

DEPARTMENT OF COMPUTER SCIENCE
BIT MESRA

COURSE STRUCTURE – MONSOON 2015 Onwards

I- SEMESTER

Code No.	Name of Subjects	L	T	P	C
THEORY					
HU1101	Technical English	3	0	0	3
PH1201	Physics	3	1	0	4
MA1201	Engineering Mathematics	3	1	0	4
EE2201	Principles of Electrical Engineering	3	1	0	4
CH1401	Engineering Chemistry	3	0	0	3
SESSIONAL/LABORATORY					
ME1202	Engineering Graphics	1	0	3	3
CS1302	Fundamental of Unix & C Programming	1	0	3	3
PE1202	Workshop Practice	0	0	3	2
PH1202	Physics Lab	0	0	3	2
EXTRA CURRICULAR ACTIVITIE					
GA1002/ GA1004/ GA1006/ GA1008	NCC/ NSS/ PT & Games/ Creative Art	0	0	2	1
TOTAL		17	3	14	29
II- SEMESTER					
Code No.	Name of Subjects	L	T	P	C
THEORY					
EC2001	Principles of Electronics Engineering	3	0	0	3
MA2201	Advance Engineering Mathematics	3	1	0	4
CH2303	Environmental Science	3	0	0	3
CS2301	Fundamental of Data Structure	3	1	0	4
ME2001	Principles of Mechanical Engineering	3	0	0	3
AM1201	Engineering Mechanics	3	1	0	4
SESSIONAL/LABORATORY					
CH1402	Chemistry Lab	0	0	3	2
EE3202	Basic Electrical Engineering Lab	0	0	3	2
EC2002	Basic Electronics Engineering Lab	0	0	3	2
CS2302	Data Structure Lab	0	0	3	2
EXTRA CURRICULAR ACTIVITIES					
GA2002 GA2004 GA2006 GA2008	NCC/ NSS/ PT & Games/ Creative Art	0	0	2	1
TOTAL		18	3	14	30

III- SEMESTER

CS 3005	Object Oriented Programming using Java	3	0	0	3
EC 3201	Digital Electronics	3	1	0	4
CS 4101	Discrete Mathematical Structures	3	0	0	3

CS 6101	Design and Analysis of Computer Algorithms	3	0	0	3
BT3021/HU4001	Biological Science/Language (Breadth Paper)	3	0	0	3
Sessionals					
EE3202/AM2202	Basic Electrical Engg. lab/Engg. Mechanics lab	0	0	3	2
CS 3006	Object Oriented Programming Lab.	0	0	3	2
EC 3202	Digital Electronics Lab.	0	0	3	2
GA3002/ 4/6/8	NCC / NSS / PT & Games / C. Arts	0	0	2	1
Total 23					
IV- SEMESTER					
MA 4109	Probability, Statistics and Numerical Techniques	3	0	0	3
CS 4205	Database Management Systems	3	0	0	3
CS 4109	Computer System Architecture	3	1	0	4
CS 4107	Operating System	3	0	0	3
HU4001/ BT 3001	Foreign Language/ Biological Sciences	3	0	0	3
Sessionals					
CS 4206	DBMS Lab.	0	0	3	2
MA 4110	Numerical Techniques Lab.	0	0	3	2
CS 4108	Operating System Lab.	0	0	3	2
GA4002/ 4/6/8	NCC / NSS / PT & Games / C. Arts	0	0	2	1
Total 23					
V- SEMESTER					
CS 6107	Computer Networks	3	0	0	3
EC 4205	Microprocessor and Microcontroller	3	0	0	3
CS 5101	Formal Language & Automata Theory	3	1	0	4
CS 8101	Artificial Intelligence and Expert Systems	3	0	0	3
	Breadth Subject-V	3	0	0	3
Sessionals					
CS 6108	Computer Networking Lab.	0	0	3	2
EC 4206	Microprocessor Application Lab.	0	0	3	2
CS 8102	Artificial Intelligence Lab.	0	0	3	2
Total 22					
VI- SEMESTER					
CS 6105	Compiler Design	3	0	0	3
CS 6011	Computer Graphics and Multimedia	3	0	0	3
CS 6109	Software Engineering	3	0	0	3
CS 6103	System Programming	3	1	0	4
	Breadth Subject-VI	3	0	0	3
Sessionals					
CS 6106	Compiler Design Lab.	0	0	3	2
CS 6110	Software Engg. Lab.	0	0	3	2
CS 6012	Computer Graphics and Multimedia Lab.	0	0	3	2
Total 22					
VII- SEMESTER					
CS 5105	Soft Computing	3	0	0	3
Departmental Elective - I	Departmental Elective - I	3	0	0	3
	Breadth Subject-VII	3	0	0	3

Sessionals						
CS 5106	Soft Computing Lab	0	0	3	2	
CS 7014	Project	0	0	0	4	
Total 15						
VIII- SEMESTER						
CS 8031	Data Mining & Data Warehousing	3	0	0	3	
	Departmental Elective - II	3	0	0	3	
	Departmental Elective – III	3	0	0	3	
Sessionals						
CS 8014	Project	Project	0	0	0	6
Total 15						
Total Credits=179						
Departmental Electives [Group I]						
1.	CS 7029	Free/Open Source software				
2.	CS 7117	Optimization Techniques				
3.	CS 7121	Cryptography and Network Security				
4.	CS 7029	Information Security and Assurance				
5.	CS 7101	Principles of Programming Languages				
6.	CS 7107	Digital Image Processing				
Departmental Electives [Group II]						
1.	EC 8201	Mobile & Cellular Communication				
2.	EE 4207	Digital Signal Processing				
3.	CS 7033	Multimedia Technology				
4.	CS 8029	Parallel & Distributed Systems				
5.	CS 8111	Natural Language Processing				
6.	CS 8121	Pattern Recognition				
7.	CS 8113	Computational Geometry				
Departmental Electives [Group III]						
1.	CS 8123	Real Time Systems				
2.	CS 8125	Computer Vision				
3.	CS 8127	Computing and Complexity Theory				
4.	EC 4201	VLSI Design				
5.	CS 7127	Software Project Management				
6.	CS 7123	Bio Informatics				
7.	CS 7125	Object Oriented Analysis and Design				

