchical page tables, Hashes page tables, Inverted page Table, Segmentation, Segmentation with Paging.

UNIT-IV

Virtual Memory: Demand Paging, Page Replacement: Basic Scheme, FIFO Replacement, Optimal Page Replacement, LRU Page Replacement, LRU approximation, Counting based Page Replacement. Threshing: cause of Threshing and Working Set Model.

Mass Storage Structure: Disk Scheduling: FCFS, SSTF, SCAN, C-SCAN, LOOK, Disk Management.

***Text Books*:**

1. *Operating System Concepts by Peterson, Silberschatz, Addison Wesley.*
2. *Operating Systems by Milenkovic, MacGraw Hill.*
3. *Operating systems – A systematic view by Davis,Rajkumar, Pearson.*
4. *Operating systems by Dhamdhere, TMH.*
5. *Operating systems by Deitel,Deitel,Choffnes, Pearson.*

Course Code: MCEF403 **Title: Database Management System**
[SGGSWU-DCSE] **L/T/P: 3/1/1**

UNIT I (15 hrs)

Data Base Management Systems *:*Basic Concepts, Purpose of Database system, Characteristics of database approach, Advantages of using DBMS, Database concept and architecture, 3-schema architecture , data abstraction, data models, instances and schemes, data independence, Database Languages: DDL, DML, DB manager, DB administrator, DB users.
Entity Relationship Model: Entity & entity sets, relationships & relationship sets, attributes, mapping constants, keys, ER diagram, generalization, aggregation. Weak and Strong entity types, Enhanced entity-relationship (EER). HIERARCHICAL MODELS, NETWORK MODEL, RELATIONAL MODEL.

UNIT II (15 hrs)

Relational Algebra : Operations, Extended Relational Algebra Operations
Relational Calculus: Operations, Tuple relational calculus, domain relational calculus
Secondary Storage: Characteristics of disk; physical organization on secondary storage, Storage access, file organization, organization of records in files, data dictionary storage INDEXING AND HASHING: Basic concepts, ordered induces, B tree index files,hashing.

UNIT III (10 hrs)

SQL: Basic structure, set operations, aggregate functions, Null Values, nested sub queries, views, Modification of database, joined relations, Embedded SQL, Dynamic SQL *QBE* Query on one relation , queries on several relations, aggregation operations , modification of data bases , updates , anomalies , Assertion and Triggers, Introduction on views
Database Design: Functional dependency, decomposition, Desirable properties of decomposition, normalization- First normal form , Second normal form, third normal form, join dependency, boyce-codd normal form, Further normal forms.

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UNIT IV (10 hrs)

Transaction Management: Transaction concept, state, serializability, Recoverability, Implementation of Isolation, Testing for serializability. CONCURRENCY CONTROL: Lock based protocols, time stamp based protocol, validation based protocols, Locking. CRASH RECOVERY Failure classification, storage hierarchy, recovery and atomicity, log-based, shadow paging, recovery, buffer management.

Syllabus for Practical:

Implementation of studied concepts.

Text Books:

1. *Database System Concepts by A. Silberschatz, H.F. Korth and S. Sudarshan, 3rd edition, 1997, McGraw-Hill, International Edition.*
2. *Introduction to Database Management system by Bipin Desai, 1991, Galgotia Pub.*
3. *Fundamentals of Database Systems by R. Elmasri and S.B. Navathe, 3rd edition, 2000, Addision-Wesley, Low Priced Edition.*
4. *An Introduction to Database Systems by C.J. Date, 7th edition, Addison-Wesley, Low Priced Edition, 2000.*
5. *Database Management and Design by G.W. Hansen and J.V. Hansen, 2nd edition, 1999, Prentice-Hall of India, Eastern Economy Edition.*

Course Code: MCEF404 **Title: Data Communication**
[SGGSWU-DCSE] **L/T/P: 3/1/0**

UNIT I (15 hrs)

Concepts & Terminology: Data communication : data representation, Analog versus digital signals; Direction of Data flow Analog and digital data transmission, data rate limits, Transmission impairments random &nonrandom, Transmission Media- Guided and unguided media, Line configuration, Topology, Categories of networks, Network Architecture – layered protocol TCP/IP and OSI model.

UNIT II (hrs)

Data Encoding and Modulation: Encoding of digital Data: Line coding schemes, Block coding, Encoding Analog data into digital signal: Pulse code modulation, sampling rate, Modulation of Digital data: ASK, FSK, PSK, QAM, Bit/baud comparison Modulation of Analog data: AM, FM and PM

UNIT III (12 hrs)

Transmission of digital data: Asynchronous and Synchronous transmission, DTE-DCE interface, Multiplexing Techniques – FDM: Multiplexing and de-multiplexing process, Applications of FDM, Analog hierarchy, TDM: Time slots and frames, Synchronizing and Bit padding, Statistical TDM, Digital signal service, T lines.

UNIT IV (15 hrs)

Data link Control: Factor Contributing Errors, , Error Control: Stop & wait ARQ, Go back N & Selective ARQ., Error Detection Methods – parity checking, checksum error detection & CRC, Forward Error Correction Method – block parity, Hamming code, Burst Error Correction Method, Flow control : Stop and wait flow control, Sliding window flow control, Data Link protocols – HDLC, CSMA/CD, token bus, token ring & FDDI.

Text books:

1. *Data Communications Networking by Behrouz A Forouzan , PHI*
2. *Data and Computer Communication by William Stalling, Pearson Education*
3. *Data Communication by Prakash C-Gupta, PHI*
4. *Computer Networks by A. S.Tanenbaum, PHI*

Course Code: MCEF405 **Title: Human Resource Management**
[SGGSWU-DCSE] **L/T/P: 3/1/0**

UNIT I (15 hrs)

Introduction: Introduction to Human Resource Management and its definition, functions of Human Resource Management & its relation to other managerial functions. Nature, Scope and Importance of Human Resource Management in Industry, Role & position of Personnel function in the organization.
Procurement and Placement: Need for Human Resource Planning; Process of Human Resource Planning; Methods of Recruitment; Psychological tests and interviewing; Meaning and Importance of Placement and Induction.

UNIT II (10 hrs)

Training & Development: Difference between training and Development; Principles of Training; Employee Development; Promotion-Merit v/s seniority Performance Appraisal, Career Development & Planning.
Job analysis & Design: Job Description, Job Specification, Motivation, Factors affecting motivation, introduction to Motivation Theories, Workers ' Participation in management, Quality of work life. The Compensation Function: Basic concepts in wage administration, Bonus & Incentives, Job Evaluation, Job satisfaction and its importance.

UNIT III (15 hrs)

Industrial Relations:- Human Relations and Industrial Relations; Difference between Human Relations and Industrial Relations, Factors required for good Human Relation Policy in Industry; Employee Employer relationship Causes and Effects of Industrial disputes; Employees Grievances & their Redressal, Administration of Discipline, Communication in organization, Absenteeism, Labour Turnover,Importance of collective Bargaining; Role of trade unions in maintaining cordial Industrial Relations.

UNIT IV (10 hrs)

Employee Welfare and Safety: Fringe & retirement terminal benefits, Meaning and Importance of Employee Safety, Accidents-Causes & their Prevention, Safety Previsions under the Factories Act 1948; Social security, Contemporary Issues in Human Resource Management.

***Text Books**:*

1. *V.S.P Rao*- Human Resource Management(Himalya)
2. *Lowin B. Flippo - Principles of personnel Management (Mc Graw-Hill)*
3. *R.C. Saxena - Labour Problems and social welfare (K.Math & Co.)*
4. *A Minappa and M. S. Saiyada - Personnel Management (Tata Mc. Graw-Hill)*
5. *C.B. Mamoria - Personnel Management (Himalaya Publishing House, Bombay)*
6. *T.N. Bhagotiwal - Economics of Labour and Industrial Relations (Sahitya Bhawan Agra)*
7. *T.N.Chhabra- Human Resource Management (Dhanpat Rai & Co.)*

Course Code: MCEF-406 **Title: Discrete Mathematics**
[SGGSWU –DCSE] **L/T/P: 3/1/0**
Hours: 55

UNIT I (15 hrs)

Relations and Functions: Relations, binary relations, composition of relations, equivalence relations and partitions, Functions-injection, surjection & bisection, composition of functions, recursion and recurrence relations, polynomials and their evaluation, Sequences and discrete functions, generating functions, mathematical induction.