Breadth - V(Elective)					
Course Code	Subject	L	T	P	C
MSH 1131	Principles of Management	3	0	0	3
PE 5009	Industrial Organization and Management	3	0	0	3
MSH 1125	Organisation Behavior	3	0	0	3
AR 3039	Art and Culture	3	0	0	3
MSH 1113	Environmental Psychology	3	0	0	3
PE 5011	Project Engineering	3	0	0	3
Breadth - VI(Elective)					
MSH 1137	Economics	3	0	0	3
PE 6009	Engineering Economy	3	0	0	3
MSH1117	Financial Management	3	0	0	3

Breadth - VII(Elective)						
MSH 1149	IPR	3	0	0	3	
MSH 1109	Entrepreneurship and Small Business Management	3	0	0	3	
MSH 1103	Business Ethics	3	0	0	3	

CS 3005 Object Oriented Programming using Java

Module 1

[Lectures - 2]

Introduction to OOP, Objects and classes, Characteristics of OOP, Difference between OOP and Procedure oriented programming. Introduction to Java Programming, Features of Java, Applications and Applets, JDK, Source File Structure

Module 2

Lectures - 4]

Java language fundamentals, Building blocks of Java, Data Types, Variable declaration, Wrapper classes, Operators and Assignment, Control Structures, Arrays, Strings, StringBuffer class

Module 3

[Lectures - 10]

Java as an OOP Language, Defining classes, Modifiers, Packages, Interfaces, Exception Handling, Exception hierarchy, Constructors and methods of Throwable class, Unchecked and Checked Exceptions, Handling Exceptions in Java, Exception and Inheritance, Throwing user defined exceptions, Redirecting and rethrowing exceptions.

Module 4

[Lectures - 4]

Multithreading, Overview of threading, Creating threads, Thread Life-cycle, Thread priorities and Thread scheduling, Thread synchronization, Daemon Threads, Thread groups, Communication of Threads

Module 5

[Lectures - 5]

Files and I/O Streams, Java I/O, File Streams, FileInputStream and FileOutputStreams, Filter streams, Random Access files, Serialization

Module 6

[Lectures - 4]

Applets, Java Applications versus Java Application, Applet Life cycle, Working with Applets, The HTML APPLET Tag, Java.Applet package

Module 7

[Lectures - 6]

AWT, Basic classes in AWT, Drawing with Graphics Class, Class hierarchy of AWT, Event Handling, Adapter classes, AWT Controls, Layout Managers, Swings, Swings packages, Hierarchy of Swing classes, Advanced layout Managers, Additional Swing Components.

ext Book

Krishna P. R., Object Oriented Programming through JAVA, 1st Edition, Universities Press, 2008

Reference Books

1. Dietel,Dietel - Java How to program , 7th edition; Pearson Education , New Delhi.
2. C. Horstmann,G. Cornell - Core Java 2 Vol I & Vol II ; Pearson Education , New Delhi.
3. Balagurusamy -Programming in Java, 2nd Edition; Tata McGraw Hill Publication; New Delhi.
4. Patrick Naghton & H. Schildt – The Complete Reference Java 2, Tata McGraw Hill Publication, New Delhi.

EC3201 Digital Electronics

MODULE – I

Simplification of Boolean Expressions: Gate-level minimization, NAND and NOR implementation, POS & SOP simplification, Karnaugh map, Quine McCluskey method

Text Books:

1. “Digital Logic and Design”, M. Mano. PHI
2. “Modern Digital Electronics”, 3/e, R.P.Jain, TMH

MODULE – II

Design of Combinational Circuits: Adders, Subtractors, Multiplexers, Demultiplexers, Encoders, Decoders, magnitude comparator, Parity Generators and Checkers, Signed number system, BCD adder/subtractor, carry look ahead adder

Text Books:

1. “Digital Logic and Design”, M. Mano. PHI
2. “Modern Digital Electronics”, 3/e, R.P.Jain, TMH

MODULE – III

Sequential Circuits: Basic Concepts, Flip-Flop, RS, JK, Master Slaves, T and D Flip-Flops, Controlled Registers, Shift Registers and their applications, Synchronous and asynchronous counters, Controlled Counters, Up/Down counters, Ring counter

Text Books:

1. “Digital Logic and Design”, M. Mano. PHI

2. “Modern Digital Electronics”, 3/e, R.P.Jain, TMH

MODULE – IV

Analysis of Clocked Sequential Circuits: State equation, state table and state diagram, input equations, Analysis with various flip flop, State reduction and assignment, Design of clocked sequential circuits

Text Books:

1. “Digital Logic and Design”, M. Mano. PHI

MODULE – V

Introduction to Various Logic Families: Electrical characteristics of logic gates TTL gates, CMOS gates, Static CMOS Design; Dynamic hazards, Ratioed Logic, Pass-transistor logic, Transmission gate logic

Text Books:

1. “Digital Logic and Design”, M. Mano. PHI
2. “Modern Digital Electronics”, 3/e, R.P.Jain, TMH

MODULE – VI

Multivibrators: Types of multivibrators, AMV, MMV and BMV using transistors, AMV and MMV using OP-AMP, Schmitt Trigger

Text Books:

1. “Modern Digital Electronics”, 3/e, R.P.Jain, TMH

MODULE – VI I

Memories and Programmable Logic Devices: Memory organization and operation, write and read operations, Read only memories, PROMs, EPROMs, EEPROMs, RAMs: Static RAM, Dynamic RAM, Design of an 8x4 ROM, PLA, PAL, Generic array logic, CPLD, FPGA

Text Books:

1. “Modern Digital Electronics”, 3/e, R.P.Jain, TMH

CS 4101 DISCRETE MATHEMATICAL STRUCTURES

Module – I & II

Logic and Mathematical Reasoning: Logic, Propositional Equivalences, Predicates and Quantifiers, Methods of Proof, Mathematical Induction, Recursive Definition and Algorithms, Program Correctness.

Module – III & IV

Functions and Relations: Functions, Sequences and Summations, The Growth Functions, Relations and Their Properties, Non- array Relations & Their Applications, Representing Relations, Closures of Relations, Equivalence Relations, Partial Orderings.

Module – V

Graphs: Introduction to Graphs, Graph Terminology and Representation, Connectivity, Euler and Hamiltonian Paths, Shortest Path Programs.

Module – VI

Trees: Introduction and applications of trees, Tree Traversal, Spanning Trees, Minimum Spanning trees.

Module –VII

Semigroups, Groups and Coding: Binary Operations, Semigroups, Products and Quotients of Semigroups, Groups, Product and Quotients of Groups, Coding of Binary Information and Error Correction, Decoding and Error Correction.

Text Books:

1. B.Kolman et.al- Discrete mathematical Structures, 5th Edⁿ, Pearson Education, New Delhi - 2004.
2. K.H. Rosen – Discrete Mathematics and Its Applications – 4th Edⁿ, Tata McGraw Hill, New Delhi - 2001

Reference Books:

1. J.P. Tremblay et.al – Discrete Mathematical Structures with Applications to Computer Science, TMH, New Delhi – 2004.

CS 6101 DESIGN AND ANALYSIS OF COMPUTER ALGORITHMS

MODULE -I

Basic Tools on Designing Algorithms: What is an algorithm? Algorithm specification and performance analysis, randomized algorithms.

MODULE –II

Divide-and-Conquer: The general method, application to binary search, finding the maximum and minimum, merge sort, quick sort, the problem of selection and Strassen's matrix multiplication.

MODULE -III

The Greedy Method: The general method, application to optimal storage on tapes, job sequencing with deadlines, optimal merge patterns and minimum weight spanning trees.

MODULE –IV & V

Dynamic Programming: The general method, application to multistage graphs, all pairs shortest paths, optimal binary search trees, 0/1-Knapsack and traveling salesman problem, Flow shop scheduling

Backtracking: The general method, application to 8- puzzle problem, 8- queen problem and sum of subsets.

MODULE -VI

Branch and Bound: The method, application to 0/1 Knapsack traveling salesman problems, and efficiency considerations.

MODULE -VII

NP-Hard and NP-Complete Problems: Introduction and basic concepts, non-deterministic turing machine, the classes of P and NP, NP-hard graph problems, NP-completeness of the satisfiability problem, and polynomial- space-bounded problem.

Text Book:

1. E. Horowitz. et.al., Fundamentals of computer Algorithms, Universities Press, 2008, 2nd Edition

Reference Books:

1. J.Kleinberg & E. Tardos – Algorithm Design, Pearson Education, New Delhi, 2006
2. G.Brassard & P. Bratley – Fundamentals of Algorithms, PHI, New Delhi, 2005
3. T.H. Cormen et.al. – Introduction to Algorithms – PHI, New Delhi, 2005
4. S.Dasgupta et.al. – Algorithms, TMH, New Delhi - 2007

BT3001Biological Sciences*

Module 1

Nature of living things: Definition of life, Miller's experiment, theories and evidences about origin of life, levels of biological organization, classification of living world.

Module 2

Biomolecules: composition of living matter, water, carbohydrates, lipids, proteins, nucleic acids, vitamins and minerals.

Module 3

Biochemistry: Bioenergetics and thermodynamics, biological oxidation-reduction reactions, glycolysis, citric acid cycle, fatty acid metabolism, electron transport chain, aerobic and anaerobic respiration

Module 4

Molecular organization of cell: Viruses, cellular structure of microorganism, animal and plant, salient features of intracellular organelles, cell division and cell cycle, structure of chromosomes, difference between prokaryotes and eukaryotes.

Module 5

Molecular biology: Structure of DNA and RNA, DNA as genetic material, central dogma of

molecular biology, DNA replication, transcription and translation, Introduction to bioinformatics and drug designing.

Module 6

Enzymology:, Mechanism of enzyme action, Lock and key model and induced fit model, active site, Michaelis Menten equation, reversible and irreversible inhibitors, competitive, non-competitive and uncompetitive inhibition.

Module 7

Techniques in biological sciences: Centrifugation, chromatography, gel electrophoresis, spectroscopy, thermal analysis,.

Books Recommended

1. Purves et al, Life: The Science of Biology
2. R. Dulbecco, The Design of Life.
3. Lehninger A, Principals of Biochemistry
4. Stryer L, Biochemistry
5. K. Wilson & K.H. Goulding, A biologist's guide to Principles and Techniques of Practical Biochemistry.

CS 4109 COMPUTER SYSTEM ARCHITECTURE

MODULE I

(DESIGN METHODOLOGY)

System Design, System Representation, Design Process, the Gate level

The Register Level Register-Level Components, Programmable Logic Devices, Register-Level Devices.

The Processor Level Processor- level Components, Processor-level Design

MODULE II

PROCESSOR BASICS

CPU Organization Fundamentals, Additional Floating-Point Numbers

Data Representation Basic Format, Fixed-Point Numbers, Floating-Point Numbers

Instruction Sets Instruction Formats and Types

MODULE III

DATAPATH DESIGN

Fixed-Point Arithmetic Addition, Subtraction, Multiplication and Division

Arithmetic Logic Units Combinational ALUs, Sequential ALUs

MODULE IV

CONTROL DESIGN

Basic Concepts Introduction, Hardwired Control
Microprogrammed Basic Concepts, Multiplier Control Unit
Control Pipeline Control Instruction Pipeline, Arithmetic Pipeline

MODULE V

MEMORY ORGANIZATION

Memory Technology Memory Device Characteristics, Random Access Memories, Serial Access Memories
Memory Systems Multilevel Memories, Address Translation, Memory Allocation
Cache Main Features, Address Mapping

MODULE VI

SYSTEM ORGANIZATION

Communication Methods Basic concepts Bus Control
System Control DMA and Interrupts

MODULE VII

ADVANCED TOPICS

Pipeline Processing, Parallel Processing

Text Book

1. Hayes, J.P., "Computer Architecture and Organization", 3rd ed McGraw-Hill, London , 2000

Reference Books

4. Mano, M.M., "Computer System Architecture" , Prentice Hall of India, New Delhi, 1995
5. Heuring V.P., etal., " Computer System Design and Architecture", Addison Wesley Indian Reprint, 2000
6. Hamacher.V., etal, (Computer Organization" ,4th edition, McGraw Hill, Singapore, 1996
7. Ram. B."Computer Fundamentals: Architecture and Organization",3rd ed New Age International Publication, New Delhi, 2000

MA 4109 Probability, Statistics and Numerical Techniques

Module – I

High Speed Computation: Introduction, Computer Arithmetic, Errors, Machine Computation.
Transcendental and Polynomial Equations: Introduction, Bisection Method, Iterative Methods, Rate of Convergence, Methods for Complex Roots, Polynomial Equations.

[5L]

Module –II

System of Linear Algebraic Equations and Eigen value Problems: Introduction, Direct Methods, Error analysis, Iteration Methods, Eigen values and Eigen Vectors. Interpolation and Approximation: Introduction to Lagrange and Newton Interpolations, Finite difference operators, Interpolating polynomial using finite differences, Hermit interpolations, Piecewise and spline interpolation.