UNIT II (15 hrs)

Logic Algebra: Definition, Truth tables of different kinds of statements, duality principle, the laws of logic-associative & distributive laws, logic circuits.

Boolean algebra: Partially ordered sets, join, meet, lattice, sub-lattice, atoms, Boolean Algebra and expressions, minimization of Boolean functions, application to switching theory, the Karnuogh map.

UNIT III (15 hrs)

Graph theory: Introduction to graphs, graph terminology, representing graphsand graph isomorphism, connectivity, sub-graph, planar graph, directed and undirected graphs and their matrix representation, Euclidean paths and cycles, shortest paths, dijkastra's algorithm, Euler's formula.

UNIT IV (10 hrs)

Algebraic Structures: Introduction to algebraic structures, semi groups, groups& subgroups(cyclic &normal) ,homomorphism &isomorphism of groups, Lagranges theorem, Elementary theory of coding.

References:

1. *Tremblay, J.P., el. Al "Discrete Mathematical Structures with Applications to Computer Science" McGraw Hill.*
2. *Sahni, S., "Concepts in Discrete Mathematics". Camelot Publisher. U.S.A.*
3. *Liu, C. L. ,Mohapatra., D. P. "Elements of Discrete Mathematics"McGraw Hill.*
   Joshi R.C., 'Discrete Structure', ACME Publication.

SEMESTER-V

Course Code: MCEF501 **Title: Relational Database Management System**
[SGGSWU-DCSE] **L/T/P: 3/1/1**

UNIT-I

Introduction to SQL: DDL aspect of SQL, DML aspect of SQL – update, insert, delete & various form of SELECT- simple, using special operators, aggregate functions, group by clause, sub query, joins, Data Constraints.
Indexes: Creation of Simple Index, Composite Index, Unique Index.
Views: Creation of Views, Selecting data set from view, Updateable views, Destroying views.
Sequences: Creating sequences, Referencing sequence, Altering and Dropping sequence.
Security Management using SQL: Granting and Revoking permissions.

UNIT-II

Introduction to PL/SQL: Advantages of PL/SQL, Generic PL/SQL Block: Declare Section, Begin Section and End Section.
Character Set, Literals, PL/SQL Data Types, Variables, Constants and Logical Comparisons.
Conditional and Iterative Control in PL/SQL.
Cursors: Types of Cursors: Implicit Cursors, Explicit Cursors, Cursor For Loops, Parameterized Cursors.

UNIT-III

Database Objects: Stored Procedures and Functions: Advantages of using Stored Procedures and Functions, Syntax for creating Stored Procedures and Functions, Deleting Stored Procedures and Functions
Packages: Package introduction, Components, Creating package, Invoking package
Database Triggers: Introduction, Use of triggers, Types of triggers: Row and Statement Triggers, Before and After Triggers, Deleting Triggers

UNIT-IV

Distributed Databases: Concepts: Characteristics of Distributed DBMS, Distributed Processing, Parallel DBMS, Advantages and Disadvantages, Types of Distributed Database Systems, Architecture of Distributed DBMS, Data Fragmentation, Data Replication and Allocation

Introduction to Object Oriented Databases:

Object Oriented Concepts, Advantages, Disadvantage and Features of OODBMS, ORDBMS, Advantages and Disadvantages of ORDBMS, Comparison of Object Oriented and Object Relational Databases.

Text Books

1. H. F. Korth & A. Silverschatz, Database Concepts, Tata McGraw Hill Sixth Edition
2. Ivan Bayross, SQL and PL/SQL, BPB Publication 2nd Revised Edition
3. Elmasri & Navathe, Fundamentals of Database Systems, Fifth Edition, Pearson Education Asia.
4. Parteek Bhatia, Gurvinder Singh, Simplified Approach to DBMS, 8th Edition, Kalyani Publications.

Reference Books

1. Hoffer, prescott, Mcfadden, Modern Database Management, Pearson Education Asia.
2. C. J. Date, Database Systems, Pearson Education Asia, Eighth Edition.
3. Thomas Conolly, Carolyn Begg," Database Systems", Pearson Education.
4. Val Occardi, Relational Database: Theory & Practice, BPB Publication, New Delhi.
5. Scott Urman, Oracle PL/SQL Programming, Tata McGraw Hill.
6. S. K. Singh, Database Systems Concepts, Design and Applications, Pearson Education.
7. Satish Asnani, Oracle Database 11g Hands-on SQL and PL/SQL, PHI.

Course Code: MCEF502 **Title: Computer Networks**
[SGGSWU-DCSE] **L/T/P: 3/1/0**

UNIT 1 (12 hrs.)

Introduction: Data Communication: Components, Network Categories: LAN, MAN, WAN, Wireless Networks; Network Software: Concept of layers, protocols, interfaces and services;

Reference Model :OSI Reference Model, TCP/IP Reference Model and comparison of OSI and TCP Reference Model.

UNIT II (14 hrs.)

Physical Layer: Concept of Analog & Digital Signal; Bit rate, Bit Length; Transmission Impairments: Attenuation, Distortion, Noise; Multiplexing: Frequency Division, Time Division, and Wavelength Division; Transmission media: Twisted pair, coaxial cable, fiber optics, wireless transmission (radio, microwave, infrared); Circuit Switching and Packet Switching.

Data Link Layer: Services provided by Data Link Layer to the Network Layer, Error correction & Detection; Elementary Data Link Protocols, Sliding window protocols: Stop & Wait ARQ, Go back n ARQ, Selective repeat ARQ; Examples of DLL Protocols: HDLC .

Medium Access Sub layer: Channel Allocation; Random Access: ALOHA, CSMA protocols; controlled Access: Polling, Reservation, and Token Passing

UNIT III (12hrs.)

Network Layer: Routing algorithms: Distance vector, Link State Routing, Hierarchical Routing, Broadcast & Multicast Routing; Congestion Control: Principles of Congestion Control, Congestion prevention policies, Leaky bucket & Token bucket algorithms

UNIT IV (12hrs.)

Transport Layer: Elements of Transport Protocols: Addressing, flow control & buffering, multiplexing & de-multiplexing, crash recovery. Example transport protocols: TCP, SCTP and UDP. **Application Layer:** Network Security; Domain Name System (DNS); Simple Network Management Protocol (SNMP); Electronic Mail (E-Mail)

Text Books:

1. *Computer Networks by Tanenbaum, PHI*
2. *Computer Networks by Darix , DLA Labs and Their Protocols*
3. *Comp. Communication by Freer , East-West-Press & Networks*
4. *Data Communication and Networking by Forouzen, TATA McGraw Hill*

Course Code: MCEF503 **Title: Computer Architecture & Organization**
[SGGSWU-DCSE] **L/T/P: 3/1/0**

Instructions:

The external paper will carry 50 marks and will be of 3 hours duration. The question paper will be divided into three sections (A, B and C). Section A will be Compulsory which consists of 5 short answer type questions of 10 marks. Section B will consist of 6 question 5 marks each. Student will attempt 4 questions from section B. Section C will consist of 3 questions 10 marks each. Candidate will be required to attempt 2 questions.

UNIT I **(13hrs.)**

Basics of Digital Electronics: Codes, Logic gates, System design, Design levels- Gate level, Register level, Processor level, Flip flops, Registers, Counters, Multiplexer, Demultiplexer, Decoder, Encoder.
Register Transfer and Micro-operations: Register transfer language, bus and memory transfers, and arithmetic, logic and shift micro-operations. Case study of 8085 instruction set, Design of arithmetic logic shift unit.

UNIT II **(13hrs.)**

Basic Computer Organization & Design: Instruction codes, common bus system, timing and control, instruction cycle, memory reference instructions, Input/ Output & Interrupts, Design of basic computer, Design of accumulator logic.

Control Design: Basic concepts, Hardwired control, Micro programmed control: Control memory, address sequencing. Design of control unit: Microprogram sequencer.

UNIT III **(12hrs.)**

Central Processing Unit: Introduction, General register organization, stack organization, Instruction formats Addressing modes, Data transfer & manipulation, Program Control, RISC & CISC Characteristics.

Computer Arithmetic: Addition & Subtraction, Multiplication Algorithms, Division Algorithms, Floating point Arithmetic operations.