[5L]

Module – III

Differentiation and Integration: Introduction, Numerical differentiation, Numerical integration, Methods based on interpolation. Ordinary Differential Equations: Introduction, Euler methods, Single and Multistep methods, Predictor-corrector methods.

[5L]

Module– IV

Graphical Statistics-histogram, scatter plot, ogive, bar diagrams (including multiple and percentage), average, dispersion, skewness and kurtosis and their statistical measures, Exploratory Data Analysis, Empirical and classical definitions of Probability, Addition theorem, Conditional Probability, multiplication theorem, Independent Events, Bayes Theorem.

[5L]

Module – V

Random variables and Probability distributions, Discrete, Continues & Multivariable Distributions: Mathematical Expectation, Bernoulli Trials and the Binomial Distribution, The Moment – Generating Function, The Poisson Distribution, The Uniform and Exponential Distributions, The Normal Distribution, Distributions of Functions of a Random Variable, Distributions of Two Random Variables.

[5L]

Module VI

Sampling Distribution Theory: Independent Random Variables, Distributions of Sums of Independent Random Variables, Random Functions Associated with Normal Distributions, The Central Limit Theorem, Approximations for Discrete Distributions, The t and F Distribution. The Gamma and Chi-Square Distributions.

[5L]

Module – VII

Estimation & Tests of Statistical Hypotheses: Point Estimation, test of significance and Confidence Intervals for Means, Confidence Intervals for Difference of Two Means, Sample Size, Tests about Proportions, Tests of the Equality of Two Normal Distributions, Chi-Square Goodness of Fit Tests, Contingency Tables, Tests of the Equality of Several Means, F test for equality of two population variances

[5L]

Text Books:

1. Jain, M.K., et. al: Numerical Methods for Scientific and Engineering Computation, 3rd Edn. New Age Publication, New Delhi , 1999
2. S. C. Gupta and V. K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand and Sons, New Delhi.

Reference Books:-

1. Sastry, S.S. – Introductory Methods of Numerical Analysis, 4th Edn., PHI, New Delhi, 2005
2. Hines, W.W. et al – Probability and Statistics in Engineering, 4th edn., John Wiley, Singapore (Indian Reprint), 2003.
3. Veerarajan, T. – Probability, Statistics and Random Processes, 2nd Edn., TMH, New Delhi, 2003.

CS 4205

DATABASE MANAGEMENT SYSTEM

Credit - 3

Module – I

Introduction: Purpose of Database System; View of Data, Database Languages, Transaction Management, Database architecture, Database Users Administrator

Database Design and Entity - Relational Model: Overview of Design process, E-R model, Constraints, E-R diagrams, Weak Entity Sets, Extended E – R Features.

Module – II

Relational Model: Structure of Relational Database, Fundamental Relational Algebra, Operation, Additional Operations, , Tuple Relational, Calculus.

Module – III

SQL and Advanced SQL: Data definition, Basic structure of SQL queries, Set Operations, Aggregate Functions, NULL values, Nested Sub-queries, complex queries, views, modification of database, SQL data types & schemas, Integrity constraints, Authorization, Embedded SQL.

Module – IV

Relational Database Design: **Atomic domains and First Normal form, Decompositions using functional dependencies, Functional dependencies, Decomposition using multivalued dependencies, more normal forms.**

Module – V

Indexing and Hashing: Basic concepts, Ordered Indices, B+ Tree Index Files, B Tree Index files, Multiple Key Access, Hashing, Comparison of Ordered Indexing and Hashing

Module VI

Query processing- Overview, measures of query cost, selection operation, sorting join operations

Module – VII

Transaction & Concurrency Control: Transaction Concepts & ACID Properties, Transaction States, Concurrent Executions, Serializability & Its Testing, Recoverability, Introduction to Concurrency Control, Locked Base Protocol & Deadlock Handling. Timestamp-Based Protocols. Validation-Based Protocols. Multiple Granularity.

Text Book:

1. A.Silberschatz et.al - Database System Concepts, 5th Edⁿ, Tata Mc-Graw Hill, New Delhi – 2000.

Reference Books:

1. Date C.J. - An Introduction to Database System, Pearson Education, New Delhi, 2005
2. R.Elmasri, Fundamentals of Database Systems, Pearson Education, New Delhi, 2005.

CS 4107

OPERATING SYSTEM

Credit-3

MODULE – I

Introduction: What is an Operating System? Simple Monitor, Performance, Multiprogramming, time-sharing, Real Time systems, Protection.

(5)

File Systems: File Concept and support, Access and allocation methods, directory systems, File protection. (3)

MODULE – II

CPU Scheduling: Scheduling concepts and algorithms, Algorithms evaluation, and Multiple processor scheduling.

(6)

MODULE – III

Memory Management: Preliminaries, Bare Machine, Resident Monitor, Swapping, Multiple partitions, Paging, Segmentation, Combined systems. (8)

MODULE – IV

Virtual Memory : Overlays, Demand paging, Performance of demand paging, Page replacement, Virtual memory concepts, Page replacement algorithms, Allocation algorithms, and Thrashing.

(8)

MODULE – V

Disk Scheduling: Physical characterization, Disk Management, Swap-Space Management, RAID structure, FCFS scheduling and Shortest-Seek-Time-First.

(6)

MODULE – VI

Deadlocks: The deadlock problem, Deadlock characterization, Deadlock prevention, Deadlock avoidance; Deadlock detection, Recovery from deadlock, and combined approach to deadlock handling. (4)

MODULE – VII

Process Synchronization: Semaphores, OS Synchronization, Atomic Transaction.

Security: The Security Problem, User Authentication, Cryptography.

Text Book:

2. Silver Schatz, A and Galvin, P.B. 'Operating System Concepts', 5th Edn. John Wiley, New York, 2000

Reference Books:

8. Deitel H.M., 'An Introduction to Operating System', Addison Wesley, Inc., London, 1995.
9. Mandinck S.E., 'Operating System' McGraw Hill., London, 1993.

FRENCH - (HU 4001)

A. AIMS AND OBJECTIVES

1. Developing the following language skills:

LISTENING: To enable the learners to listen and understand the spoken French language which uses the elementary spoken structures.

SPEAKING: To enable the learners to speak and engage in simple dialogues in French.

READING SKILLS AND TEXTUAL COMPREHENSION: To enable the learners to read and understand the elementary texts in French.

WRITING: To enable the learners to write simple sentences and short paragraphs in French.

2. To enable the learners to manipulate the simple grammatical structures of the language and the most essential vocabulary.

3. To expose the learners to the culture of France / Francophone countries.

B. DURATION OF THE COURSE

One semester

C. CONTENTS

1. Functional Grammar

- Nouns and Articles: gender and number
- Pronouns
- Verbs

- Present, past, and future
 - Adjectives and Adverbs
 - Interrogation & Negation
 - Simple essay writing
 - Simple conversation
2. Life and culture of French and Francophone peoples.
Cuisine, Fashion, Cinéma, science and technology, geography etc.

Books recommended :

- ✓ Le Nouveau sans Frontières-1, CLE International
- ✓ Alter Ego-1
- ✓ Panorama – 1, CLE international
- ✓ Campus- 1, CLE international
- ✓ Connexions-1, Didier
- ✓ Café Crème -1, Hachette
- ✓ Libre Echange- 1, Didier
- ✓ 450 Exercices de phonétique, CLE International (2010)

D. Teaching Techniques

Class room activities

1. Main activities based on Text book and workbook based class
2. Internet
3. Role plays
4. Audio sessions
4. Quiz

Language Laboratory activities

1. Audio sessions for self learning
2. Phonetic training
3. Language games
4. Internet based session

External Activities

1. Theater
2. Film sessions

E. Examination

The examination at the end of the course consists of (1) a written paper and (2) an Oral examination.

Evaluation

A candidate's performance is evaluated on the basis of

- a. Internal Assessment (Teacher's assessment and Periodical tests): relative weight 40%.
- b. Final examination at the end of the course: relative weight 60%.

The Internal Assessment comprises (a) Teacher's assessment: participation in class, homework, punctuality, motivation, etc; (b) Periodical testes (an average of 3 tests). The relative weight assigned to (a) and (b) is 20:20.

GERMAN - (HU 4003)

A. AIMS AND OBJECTIVES

1. Developing the following language skills:

LISTENING: To enable the learners to listen and understand the spoken German language which uses the elementary spoken structures.

SPEAKING: To enable the learners to speak and engage in simple dialogues in German.

READING SKILLS AND TEXTUAL COMPREHENSION: To enable the learners to read and understand the elementary texts in German.

WRITING: To enable the learners to write simple sentences and short paragraphs in German.

2. To enable the learners to manipulate the simple grammatical structures of the language and the most essential vocabulary.

3. To expose the learners to the culture of German speaking countries

B. DURATION OF THE COURSE

One semester

C. CONTENTS

1. Simple texts and interactions useful in daily life
2. Life and culture of Germany and German speaking countries

3. Describing the immediate environment and things of common interest.

D Functional Grammar:

1. Articles
2. Nouns and pronouns
3. Present tense
4. Position of verbs in different types of sentences
5. Direct and indirect objects
6. Interrogative sentences
7. Articles as pronouns

E. Internet sites for language skills

F. Geography of Germany and German speaking countries

G. Introduction to German culture (intercultural perspectives)

Books recommended:

- ✓ Tangram aktuell A 1 -1, Kursbuch, Arbeitsbuch, Glossar, Übungsheft und CD Lektion 1 - 4: Deutsch als Fremdsprache, Authors: Rosa-Maria Dallapiazza, Eduard von Jan, und Til Schönherr, Verlag: Hueber.
- ✓ Tangram aktuell A1- 2, Kursbuch, Arbeitsbuch, Glossar, Übungsheft und CD, Lektion 5 - 8: Deutsch als Fremdsprache, Authors: Rosa-Maria Dallapiazza, Eduard von Jan, und Til Schönherr, Verlag: Hueber.

H. Teaching Techniques

Class room activities

1. Main activities based on Text book and workbook based class
2. Internet
3. Role plays
4. Audio sessions
5. Quiz

Language Laboratory activities

1. Audio sessions for self-learning
2. Phonetic training
3. Language games
4. Internet based session

External Activities

1. Theatre
2. Film sessions

I. Examination

The examination at the end of the course consists of (1) a written paper and (2) an Oral examination.

Evaluation

A candidate's performance is evaluated on the basis of

1. Internal Assessment (Teacher's assessment and Periodical tests): relative weight 40%.
2. Final examination at the end of the course: relative weight 60%.

The Internal Assessment comprises (a) Teacher's assessment: participation in class,

homework, punctuality, motivation, etc; (b) Periodical testes (an average of 3 tests). The relative weight assigned to (a) and (b) is 20:20.

EC4205 MICROPROCESSOR AND MICROCONTROLLER

Module – 1:

Revision of logic circuits with emphasis on control lines, SAP concepts with stress on timing diagrams, Microinstructions, Microprogramming, Variable machine cycle, Architecture of 8085 Processor , Functions of all signals, Bus concepts, Multiplexed and De-multiplexed Bus, Minimum system.

Text Books:

1. “Digital Computer Electronics”, 2/e. by A. P. Malvino.
2. “Microprocessor Architecture, Programming and Applications with 8085” by R. S. Gaonkar.

Module – 2:

Instruction set, Addressing modes, Stack operation, Timing diagrams, Programming examples like Time delay, Looping, Sorting, Code conversions like BCD to Binary, Binary to BCD, HEX to ASCII, ASCII to HEX, BCD Arithmetic etc.

Text Books:

1. "Digital Computer Electronics", 2/e. by A. P. Malvino.
2. "Microprocessor Architecture, Programming and Applications with 8085" by R. S. Gaonkar.

Module – 3:

8085 based Microcomputer system, Memory Organization, Memory Interfacing, Memory Mapped I/O, I/O Mapped I/O, Interrupts, Hardware and Software Interrupts, Interrupt instructions, Programmed I/O, Interrupt driven I/O, DMA.

Text Books:

1. "Digital Computer Electronics", 2/e. by A. P. Malvino.
2. "Microprocessor Architecture, Programming and Applications with 8085" by R. S. Gaonkar.

Module – 4:

Architecture of 8255 I/O peripheral chip, Modes of operation, Hand shake mode operation, BSR mode, ADC 0801 and ADC 0808 Interfacing with 8085 microprocessor, Analogue multiplexed ADC, DAC 0808 specifications, DAC Interfacing, Programming examples for Generation of square wave, positive and negatives ramps, triangular and sine waves, Sample and Hold circuit, LF 398 and its applications in Data Acquisition.

Text Books:

1. "Digital Computer Electronics", 2/e. by A. P. Malvino.
2. "Microprocessor Architecture, Programming and Applications with 8085". by R. S. Gaonkar.
3. "Microprocessor and Interfacing, Programming of Hardware" by Douglas Hall.
4. "Microprocessor and Peripherals" by S. P. Chowdhury and Sunetra Chowdhury.