UNIT IV **(13hrs.)**

Input-Output Organization: Peripheral devices, I/O interface, Data transfer schemes, Program control, Interrupt, DMA transfer, I/O processor.

Memory Unit: Memory hierarchy, Main Meomory , Auxiliary memory, Cache memory, Associative memory, Interleave, Virtual memory, Memory management.

Text Books

1. *Mano, Morris M., Computer System Architecture, Prentice Hall (1992) 3rd ed.*
2. *Hayes, J.P., Computer Architecture and Organization, McGraw Hill (1998) 3rd ed.*
3. *J.D. Carpinelli Computer System organization and Architecture , Pearson Edu.*

The internal paper will carry 50 marks & it will be distributed as follows:

1. First sessional test 15 marks
2. Second sessional test 15 marks
3. Seminar/assignment & tests 10 marks.
4. Attendance 5 marks
5. Class behavior 5 marks

Course Code: MCEF504 **Title: Web Technology**
[SGGSWU-DCSE] **L/T/P: 3/1/1**

UNIT I **(13hrs.)**

Basics of Internet: Concepts, Architecture: Internet, Intranet and Extranet, Internet Addressing, ISP, types of Internet Connections protocols, applications - e-mail, ftp, telnet, WWW, IRC.

Intranet Connectivity: Connection concepts, FDDI, ISDN, ADSL, PPP and ATM, web server, proxy server, web browser.

UNIT II **(12hrs.)**

HTML:

Introduction to HTML, Lists, Adding Graphics to HTML Page, Creating tables, Linking Documents, Frames, DHTML and Style Sheets.

XML:

Why XML, XML Syntax Rules, XML Elements, XML Attributes, XML DTD, Displaying XML with CSS.

UNIT III **(12hrs.)**

Server Side Scripting Languages:

JSP- Introduction to JSP, JSP Architecture, Scripting components, Standard Actions, JSP with JDBC-Case Study of Simple Online Application.

PHP: Introduction (variables, control statements etc), String processing and Regular expression. Form Processing and business logic, connecting to a database, Cookies, Dynamic content in PHP: Case Study of Online Application.

UNIT IV **(12hrs.)**

The Dynamic Functionality in Web Pages: CGI, CGI Script Communication CGI script languages, A Scripting, Language , Java Script, Dynamic Page Functionality Using servlets and JSP, ASP, COM, DCOMS**.**

Syllabus for Practical:

Implementation of studied concepts.

Text Books:

1. *Internet and Web Technology by S. Raj Kama, TMH*
2. *Web Technology by A.S. Godbole&Kahate, TMH*
3. *The Complete Reference by Patrick Naughton, TMH*
4. *Java Programming by Balagurusamy, BPB.*

Course Code: MCEF505 **Title: Principles & Practice of Management**
[SGGSWU-DCSE] **L/T/P: 3/1/0**

Unit I (13hrs.)

Introduction to Management: Concept, Meaning, Nature & Scope, Functions, Objectives & Importance of Management, Management Skills & Roles, Levels of Management, Functions of a Manager, Management as an Art or Science; Evolution of Management thought: Background, Contribution made by F.W Taylor, Henry Fayol, Elton Mayo, A.H.Maslow & Mc Gregor.

Unit II (12hrs.)

Planning: Meaning, Nature & Scope, Objectives, Importance of planning, Types of Plan & Planning and Process of Planning, Barriers to effective Planning, Nature & Purpose of Strategies & Polices, Strategic planning process; Management by Objectives: Concept, Nature of Objectives, Setting of Objectives, Process of MBO.

Unit III (14hrs.)

Organizing: Concept, Nature and Process of Organizing; Bases of Departmentation, Concept of Authority and Power, Distinction of authority & Power, Line & Staff Concept, Problems of use of Staff, Ways to avoid Line-Staff conflict; Concept of Delegation, Elements of Delegation, Reasons for failure of delegation & How to make delegation effective, Concept of Decentralization, Reasons for Decentralization, Advantages & Disadvantages of Decentralization.

Unit IV (12hrs.)

Communication: Meaning, Process, Barriers in effective communication; Coordination: Concept, Importance, Factors which make coordination difficult, Techniques or Methods to ensure effective coordination, Coordination Vs. Cooperation; Control: Concept, Process of Control, Dimensions or Types of Control, Planning-Control relationship, Techniques of Control.

SUGGESTED READINGS:

1. *Koontz – Principles of Management, Tata McGrew Hill, 1st Edition 2008*
2. *Robbins & Caulter – Management, Prentice Hall of India, 8th Edition*
3. *L.M. Prasad – Principles & Practices of Management, Sultan Chand & Sons, New Delhi*
4. *Parag Diwan – Management Principles and Practices, Excel Books, New Delhi*
5. *Stoner, Freeman, Gilbert. Jr. – Management, Prentice Hall of India, 6th Edition*
6. *Koontz, weihrich – Essentials of Management, Tata McGrew Hill, 5th Edition*

SEMESTER-VI

Course Code: MCEF601 **Title: Linux System Administration**
SGGSWU-DCSE] **L/T/P: 3/1/1**

Unit-I **(15 Hours)**

Linux Startup: User accounts, accessing Linux - starting and shutting processes, Logging in and Logging out, Command line, simple commands
Shell Programming: Unix file system: Linux/Unix files, i-nodes and structure and file system related commands, Shell as command processor, shell variables, creating command substitution, scripts, functions, conditionals, loops, customizing environment

Unit-II **(13 Hours)**

Regular Expressions and Filters: Introducing regular expressions patterns, syntax, character classes, quantifiers, introduction to egrep, sed, programming with awk and perl.

Unit III **(10 Hours)**

The C Environment: The C compiler, vi editor, compiler options, managing projects, memory management, use of makefiles, dependency calculations, memory management - dynamic and static memory, building and using static and dynamic libraries, using ldd, soname, dynamic loader, debugging with gdb

Unit-IV **(12 Hours)**

Processes in Linux: Processes, starting and stopping processes, initialization processes, rc and init files, job control - at, batch, cron, time, network files, security, privileges, authentication, password administration, archiving, Signals and signal handlers, Linux I/O system.

Syllabus for Practical:

Implementation of studied concepts

Text Books:

1. *Introduction to Linux by Machtelt Garrels.*
2. *Linux: Command Line and Shell scripting by Richard Blum.*
3. *Ellen Siever, Robert Love and Arnold Robbins, Linux in Nutshell, Fifth Edition,Oreilly Media.*
4. *Kurt Wall, Mark Watson, Mark Whitis, Linux Programming, Third Edition, SAMS Techmedia.*
5. *Mark Sobell, Practical* Guide to Linux Programming, Pearson Education.

Course Code: MCEF602 **Title: Artificial Intelligence**
[SGGSWU-DCSE] **L/T/P: 3/1/0**

Unit I (12 Hours)

Introduction: Artificial intelligence, importance of AI, AI and related fields, Historical background of AI.
Problem solving techniques: State space search, control strategies, heuristic search, problem characteristics, production system characteristics, Generate and test, Hill climbing, best first search, A* search, Constraint satisfaction problem, Mean-end analysis, Min-Max Search, Alpha-Beta Pruning, Additional refinements, Iterative Deepening.

Unit II (12 Hours)

Knowledge Representation: Mapping between facts and representations, Approaches to knowledge representation, procedural vs declarative knowledge, Forward vs. Backward reasoning, Matching, conflict resolution, Nonmonotonic reasoning, Default reasoning, statistical reasoning, fuzzy logic Weak and Strong filler structures, semantic nets, frame, conceptual dependency, scripts.

Unit III (12 Hours)

Knowledge Acquisition: General concepts, type of learning, general learning model, performance measures, Genetic algorithms, intelligent editors, learning by induction, Analogical and explanation-based learning.
Knowledge Organization and Manipulation: Search and control strategies, matching techniques, fuzzy matching algorithms, knowledge organization and management.

Unit-IV (12 Hours)

Languages for AI Problem Solving: Introduction to Prolog- syntax and data structures, representing objects and relationships, built in predicates. Introduction to LISP- basic and intermediate LISP programming.

Introduction to: Expert Systems, Pattern recognition, Natural Language Processing Evolutionary algorithm, Fuzzy logic, Neural Networks.