Module – 5:

8253 timer, Modes of operation, Applications, 8279 Keyboard/Display Interface, Different modes of operation, Interfacing, Programming examples, 8237 DMA Controller

Text Books:

1. "Microprocessor and Interfacing, Programming of Hardware" by Douglas Hall.
2. "Microprocessor and Peripherals" by S. P. Chowdhury and Sunetra Chowdhury.
3. "The INTEL 8086/8088 Microprocessor, Architecture, Programming, Design and Interfacing", 3/e. by Bhupendra Singh Chhabra.

Module – 6:

Introduction to 8086 microprocessor, Architecture of 8086, pins description and memory bank interfacing. Addressing modes and instruction sets of 8086. Interfacing examples with PPI 8255 and ADC 0801 and ADC 0808

Text Books:

1. "Microprocessor, Microcomputer and their Applications", 2/e. by A. K. Mukhopadhyay.
2. "Advanced Microprocessor" by Y. Rajasree.
3. "The INTEL 8086/8088 Microprocessor, Architecture, Programming, Design and Interfacing", 3/e. by Bhupendra Singh Chhabra.

Module - 7:

Evolutionary steps and Additional features of 80186, 80286, 80386, 80486 and Pentium

Processors, Concept of CISC and RISC processors

Text Books:

1. “Microprocessor, Microcomputer and their Applications”, 2/e. by A. K. Mukhopadhyay.
2. “Advanced Microprocessors” by Y. Rajasree.
3. “Microprocessor and Peripherals” by S. P. Chowdhury and Sunetra Chowdhury.

CS 5101 FORMAL LANGUAGES AND AUTOMATA THEORY

MODULE - I

Introduction to Automata: Study and Central concepts of automata theory, An informal picture of finite automata, deterministic and non-deterministic finite automatas, applications of finite automata, finite automata with epsilon – transitions.

MODULE - II

Regular expression and languages: Regular expressions, finite automata and regular expressions, applications of regular expressions, algebraic laws of regular expressions.

MODULE - III

Properties of Regular Languages: Proving languages not to be regular, closure properties of regular languages, equivalence and minimization of automata.

MODULE - IV

Context – free Grammars and Languages: Parse trees, Applications of context free grammars, Ambiguity in grammars and languages.

MODULE - V

Pushdown Automata: Pushdown automation (PDA), the language of PDA, equivalence of PDA's and CFG's, Deterministic Pushdown Automata.

MODULE - VI

Properties of Context – Free Languages: Normal forms of context free grammars, pumping lemma for context free languages, close properties of context free languages.

MODULE - VII

Introduction to Turing Machine: The Turing machine, programming techniques for Turing machine, extensions to the basic Turing machine, restricted Turing Machines, Turing Machines and Computers.

Text Books:

1. J.E. Hopcroft , et.al. - Introduction to Automata Theory, Languages and Computation, 2nd Edn. Pearson Education , New Delhi 2001

Reference Books:

1. K.L.P. Misra – et.al. - Theory of Computer Science, 2nd Edn. PHI, New Delhi, 2000
5. J.C. Martin - Introduction to Languages and the Theory of Computation 2nd Edn, TMH, New Delhi, 2000.

CS 8101ARTIFICIAL INTELLIGENCE & EXPERT SYSTEM

Module I

Overview of Artificial Intelligence: Definition & Importance of AI.

Knowledge: General Concepts: Introduction, Definition and Importance of Knowledge, Knowledge-Based Systems, And Representation of Knowledge, Knowledge Organization, Knowledge Manipulation, And Acquisition of Knowledge.

Module II

LISP and Other AI Programming Languages: Introduction to LISP : Syntax and Numeric Function, Basic List Manipulation Functions in LISP, Functions, Predicates and Conditionals, Input, Output and Local Variables, Iteration and Recursion, Property Lists and Arrays, Miscellaneous Topics, PROLOG and Other AI Programming Languages.

Module III

Knowledge Representation: Introduction, Syntax and Semantics for Propositional logic, Syntax and Semantics for FOPL, Properties of Wffs, Conversion to Clausal Form, Inference Rules, The Resolution Principle, No deductive Inference Methods, Representations Using Rules.

Module IV

Dealing with Inconsistencies and Uncertainties: Introduction, Truth Maintenance Systems, Default Reasoning and the Closed World Assumption, Predicate Completion and Circumscription, Modal and Temporal Logics.

Probabilistic Reasoning: Introduction, Bayesian Probabilistic Inference, Possible World Representations, Dumpster-Shafer Theory, Ad-Hoc Methods.

Module V

Structured Knowledge: Graphs, Frames and Related Structures: Introduction, Associative Networks, Frame Structures, Conceptual Dependencies and Scripts.

Object-Oriented Representations: Introduction, Overview of Objects, Classes, Messages and Methods, Simulation Example using an OOS Program.

Module VI

Search and Control Strategies: Introduction, Preliminary Concepts, Examples of Search Problems, Uninformed or Blind Search, Informed Search, Searching And-Or Graphs.

Matching Techniques: Introduction, Structures Used in Matching, Measures for Matching, Matching Like Patterns, Partial Matching.

Module VII

Knowledge Organization and Management: Introduction, Indexing and Retrieval Techniques, Integrating Knowledge in Memory, Memory Organization Systems.

Expert Systems Architectures: Introduction, Rule Based System Architecture, Non-Production System Architecture, Dealing with uncertainty, Knowledge Acquisition and Validation, Knowledge System Building Tools.

Text Book:

1. Dan W. Patterson - Introduction to Artificial Intelligence and Expert Systems, PHI, New Delhi, 2006.

Reference Books:

1. E. Rich & K. Knight - Artificial Intelligence, 2/e, TMH, New Delhi, 2005.
2. P.H. Winston - Artificial Intelligence, 3/e, Pearson Edition, New Delhi, 2006.
3. D.W. Rolston, - Principles of AI & Expert System Development, TMH, New Delhi.

CS 6105 COMPILER DESIGN

MODULE -I

Introduction to Compiling: Compilers, Analysis of the source program, the phase of a compiler, Cousins of the compiler, the grouping of phases, Compiler-constructions tools.

MODULE -II

A Simple One-Pass Compiler: Syntax definition, Syntax-directed translation, Parsing, A translator for simple expressions, Lexical analysis, Incorporating a symbol table, Abstract stack machines.

MODULE-III

Lexical Analysis: The role of the lexical analyzer, Input buffering, Specification of tokens, Recognition of tokens, A language of specifying lexical analyzers, Design of a lexical analyzer generator.

MODULE –IV

Syntax Analysis: The role of the parser, writing a grammar, Top-down parsing; Bottom-up parsing, Operator-precedence parsing, LR parsers, Using ambiguous grammars, Parser generators.

MODULE V

Syntax-Directed Translation: Syntax-direct definitions, Construction of syntax trees, Bottom-up evaluation of S-, attributed definitions, L-attributed definitions, and Top-down translation.

Type Checking: Type systems, Specification of a simple type checker.

MODULE VI

Run-Time Environments: Source language issues, Storage organization, Storage-allocation strategies, Access to nonlocal names, Parameter passing, Symbol tables, Language facilities for dynamic storage allocation, Dynamic storage allocation techniques.

MODULE VII

Intermediate Code Generation: Intermediate languages, Declarations, Assignment statements, Boolean expressions.

Code Generation: Issues in the design of a code generator, Target machine, Run-time storage management, Basic blocks and flow graphs.

Code Optimization: Introduction, The Principle sources of optimization.

Text Book:

1. A.V.Aho, R. Sethi et.al. - Compilers Principles, Techniques, and Tools, 2nd Edition, Pearson Education, New Delhi, 2006

Reference Books:

- A.I.Holub -Compiler Design in C, Prentice Hall of India, New Delhi, 1995
- J.P. Tremblay - The Theory and Practical of Compiler Writing, McGraw Hill, Singapore, 1993.
- K.C. Louden- Compiler Construction: Principles and Practice, Thomson Learning, New Delhi, 2005.

CS 6011 COMPUTER GRAPHICS AND MULTIMEDIA

Module-I

Introduction and Overview of Graphics Systems:- Use of Computer graphics, Video Display Devices, Refresh Cathode-Ray Tubes, Raster and Random Scan Displays, Colour CRT Monitors, Direct View Storage Tubes, Flat Panel Displays, Three-Dimensional Viewing Devices, Stereoscopic & Virtual Reality Systems, Raster and Random Scan Systems, Different Input and Hard Copy Devices, Graphics Softwares.

Module-II

Output Primitives: - Points and Lines, Line Drawing Algorithms (DDA & Bresenham's), Circle and Ellipse Generating Algorithms, Conic Sections.

Module-III

Two-Dimensional Geometric Transformations:- Different types of transformations and

their matrix representations, Homogeneous Coordinates, Composite Transformations, transformations between Coordinate Systems, Affine transformations, Window-to-Viewport Coordinate transformation, Clipping-Point, Line, Polygon, Curve and Text Clipping.

Module-IV

Three-Dimensional Concepts and Object Representation:- Three Dimensional Display Methods, Polygon Surfaces, Curved Lines & Surfaces, Quadric Surfaces, Spline Representations, Cubic Spline interpolation methods, Bezier Curves and Surfaces.

Module-V

Three Dimensional Transformations and Viewing: Translation, Rotation, Scaling, Reflection, Shears, Composite Transformations, Projections- Parallel and Perspective, Projection Transformations, Clipping.

Module-VI

Visible Surface Detection Methods: Classification of Visible Surface Detection Algorithms, Back Face Detection, Depth Buffer Method, A-Buffer Method, Scan-Line Method, Depth Sorting Method, BSP-Tree Method & Area Subdivision Method. Polygon- Rendering Methods.

Module-VII

Introduction to Multimedia Systems Design:

An Introduction – Multimedia applications – Multimedia System Architecture – Defining objects for Multimedia systems – Multimedia Data interface standards – Multimedia Databases

Compression & Decompression – Data & File Format standards – Multimedia I/O technologies - Digital voice and audio – video image and animation – Full motion video – Multimedia Authoring & User Interface – Hypermedia messaging -

Text Book:

3. D. Hearn & M.P. Baker - Computer Graphics, 2/e , Pearson Education, New Delhi, 2005
4. Prabat K Andleigh and Kiran Thakrar, “Multimedia Systems and Design”, PHI, 2005

Reference Books:

10. W.M. Newman. et. al.- Principle of Interactive Computer Graphics, Mc Graw Hill Publication, New Delhi, 1995.
11. S. Harrington -Computer Graphics- A Programming Approach, Mc Graw Hill Publication, New Delhi, 1994.
12. J.D. Foley et. al- A Fundamental of Computer Graphics Addition Wesley, London, 1993.

CS 6109 SOFTWARE ENGINEERING

MODULE – I

Introduction: Some Definitions, FAQs about software engineering, the evolving role of software, Software characteristics, SW applications

Software Processes: Software process models, Waterfall model, the prototyping model, spiral model, RAD and Incremental model.

MODULE – II

Project Management: Management activities, Project planning, Project scheduling, Risk Management.

MODULE – III

Software Requirements: Functional and non functional requirements, User requirements, System requirements, the software requirements document. IEEE standard of SRS, Quality of good SRS.

Requirement Engineering Process: Feasibility study, Requirements elicitation and analysis,
Requirements validation, Requirement management.

MODULE – IV

Software Design: Design Concepts and Principles, Architectural Design, Object oriented Design, User interface design

UML: Class diagram, Sequence diagram, Collaboration diagram

MODULE – V

Verification and Validation: Verification and Validation Planning, S/W inspection, static analysis.

Software Testing : Testing functions, Test case design, White Box testing, Black box testing, Unit testing, Integration Testing, System testing, Reliability.

MODULE – VI

Management: SW cost estimation: Estimation techniques, Algorithmic cost modeling, Project duration and staffing.

Quality Management: Quality assurance and standards, Quality planning, Quality control.

MODULE – VII

Software Change: Program Evolution Dynamic, S/W Maintenance in detail.

Text Book:

13. I. Sommerville : Software Engineering, Pearson Education Publication, 7th ed.

Reference Book:

5. R. S. Pressman: Software Engineering: A Practitioners Approach, 5th Edn., TMA, New Delhi.
6. J. F. Peters & W. Pedrycz– Software Engineering, John Wiley & Sons, Inc. 2000
7. A. Behforooz & F.J. Hudson – Software Engineering Fundamentals, Oxford Univ. Press, New York, 2000.

CS 6103 SYSTEM PROGRAMMING

MODULE – I

Background: Introduction, System Software and Machine Architecture, The Simplified Instructional Computer (SIC), Traditional (CISC) machines, RISC Machines.