Text Books:

1. *D.W.Patterson, Introduction to AI and Expert Systems, PHI.*
2. *N.J.Nilsson, Principles of Artificial Intelligence, Kaufmann,1980*
3. *Saroj Kaushik,Logic and Prolog Programming, New Age International Publications.*
4. *PH.Winston,Artificial Intelligence, Addison Wesley.*

Course Code: MCEF603 **Title: Software Engineering**
[SGGSWU-DCSE] **L/T/P: 3/1/0**

Unit I (10 Hours)

Introduction: Introduction to Software Engineering, importance of Software, The Software Evolution, Software Characteristics, Software Applications, Software Crisis: Problem and Causes.
Software Development Life Cycle: Waterfall model, Incremental and Evolutionary process models, Personal Software process (PSP) and Team Software process (TSP), Overview of agile process and aspect oriented programming

Unit II (10 Hours)

Software Requirement Specification: Problem Analysis, Requirement elicitation and Validation, Requirements modeling: Scenarios, Information and analysis classes, flow and behavioral modeling, documenting Software Requirement Specification (SRS).
System Design: Design Concepts, design models for architecture, component, data and user interfaces; Problem Partitioning, Abstraction, Cohesiveness, Coupling, Top Down and Bottom Up design approaches; Functional Versus Object Oriented Approach, Design Specification, 4GL.

Unit III (12 Hours)

Coding: TOP-DOWN and BOTTOM-UP structure programming, Information Hiding, Programming Style, and Internal Documentation, Verification.
Software Testing: Levels of Testing, Functional Testing, Structural Testing, Test Plan, Test Case Specification, Software Testing Strategies, Verification & Validation, Unit, Integration Testing, Top Down and Bottom Up Integration Testing, Alpha & Beta Testing, White box and black box testing techniques, System Testing and Debugging.

Unit IV (18 Hours)

Software Quality Assurance: Software Configuration Management, Overview of Software Quality Control and Quality Assurance, ISO 9000 Certification for Software Industry, SEI Capability Maturity Model (CMM) and Comparison between ISO & SEI CMM.
Technical Metrics for Software: A Framework for Technical Software Metrics, Metrics for the Analysis Model, Metrics for Design Model, Metrics for Source Code, Metrics for Testing, Metrics for Maintenance.

Text Books:

1. *Software Engineering by Ian Sommerville, Seventh Edition, Pearson Education.*
2. *Effective Methods for Software Testing by William E. Perry, Second Edition, John Wiley & Sons.*
3. *Software Engineering: A Practitioner's Approach by R.S. Pressman, Sixth Edition, Tata McGraw-Hill.*
4. *Software Testing Techniques by Boris Beizer, Second Edition, Dreamtech.*
5. *Software Quality Assurance – Principles and Practice by Nina S Godbole, Narosa.S.L. Pfleeger,*
6. *Software Engineering: Theory and Practice by J.M. Atlee, Second Edition, Pearson Education.*
7. *An Integrated Approach to Software Engineering by PankajJalote, Second Edition, Narosa.*

Course Code: MCEF 604 **Title: Microprocessors and Applications**

[SGGSWU –DCSE] **L/T/P: 3/1/1**

UNIT I (12 hrs)

Introduction to microprocessor, Intel 8085 microprocessor architecture and its operations, various functions, Data flow to/from memory, from/to microprocessor unit, multiplexing and de-multiplexing of address data bus. Comparative study of 8-bit microprocessors: 8085, Motorola 6800, Zilog Z-80.

UNIT II (13 hrs)

Addressing modes, Bus timings, T state, machine cycle, timing diagram, Detail study of 8085 instruction set. Memory mapping. Interrupt: necessity, types and structure, stack and subroutines, Programming techniques: looping, counting. Efficient programming in view of memory and speed.

UNIT III (15 hrs)

Concept of programmable devices, architecture and programming of 8155/8156 (programmable I/O port timer), 8254/8253 (programmable interval timer), 8255 (programmable peripheral interface), its interfacing with 8085 microprocessor. 8279 (keyboard display controller),

UNIT IV (15 hrs)

8237 (direct memory access controller), 8251(universal synchronous, asynchronous receiver transmitter) with 8085 microprocessor.

Microprocessor 8086: Block diagram, Architecture & Pin diagram of 8086, pipelining process, flag register. Register details of 8086, operation, different addressing modes.

References:

1. *Microprocessor Architecture Programming and Applications with the 8085 by Gaonkar R.S, Penram International Pub.*
2. *Microprocessor and Interfacing Programming and Hardware by Hall D.V, McGraw Hill Co.*
3. *Microprocessors and its applications by Theagrajan, PHI*
4. *Intel Data Books.*

Course Code: MCEF605 **Title: Design and Analysis of Algorithm**
[SGGSWU-DCSE] **L/T/P: 3/1/0**

Unit I (8 hrs)

Introduction: Role of Algorithms in Computing; Growth of functions: Asymptotic Notation, Standard notation & common functions
Divide and Conquer: Performance analysis of Binary Search, Merge sort, Quick sort, Selection sort;

Unit II (12hrs)

Greedy Algorithms: Elements of Greedy strategy, Activity Selection Problem, Knapsack problem, Single source Shortcut paths problem, Minimum Spanning tree problem and analysis of these problems.

Unit III (12 hrs)

Dynamic Programming: Elements of dynamic programming, Assembly-line scheduling problem, Matrix-chain multiplication, Multistage Graph, All Pairs Shortest paths, Longest common subsequence, 0/1 Knap Sack.

Unit IV (18 hrs)

Back Tracking: General method, 8 queen's problem, Graph coloring, 0/1 Knap Sack Problem
NP-Completeness: Polynomial Time, polynomial-time verification, NP-completeness & reducibility, NP-complete problems

Syllabus for Practical:

Implementation of studied concepts.

Text Books:

1. Introduction to Algorithms by Coremen, PHI

2. Algorithm Analysis & design by Harwitz and Sahni, Galgotia Publications

3. The Design and Analysis of computer Algorithms by Aho, Hopcroft,Ullman, Pearson

SEMESTER-VII

Course Code: MCEF701 **Title: Java Programming**
[SGGSWU-DCSE] **L/T/P: 3/1/1**

UNIT I (12 Hrs)

Java Fundamentals: Features of Java, OOPs concepts, Java virtual machine , Reflection byte codes, Byte code interpretation , Data types, variable, arrays, expressions, operators, and control structures, Objects and classes ,
Java Classes: Abstract classes, Static classes, Inner classes.

UNIT II (10 Hrs)

Inheritance : Overloading Methods ,Member Access & Inheritance & Method Overloading using super and final
Packages: Defining a package, Understanding class path, Importing packages

UNIT III (14 Hrs)

Interface - Defining on Interface, Implementing Interfaces, Applying Interfaces, Variables in interface
Multithreading – threads, threads states, creating threads, interrupting threads, threads priorities, synchronizing threads, inter threads communication ,suspending, resuming & stopping threads.

UNIT IV (15 Hrs)

Exception Handling: Dealing with error , benefits of exception Handling, the classification of exception- exception hierarchy, checked exception and unchecked exception, Try catch, Throw, throws
Event Handling: Event, Event Source, Event Classes, Semantic and low level events, handling a button click, handling mouse and keyboard events .
Introduction to Applets

Text Books:

1. *Java: the complete reference , Herbert Schildt, TMH*
2. *Java how to Program, Deital & deital , Prentice Hall.*

Course Code: MCEF-702 **Title: Software Quality Models and Testing**
[SGGSWU-DCSE] **L/ T/ P: 3/1/0**

UNIT-I (12 Hrs)

Software Quality: Meaning and scope, software quality factors, software quality metrics, relationship b/w quality factors and quality metrics, quality management system, software reviews, formal technical reviews, correctness proof, statistical quality assurance, clear room, software engineering, standards of software quality assurance.

UNIT II (14 Hrs)

Software Reliability: meaning and its relation with software quality, reliability modeling exponential failure time models (viz., Jelinski Moranda model, Schneidiwind's model, Musa's basic execution time model, hyberexponential model), Weibull and gamma failure time model (viz. Weibull model, S-shaped reliability growth model), and infinite failure category models (viz. Duane's model, geometric model, Muse-Okumto model). Types of failure, bath-tub Curve, Exponential law of reliability.

UNIT III (12 Hrs)

Software Testing: Meaning. Scope and its relationship with software quality, software testing techniques: white box testing, basis path testing, control structure testing and black box testing, etc.

Software testing strategies: unit testing, integration testing, validation testing and system testing, etc.

UNIT IV (12Hrs)

Concept of repair and maintenance, concept of availability and its relation with reliability and maintainability, preventive maintenance, Software maintenance, the management of reliable software, Automatic error detection and error correction.

Text Books:

1. *Software Quality: Concepts and Plan, by Robert H Dunn Prentice Hall International*
2. *Software Reliability: Measurement, Prediction and application by John D.Musa, McGrawHill*
3. *Software Reliability Engineering By Michele R Lyu , McGraw Hill*
4. *Effective methods of Software Testing, by William E Perry, Wiley.*
5. *Concepts of Reliability by L SriNath*
6. *Software Reliability By K.K. Aggarwal*
7. *Software Reliability by H Koptez.*

Course Code: MCEF-703 **Title: Compiler Design**
[SGGSWU-DCSE] **L/ T/ P: 3/1/ 0**

UNIT I (15 Hrs)

Intoduction: Assemblers, linkers, loaders, compilers and translators, the structure of a compiler, different states in the construction of a compiler.
Lexical Analysis: Lexical analysis: Lexical Analyzer, its role, input buffering, Specifications and recognition of tokens, Lexical analyzer generator
Syntax analysis: Context-free Grammars, writing Grammar, Top-Down parsing-recursive descent and predictive parsers, Bottom-Up parsing, operator Precedence parsing, LR Parsers, Parser generator

UNIT II (12 Hrs)

Syntax-Directed Translation: Syntax-directed translation schemes, implementation of syntax directed translators, intermediate code, postfix notation, parse trees and syntax trees, three address code, quadruples, and triples, translation of assignment statements. Boolean expressions, control statements.
Symbol labels: The contents of a symbol table data structures for symbol tables representing scope information.

UNIT III (12 Hrs)

Run Time Storage Administration: Implementation of a simple stack allocation scheme, implementation of block structured languages, storage allocation in block structured languages.
Error Detection And Recovery: Error, Lexical-phase errors, syntactic-phase errors, semantic errors.

UNIT IV (15 Hrs)

Code Optimization: The principle sources of optimization, loop optimization, the DAG representation of basic blocks, value number and algebraic laws, global dataflow analysis.
Code Generation: Object programs, problems in code generation, a machine model, a single code generator, register allocation and assignment, code generation from DAGs, peephole optimization.

Text Books:

1. *Aho A.V. and Ullaman J.D. Principles of Compiler Design, Addison Wesley*
2. *Donovan, J, System Programming , TMH*
3. *D.M. Dhamdhere: Compiler construction- Principles and Practice Mc Milan India*
4. *David Grics: Compiler Construction for digital computer*.

Course Code: MCEF704 **Title: Theory of Computation**
[SGGSWU-DCSE] **L/T/P: 3/1/0**

UNIT I (12Hrs)

Finite Automata & Regular Languages: Finite state systems, Deterministic, non-deterministic finite automata, equivalence of deterministic and non-deterministic finite automata, Finite -moves, 2 way finite automata with output, equivalence of Mealy and Moore machines.

UNIT II (12Hrs)

Properties of Regular Sets: Finite automata and regular expressions, The pumping lemma for regular sets, closure properties of regular sets, decision algorithms of regular sets, Minimization of finite Automata, regular sets and regular grammars.

Context free grammars: Introduction to context free grammers, derivation trees, top-down & bottom up parsing methods, ambiguous context free grammars, chomsky normal forms.

UNIT III (12Hrs)

Properties of Context free Languages: The pumping Lemma for context free languages, closure properties of context free languages, decision algorithms for context free languages.

Pushdown Automata: Deterministic and Non-deterministic pushdown automata, Equivalence of context free languages and sets accepted by pushdown automata.

UNIT IV (12Hrs)

Turning Machines: Introduction to turing Machines, Deterministic, non-deterministic, two way infinite tape, multi tape, Chomsky hierarchy of languages, Unsolvability of the halting problems.

Text Books:

1. *Introduction to automata theory Languages &computation by Hopcraft,Ullman, Narosa Publications*
2. *Theory of Computer science by EV Krishnamurthy, East-west press*
3. *Switching circuits & FSM by ZVI Kohavi, TMH publications*

Course Code: MCEF-705 **Title: Distributed Operating Systems**
[SGGSWU-DCSE] **L/ T/ P: 3/1/0**

UNIT-I (12 Hrs)

Architecture of distributed operating system: Introduction, motivation, system architecture type, issues in distributed operating system, Communication primitive.

Interprocess communication: API for internet protocol, Marshalling. Client server communication, group communication

UNIT-II (12 Hrs

Distributed objects and remote invocation: communication between Distributed objects, RPC,
events and notification

Operating System Support: Operating System layer. Protection, processes and threads, operating system architecture

UNIT-III (15 Hrs)

Distributed dead lock detection: Introduction, dead lock handling, strategies, issues in deadlock detection & resolution, Control organization, centralized, distributed & hierarchical detection algorithm.

Transaction and concurrency control: transactions, nested transactions, Locks, optimistic concurrency control, time stamp ordering, Comparison of methods for concurrency control

UNIT-IV (15 Hrs)

Distributed file system: Introduction, architecture mechanism for building, design issues, log structured file system.

Distributed Scheduling: Introduction, motivation, issues in load distribution, component of load algorithm, stabilizing load distribution algorithm, performance comparison, selection of a suitable load sharing algorithm, requirement for load distribution, task migration, issues in task migration.

Text Books:

1. *Mukesh Singhal & N.G. Shivaratri: Advanced concepts in operati g systems, TMH 2001.*
2. *A S Tanenbaum : Modern Operating Systems ,PHI.*
3. *A. Silberschatz, P. Galving, G. Gahne : Applied operating system concepts, Wiley.*

SEMESTER-VIII

Code: MCEF801 **Title: Computer Graphics**
[SGGSWU-DCSE] **L/T/P: 3/1/1**

UNIT I [12 hours]

Presentation Graphics, Graphics Hardware: Input Devices: Touch panel, light pen, graphics tablets, joysticks, track balls, data glove, digitizes, image scanner, voice systems.
Video Display Devices: Refresh cathode ray tube, raster scan displays, random scan displays, graphics monitors & workstations.

UNIT II [14 hours]

Scan Conversion: Point plotting, line drawing algorithm MS-DDA algorithm, Bresenham's Line algorithm, Area filling – scan line algorithm, flood-fill algorithm, circle, ellipses, and generation.
2-Dimensional Transformations : Basic transformations translation, scaling, rotation, matrix, representation & homogeneous coordinates, composite transformations-scaling relative to a fixed pivot, rotation about a pivot point, line & polygon clipping reflection, shearing, about a arbitrary line. Clipping: Line & Polygon

UNIT III [14 hours]

3-Dimensional Graphics &Transformations : Co-ordinate systems & Display techniques, Representation – Polygon surfaces, curved surfaces, Bezier, B-spline curves, 3-D Transformation- translation, scaling, rotation; reflection, shearing, Mathematics of Projections - parallel & perspective, clipping

UNIT IV [12 hours]

Hidden Line & Surface Elimination Algorithms: z-buffer, scan-line, sub-division, and Painters algorithm. Illumination Models: Diffuse reflection, specular reflection, refracted light, texture surface patterns, Half toning, Dithering. Surface Rendering Techniques: Constant intensity shading, Garoud Shading, Phong Shading, Fast Phong Shading. Basic Color Models**:** CMY, RGB, and HSV Color Models

Syllabus for Practical:

Implementation of studied concepts.

Texts Books:

1. *Donald Hearn & M.P. Baker, "Computer Graphics" PHI New Delhi, 2nd edition,.*
2. *R.A. Plastock & ZHIGANG Xiang "Computer Graphics" Schaum Outlines 2nd edition*
3. *J.D. Foley, A.V. Dam, S.K. Feiner, J.F. Hughes, R.L. Philips, "Introduction to Compute Graphics", Addisen- Wesley Publishing Company, N.Y., 2nd edition.*
4. *R.A. Plastock& G. Kalley, "Computer Graphics" McGraw Hill.*

Course Code: MCEF802 **Title: Wireless Communication and Networks**
SGGSWU [DCSE] **L/T/P: 3/1/1**

UNIT –I [12 hours]

Introduction and Classification of Mobile Communication Systems: Introduction, Evolution of Wireless Networks, Paging systems, Wireless Telephony, Trunking Systems, Cellular Systems, Personal Satellite Communication Systems, Wireless access to the Local Area networks

Wireless Transmission: Frequencies for radio transmission, signals, antenna types, signal propogation, multiplexing techniques, modulation techniques, spread spectrum, cellular systems: Operation of cellular systems, analog cellular systems, digital cellular systems, 1G, 2G and 3G cellular systems.

UNIT-II [14 hours]

Wireless Local Area Network: Introduction, Infrastructure based vsinfrastructureless wireless LANS, Wireless LAN IEEE 802.11 standard, IEEE 802.11 architecture, Layered Protocol Architecture, IEEE 8-02.11 Medium Access Control, IEEE 802.11 Physical Layer, 802.11a & 802.11b, WiMax: 802.16

Mobile IP: IP Packet Delivery, Agent Discovery, Registration, Encapsulation,Tunneling& Reverse Tunneling, Mobile IP Type: MIPv4, MIPv6.

UNIT-III [14 hours]

Adhoc networks: Introduction, Network Architecture

Adhoc Routing Protocols: Issue in designing a routing protocol for adhoc wireless networks, Classification of Routing Protocols: Destination Sequenced Distance Vector(DSDV), Wireless Routing Protocol (WRP), Adhoc On-Demand Distance Vector Routing (AODV), Dynamic Source Routing (DSR), Temporally Ordered Routing Algorithm (TORA), Zone Routing Protocol (ZRP)

Multicast Routing in Adhoc Networks: Operation of multicast routing protocols, An architecture reference model for multicast routing protocols, Classifications of Multicast Routing Protocols: Tree-Based Multicast Routing Protocols, Mesh-based multicast routing protocols

UNIT–IV [12 hours]

Satellite Communication: Introduction to satellite communication, LEO,MEO,GEO

Security in Wireless System: Security Threats, Vulnerabilities, Attacks, Integrity, confidentiality, Authentication Strategies, Routing security

Introduction to simulators: OpNet, NS2, QualNet

Syllabus for Practical:

Practicals based on the following trainer kits: LAN, CDMA, GSM, Mobile telephony and Bluetooth

Text Books:

1. *J. Schiller, Mobile Communication, 2nd edition ,Pearson Education*
2. *W.C.Y. Lee,"Mobile Cellular Telecommunications" 2nd Edition ,Tata McGrawHill*
3. *Anna Hac, "Mobile Telecommunications Network Protocols" 2nd Edition ,John Willey.*

Course Code: MCEF 803 **Title: Data Warehouse & Data Mining**
[SGGSWU- DCSE] **L/T/P: 3/1/0**

UNIT- I **[12 hours]**

Introduction: Introduction to Data Mining, Kind of Data to be mined, Data Mining Functionalities, Pattern Interestingness, Classification of Data Mining System, Major Issues in Data Mining
Data Warehouse and OLAP: Data warehouse, Difference from traditional databases, Multidimensional data model, Schema for Multi-dimensional model, measures, concept hierarchies, OLAP operations, starnet query model, Data Warehouse architecture, ROLAP, MOLAP, HOLAP, Data Warehouse Implementation, Data Cube, Metadata Repositories, OLAM

UNIT-II [12 hours]

Data Objects and attribute Types: Nominal, Binary, Ordinal, numeric, Discrete and continuous Attributes

Basic Statistical Descriptions of Data: Measuring the Central Tendency and Dispersion of data

Data Processing: Data Cleaning, Data integration and Transformation , Data Reduction, Discretization and concept hierarchy

UNIT-III [12 hours]

Association Rules: Market basket analysis, Frequent, closed Itemsets, Frequent Pattern Mining, The Apriori Algorithm, Improving the efficiency of Apriori, Mining Frequent Itemsets without candidate Generation, Mining various kinds of association rules, correlational analysis

Classification and Clustering : Classification and prediction, Decision tree induction, Bayesian classification, k-nearest neighbour classification, Cluster analysis, Types of data in clustering, categorization of clustering methods

UNIT-IV **[12 hours]**

Introduction of Mining Complex Data: Complex data objects, Mining spatial databases, Multimedia databases, Time Series and sequence databases, Taxt databases and World Wide Web, Data Mining Application and Trends.

Text Books:

1. *J.Han and M. Kamber:Data Mining: Concepts and Techniques By Morgan Kaufman publishers, Harcourt India pvt. Ltd. Latest Edition*
2. *Dunham: Data Mining Introductory and Advance Topics, Pearson Education, Latest Edition*
3. *Berson :Data Mining By TMH*

MCEF 804: Natural Language Processing **L/T/P- 3/1/0**

UNIT-I (12 hours)

Goals of NLP: Survey of applications, Levels of linguistic processing: morphology, syntax, semantics, Language processors: recognizers, transducers, parsers, generators, Language as a rule-based system, Language understanding as an inferential activity.Resources for NLP: lexicons and knowledge bases.

UNIT-II (10hours)

Elements of formal language theory: alphabet, string, language, grammar, productions, symbol vocabulary, generator, recognizer, procedure.Types of grammar: the Chomsky Hierarchy.

UNIT-III (14 hours)

Computational morphology: lemmatisation, Part-of-Speech Tagging, Finite-State Analysis. Parsing: definition of a parser; derivations, basic parsing strategies for context free grammars ,determinism and non-determinism; decidability ,data structures and algorithms for parsing ,unification based grammar formalisms.

UNIT-IV (12 hours)

Ambiguity and its resolution: Syntactic ambiguities and heuristics, lexical ambiguities and selectional restrictions, indeterminacy of reference, Generation and Dialogue: Syntactic generation algorithms and reversibility, text planning, modeling dialogue agents.

Text Books:

1. *Natural language understanding by Allen, J.*
2. *Readings in natural language processing by Grosz, B.J., Sparck Jones, K. & Webber, B.L. (eds)*
3. *Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics by Jurafsky, D. & J. Martin.*

MCEF 805: Information Retrieval **L/T/P: 3/1/0**

UNIT-I (12 hours)

Introduction: Introduction to Information Retrieval. Inverted indices and boolean queries. Query optimization. The nature of unstructured and semi-structured text, the term vocabulary and postings lists

Text encoding: tokenization, stemming, lemmatization, stop words, phrases. Optimizing indices with skip lists. Proximity and phrase queries. Positional indices.

UNIT-II (11 hours)

Dictionaries and tolerant retrieval: Dictionary data structures. Wild-card queries, permuterm indices, n-gram indices. Spelling correction and synonyms: edit distance, soundex, language detection.

UNIT-III (12 hours)

Index construction:Postings size estimation, sort-based indexing, dynamic indexing, positional indexes, n-gram indexes, distributed indexing, real-world issues.

UNIT-IV (13 hours)

Scoring: Term weighting and the vector space model. Parametric or fielded search. Document zones. The vector space retrieval model .tf.idf weighting. The cosine measure. Scoring documents.

Text Books:

1. *Introduction to Information Retrieval by C. Manning, P. Raghavan, and H. Schütze, Cambridge University Press,2008(4)*
2. *Modern Information Retrieval by R. Baeza-Yates, B. Ribeiro-Neto, Addison-Wesley.*

MCEF806: Topics in Design and Analysis of Algorithm L/T/P - 3/1/0

UNIT–I (12 hours)

Review of basic concepts; Worst case and average case analysis: big oh; Small oh, omega and thet a notations, Solving recurrence equations. Overview of basic design paradigms such as increment a l approach; Divide and conquer; Greedy paradigm; Dynamic programming backtracking; Branch a nd bound; pruning; transformations; Preprocessing and case studies illustrating each design methodologies with complete Analysis of algorithms.

UNIT-II (14 hours)

Advanced graph algorithms; Matching Network flows; Applications to OR / optimization; Geomet ric algorithms; Line• sweep paradigm; Incremental design; Closest pair problem; Convex hull; Tri angulations; Planar point location; Segment intersection Applications to data bases and computer graphics. Stringology; Pattern matching; 8M algorithms; KMP algorithms; Computational number theory; GCD algorithm; Primality tests; Quadratic residues; Applications to cryptography.

UNIT-III (10 hours)

Lower bound theory; Information theoretic bounds; Adversary arguments; NP completeness; Basi c techniques for proving NP completeness case studies. Approximate algorithms; Scheduling prob lems; Set cover problem; Bin packing problem

UNIT-IV (12 hours)

Polynomial time approximate schemes; Basics of parallel algorithms; Flynn's classification; SIMD algorithms for simple problems; List ranking. Basics of randomized algorithms; Their practical si gnificance; Las Vegas and Monte Carlo algorithms; Skip lists; Treaps; Uniform hashing.

Text Books:

1. *Fundamentals of Data structures in C++ by E. Horowitz, S.Sahni and Dinesh Mehta, Galgotia,1999.*
2. *Data Structures and algorithms in C++by Adam Drozdex,, Second Edition, Thomson learning – Vikas publishing house, 2001.*
3. *Algorithmics: Theory and Practice by G. Brassard and P. Bratley, Prentice –Hall, 1988.*
4. *Introduction to Algorithms by Thomas H.Corman, Charles E.Leiserson, Ronald L. Rivest, PHI.*

MCEF 807 - Object Oriented Software Development **L/T/P – 3/1/0**

UNIT-I **(10 hours)**

Basic concept: Keywords, data types, Reference variables, Call by Reference, return by Reference,
Function prototyping, inline function, Default Arguments, Friend Function, Array of Object, Static data member, Object as Function arguments

UNIT-II **(14 hours)**

Introduction to object oriented: Classes, Object, Instances, Abstraction, Data, Encapsulation,Function overloading, Operator overloading, Constructor and Destructor, Inheritance, Polymorphism using C++,
Exceptional handling

UNIT-III **(12 hours)**

Unified modeling language: Introduction to UML, basic representation: Class, Active Class, Interface, use case, Actor, component, node, Events, Cardinality, types of Message, Relationship: Dependency, Association, generalization, realization, functional view, static view, Dynamic view

UNIT-IV **(13 hours)**

UML Diagrams: Structural Modeling: Class Diagram, Package diagram, Object Package**,** Component Diagram Behavioral Modeling: Use Case Diagram**,** Activity Diagram Architectural Modeling: Sequence Diagram, Collaboration Diagram, State Diagram, Deployment Diagram

Text Books:

1. *Object Oriented Programming with c++ by EBalagurusamy, TMH*
2. *2 The Complete reference C++ by Herbert Schildt, TMH*
3. *3 Object Oriented Analysis and Design with Application by Booch,Jacobson,Rumbaugh, Pearson*
4. *4 UMLIn an Instant by Thomas A. Pender, WILEY*

SEMESTER-IX

Course Code: MCEF901 **Title: Research Methodology**
SGGSWU [DCSE] **L/T/P: 3/1/0**

UNIT I (10 hours)

Introduction to Research: Meaning of Research, Objectives of Research, Types of Research, Significance of Research, Research Process, Criteria of Good Research, Problems encountered by Researchers in India.

Defining the Research Problem: What is a Research Problem, Selecting the problem, Necessity of Defining the problem, Techniques involved in Defining a Problem.

Research Design: Meaning of Research Design, Need for Research Design, Introduction to different Research Designs, Basic Principles of Experimental Designs, Completely Randomized Design, Randomized Block Design, Latin Square Design, Factorial Design

UNIT II (15 hours)

Sampling Techniques: Concept of population and sample, Steps in Sample Design, Characteristics of a Good Sample Design, Different Types of Sample Designs: Probability and Non-Probability Sampling. Complex Random Sampling Designs: Systematic Sampling Stratified Sampling, Cluster Sampling, Area Sampling and Multi-Stage Sampling. Non-Probability Sampling: convenience sampling, judgment sampling, quota sampling.

Methods of Data Collection: Primary and Secondary Data, Collection of Primary Data: Observation Method, Interview Method, Questionnaires, Schedules and other methods, Collection of Secondary Data.

UNIT-III (13 hours)

Processing and analysis of data: processing operations: editing, coding, classification, tabulation, statistics in research

Measures of central tendency: Mean, Geometric Mean, Harmonic Mean, Median for grouped data and ungrouped data, Mode.

Measures of Dispersion: Range, Mean Deviation and Standard Deviation.

Correlation Analysis: Concept, Significance Of Study Of Correlation, Types Of Correlation- positive , negative, simple, partial and multiple, linear and nonlinear, Methods Of Studying Correlation: Scatter Diagram method, merits and limitations of scatter diagram method, Karl Pearson coefficient of correlation: Direct Method And Assumed Mean method, Rank Correlation Coefficient: Where Ranks Are Given , Where Ranks Are Not Given, Equal Ranks.

Regression Analysis: Simple Regression Analysis, Difference between Correlation and Regression Analysis, Regression Lines, Regression Equations.

UNIT –IV (12 hours)

Test of Hypothesis: Defining Hypothesis; Basic concepts in context of Testing of Hypothesis: Null and Alternative Hypothesis, Level of Significance, Decision Rule, Type I and Type II errors; Procedure for Hypothesis Testing

Parametric Tests: Tests of significance for small samples: T-test: students t distribution, applications of T distribution: to test the significance of the mean of random sample, testing difference between means of two samples (independent samples, dependent samples/paired)

Tests of significance for large samples: Z-test: for single mean, difference of mean, single proportion, difference of proportion F-test (variance ratio test: concepts, assumptions, applications of F test)

Essentials of Report Writing: Significance of Report Writing, Different Steps in Writing Report, Layout of the Research Report, Types of Reports, Mechanics of Writing a Research Report, Precautions of Writing Research Reports.

Text Books

1. *Levin, R.I. and Rubin, D.S.; Statistics for Management, 7th Edition, Pearson Education: New Delhi.*
2. *Malhotra, N.K., Marketing Research An Applied Orientation, 4th Edition, Pearson Education: New Delhi*
3. *Zikmund, W.G., Business Research Methods, 7th Edition, Thomson South-Western.*
4. *Krishnaswami, K.N.,Sivakumar, A.I. and Mathirajan, M., Management Research Methodology, Pearson Education: New Delhi.*
5. *Kothari C.R., Research Methodology Methods and techniques by, New Age International Publishers, 2nd edition.*

Course Code: MCEF 902 **Title: Digital Image Processing**
[SGGSWU-DCSE] **L/T/P: 3/1/1**

Instruction

The external paper will carry 50 marks and will be of 3 hours duration. The question paper will be divided into three sections (A, B and C). Section A will be Compulsory which consists of 5 short answer type questions of 10 marks. Section B will consist of 6 question 5 marks each. Student will attempt 4 questions from section B. Section C will consist of 3 questions 10 marks each. Candidate will be required to attempt 2 questions.

UNIT-I (10 hours)

Digital Image Processing: Definition, Examples of Fields that use Digital Image Processing, Fundamental Steps in Digital Image Processing, Components of an Image Processing System.
Digital Image Fundamentals: Image Sensing, and Acquisition, Image Sampling and Quantization, spatial and gray level resolution, Zooming and Shrinking.

UNIT-II (14 hours)

Image Enhancement in Spatial Domain: Basic Gray Level Transformations, Histogram Processing, Enhancements using Arithmetic/Logic Operations, Basics of Spatial Filtering, Smoothing, Spatial Filters, Sharpening Spatial Filters, Combining Spatial Enhancement Methods

UNIT-III (14 hours)

Fourier Transformation and Frequency Domain: Smoothing Frequency Domain Filters, sharpening Frequency Domain Filters, Homomorphic Filtering, Implementation.
Colour Image Processing: Colour Models, Pseudocolour Image Processing, Basics of Full Colour Image Processing. Colour Transformations, Smoothing and Sharpening.

UNIT-IV (10 hours)

Point, Line and Edge Detection, Thresholding, Region Based Segmentation, Regiongowing, Region Splitting and Merging.

Syllabus for Practical:

Implementation of studied concepts.

Text Books:

1. *Gonzalez and Woods: Digital Image Processing, Addison Wesley*
2. *Forsyth and Ponce: Computer Vision A Modern Approach, Pearson Education.*
3. *Trucco&Verri: Introductory Techniques for 3-D Computer Vision, Prentice Hall, Latest Edition*
4. *Low :Introductory Computer Vision and Image Processing, McGraw-Hill 1991, ISBN 0-07-707403-3*
5. *Jain, Kasturi and Schunk :Machine Vision, McGraw-HiII. 1995 ISBN 0070320187.*
6. *Sonka, Hlavac, Boyle:Image -Processing, Analysis and Machine Vision 2nd ed. ISBN 0-534-95393-X, PWS Publishing,1999*

MCEF 903 - Parallel and Randomized Algorithms

L/T/P - 3/1/0

UNIT-I (10 hours)

The Role of Algorithms in Computing , Growth of Functions , Recurrences, The Substitution Method, The Recurrence Tree Method, The Master Method, Probabilistic Analysis and Randomized Algorithms, The Hiring Problem, Random Variables, Randomized Algorithms. Basic probability theory; randomized complexity classes; game-theoretic techniques.

UNIT-II (13 hours)

Quicksort - Description-Performance, Randomized version, Analysis. Sorting in linear time, Lower bounds for sorting-Counting sort-Medians and order statistics-Minimum and maximum-Selection in expected linear time, Selection in worst-case linear time-Dynamic Programming , Matrix chain multiplication, Elements of Dynamic programming, Longest common sequences.

UNIT-III (15 hours)

Basic notions in Markov Chains and Random Walks in Graphs (connectivity, ergodicity, stationary distributions, cover times, etc.). Markov, Chebyshev, and moment inequalities; limited independence; coupon collection and occupancy problems; tail inequalities and the Chernoff bound; conditional expectation; the probabilistic method; algebraic techniques; probability amplification and derandomization. Parallel The Lovasz local lemma and the method of Conditional Probabilities. Algebraic Techniques: Freivald's technique, the Schwartz-Zippel Theorem, Perfect matchings.

UNIT-IV (12 hours)

Randomized algorithms; Parallel randomized algorithms in computational geometry. Sorting and searching; data structures; combinatorial optimization and graph algorithms; geometric algorithms and linear programming; approximation and counting problems; parallel and distributed algorithms.

Text Books:

1. *Randomized algorithms by Rajeev Matwani and Prabhakar Raghvan.*

MCEF 904- Multimedia Systems **L/T/P- 3/1/0**

UNIT-I (10 hours)

Introduction: Motivation Overview, Evolution of Multimedia, Structure and components of Multimedia. Application Domains, Internet and Multimedia, Multimedia and Interactivity, multimedia devices CD- Audio, CD-ROM, CD-I, LANs and multimedia; internet, Primary User-Interface Hardware: Mouse. Keyboard, Joystick. Primary Visual Interface Items: Window, Buttons, Textbox, Icons. Hypertext, Hypermedia, Multimedia

UNIT-II (12 hours)

Image & Graphics: Principles of raster graphics, Computer Visual Display concepts, Resolution, Computer color models, Digital image Representation and formats, overview of other image file formats as GIF, TIFF, BMP, PNG etc

Data Compression & Standards: Text compression, image compression, various methods of compressions, Run Length coding, Huffman Coding, LZW Encoding, JPEG-objectives and architecture; JPEG-DCT encoding and quantization, JPEG statistical coding, JPEG predictive lossless coding; JPEG performance.

UNIT-III (12 hours)

Audio & Video: Digital representation of sound; method of encoding the analog signals; transmission of digital sound; Principles Broadcast standards, IDTV and HDTV principles, MPEG Audio; audio compression & decompression; brief survey of speech recognition and generation; musical instrument digital interface (MIDI); MPEG motion video compression standard;

Animation: Animation principles, Survey of animation tools, Various animation effects.

UNIT-IV (14 hours)

Synchronization: Temporal Dependence in Multimedia presentation, Inter-object and Intra-object Synchronization, Time Abstraction for authoring and visualization, Reference Model and Specification.

Application Development: Product development overview, Life cycle Models, Human Roles and Teamwork, Product Planning, Basic Authoring Paradigms: Story Scripts, Authoring Metaphors and authoring languages, Content Analysis: Message, platform, Metaphor and Navigation, cost-quality tradeoffs, Intellectual Property Right and Copyright issues.

Text Books:

1. *Multimedia Systems by John F. Koegel Buford.*
2. *Multimedia Systems by Ralf Steinmetz, Klara Nahrstedt*
3. *Multimedia Systems: Algorithms, Standards, and Industry Practices by Parag Havaldar and Gerard Medioni*

MCEF 905- EMBEDDED SYSTEMS **L/T/P - 3/1/0**

UNIT-I **(10 hours)**

Introduction Review of Embedded Hardware: Terminology, Gates, Timing
Diagram, Memory, Microprocessor Buses, Direct Memory Access, Interrupts, Built instructions on the Microprocessor. Conventions used on Schematic, Interrupts, Microprocessor Architecture, Interrupt Basic, Shared Data Problem, Interrupt Latency.

UNIT-II **(13 hours)**

PIC Micro controller & Interfacing: Introduction, CPU Architecture, Registers, Instruction Sets,
Addressing Modes, Programs, Interfacing Methods, Parallel I/O Interface, Parallel Port Interface, Memory Interfacing, High Speed I/O Interfacing, Interrupts – Interrupt Service Routine – features of Interrupts – Interrupt vector & Priority, Timing Generation & Measurements, Input Capture, Output Compare, Frequency Measurement, Serial I/O Device RS232, RS845, Analog Interfacing, Applications.

UNIT-III **(12 hours)**

Software Development & Tools: Embedded System Evolution Trends, Round – Robin, Robin with Interrupts, Function Scheduling architecture, Algorithms, Introduction to assembler, Compiler and Cross compilers and Integrated Development Environment IDE, Object Oriented Interfacing, Recursion, Debugging Strategies, Simulators.

UNIT-IV **(13 hours)**

Real Time Operating Systems: Task And Task States, Tasks and Data, Semaphores and shared
data, operating system services, Message queues, Timer Function, Events, Memory Management, Interrupt Routines in an RTOS Environment, Basic Design Using RTOS.

Text Books:

1. *Computers as Components, Third Edition: Principles of Embedded Computing System Design (The Morgan Kaufmann Series in Computer Architecture and Design) by Marilyn Wolf*
2. *The Fundamentals of Microcontrollers and Applications in Embedded Systems with PIC by Ramesh S. Gaonkar*

Network Security

Paper Code: MCEF-906 **L/T/P: 3/1/0**

UNIT-I **Contact Hours:10**

Introduction: Attacks, Services and Mechanisms. The OSI Security Architecture Introduction to information security: types of information security controls and purpose of information security management. Integrity check, digital Signature, authentication.

UNIT-II **Contact Hours:12**

Classical Encryption Techniques- Secret Key Cryptography: Block Encryption, DES rounds, S-Boxes IDEA: Overview, comparison with DES, Key expansion, IDEA Rounds. Uses of Secret key Cryptography; ECB, CBC, OFB,CFB, Multiple encryptions DES.

UNIT-III **Contact Hours:10**

Hash Functions and Message Digests: Length of hash, uses, overview of algorithms (MD2, MD4, MD5, SHS) MD5: algorithm (padding, stages, digest computation.) SHS: Overview, padding, stages.

Public key Cryptography: Algorithms, examples, Modular arithmetic (addition, multiplication, inverse, and exponentiation) RSA: generating keys, encryption and decryption. Other Algorithms: Diffie-Hellman

UNIT-IV **Contact Hours:11**

Network Security : Authentication applications – Kerberos – X.509 authentication service – Electronic mail security – PGP – S/MIME – IP security: Authentication Header, Encapsulation Security Payload.

Web Security : Web Security Requirements, Secure Sockets Layer and Transport Layer Security, Secure Electronic Transaction.

System Level Security: Intrusion detection – Password management – Viruses and related threats – Virus counter measures – Firewall design principles – Trusted systems.

Text Books:

1. *Cryptography And Network Security; Mcgraw Hill; Behrouz A Forouzan.*
2. *W. Stallings, Cryptography And Network Security Principles And Practice, 2/E.*
3. *Charlie Kaufman, Radia Perlman, Network Security.*

Reference Books:

1. *Atul Kahate, Cryptography And Network Security, Mcgraw Hill.*
2. *Information Security Intelligence Cryptographic Principles And App. Calabres Thomson.*