MODULE – II & III

Assemblers: Basic Assembler Functions, Machine – Dependent Assembler Features, Machine – Independent Assembler Features, Assembler Design Options, Implementation Examples.

MODULE – IV & V

Loaders and Linkers: Basic Loader Functions, Machine - Dependent Loader Features,

Machine – Independent Loader Features, Loader Design Options, Implementation Examples.

MODULE – VI

Macro Processors: Basic Macro Processor Functions, Machine – Independent Macro Processor Features, Macro Processor Design Options, Implementation Examples.

MODULE – VII

Software Engineering Issues: Introduction to Software Engineering Concepts, System Specifications, Procedural System Design, Object – Oriented Design, System Testing Strategies.

Text Book:

1. L. L. Beck – System Software – An Introduction to Systems Programming, 3rd Edn., Pearson Education, New Delhi, 2004

Reference Book:

14. J.J. Donovan – System Programming, McGraw Hill , New Delhi, 1993.
15. D.M. Dhamdhare – System Programming and Operating Systems, 2nd Edn., Tata McGraw Hill , New Delhi, 2000

CS 5105 SOFT COMPUTING

FUZZY LOGIC

MODULE -I

Fuzzy Set Theory: Basic Definition and Terminology, Set Theoretic Operations, MF Formulation and Parameterization, MF of two dimensions, Fuzzy Union, Intersection and Complement.

MODULE -II

Fuzzy Rules and Fuzzy Reasoning: Extension Principles and Fuzzy Relations, Fuzzy IF THEN Rules, Fuzzy Reasoning.

1. MODULE –III
2. Fuzzy Inference System Introduction, Mamdani Fuzzy Models, Other Variants, Sugeno Fuzzy Models, Takamoto Fuzzy Models.

GENETIC ALGORITHMS

MODULE –IV

Fundamentals of Genetic Algorithms: Basic Concepts Creation, Offspring's Encoding, Fitness functions, Reproduction, Genetic Modelling: Inheritance Operators, Cross over, Inversion and detection, Mutation operator, Bitwise operators.

ARTIFICIAL NEURAL NETWORKS

MODULE -V

Introduction, Architecture, Back Propagation and feed Forward Networks, Offline Learning, Online Learning.

MODULE -VI

Supervised Learning of Neural Networks: Introduction, Perceptrons, Adaline, Back Propagation Multilayer Perceptrons, Back Propagation Learning Rules, Methods of Speeding. Radical Basis Function Networks, Functional Expansion Networks.

MODULE -VII

Unsupervised Learning : Competitive Learning Networks, Kohonen self-organising networks, Hebbian Learning, The Hopfield Network

Text Book :

1. J.S.R. Jang, C.T.Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing" PHI/Pearson Education, New Delhi 2004.
16. S. Rajasekaran & G.A. Vijayalakshmi Pai, PHI, New Delhi 2003

Reference Books:

1. T. J. Ross, "Fuzzy Logic with Engineering Applications." TMH, New York, 1997.

2. CS 7121 CRYPTOGRAPHY & NETWORK SECURITY

Module I

Security Services, Mechanisms and Attacks, The OSI Security Architecture, A Model for Network Security. Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Rotol Machines, Steganography.

Module II

Simplified DES, Block Cipher Principles, The Data Encryption Standard, The Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles, Block Cipher Modes of Operation.

Module III

Finite Fields and Confidentiality : Groups, Rings, and Fields, Modular Arithmetic, Euclid's Algorithm, Finite Fields of the Form $GF(p)$, Polynomial arithmetic, Finite Fields of the Form $GF(2^n)$, Placement of Encryption Function, Traffic Confidentially, Key Distribution, Random Number Generation.

Module IV

Encryption Standard and Ciphers : Evaluation criteria for AES, AES cipher, Multiple encryption and Triple DES, Block cipher Modes of operation, Stream ciphers and RCG

Module V

Number Theory and Public-Key Cryptography: Prime Numbers, Fermat's and Euler's Theorems, Testing for Primality, The Chinese Remainder Theorem, Discrete Logarithms, Principles of Public-Key Cryptosystems, The RSA Algorithm,

Module VI

Message Authentication, Function, Algorithms and Digital System :Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Functions,

MODULE VII

Security of Hash Functions and MACs, Secure Hash Algorithm, HMAC, Digital Signatures, Authentication Protocols.

Text Book:

1. W.Stallings : Cryptography and Network Security : Principles and Practice, 4/e
Pearson Education, New Delhi, 2006.

Reference Books:

17. B.A. Forouzan – Cryptography and Network Security, TMH, New Delhi, 2007
18. B. Schneier – Applied Cryptography, John Wiley, Indian Edition, 2006.

CS 7101 PRINCIPLES OF PROGRAMMING LANGUAGES

Module-I

Introduction: Programming Linguistics, Historical Development.

DATA ABSTRACTION: Program units, packages, and encapsulation, Abstract types, Objects and classes, Implementation notes.

Module-II

GENERIC ABSTRACTION: Generic units and instantiation, Type and class parameters, Implementation notes.

TYPE SYSTEMS: Inclusion polymorphism, Parametric polymorphism, Overloading, Type conversions, Implementation notes.

Module-III & IV

CONTROL FLOW: Sequencers, Jumps, Escapes, Exceptions, Implementation notes

CONCURRENCY: Why concurrency, Programs and processes, Problems with concurrency, Process interactions, Concurrency primitives, Concurrent control abstractions.

IMPERATIVE PROGRAMMING: Imperative programming: Key concepts, Pragmatics, Case study: C, Case study: ADA.

Module-V

OBJECT-ORIENTED PROGRAMMING: Key concepts, Pragmatics, Case study: C++, Case study: JAVA, Case study: ADA95.

Module-VI +VII

CONCURRENT PROGRAMMING: Key concepts, Pragmatics, Case study: ADA95, Case study: JAVA, Implementation notes.

FUNCTIONAL PROGRAMMING: Key concepts, Pragmatics, Case study: HASKELL.

LOGIC PROGRAMMING: Key concepts, Pragmatics, Case study: PROLOG

SCRIPTING: Pragmatics Key concepts, Case study: PYTHON.

Text Book:

1. David A. Watt – Programming Language Design Concepts, John Wiley, India Edition, 2004.

Reference Books:

1. R. Sethi and K.V. Viswanatha – Programming Languages: Conupt & Constructs, 2/e, New Delhi-2007.
2. D.Appleby & J.J.Vanda Kopple – Programming Languages : Paradigm and Practice 2/e, TMH, New Delhi – 2005.
3. K.C. Louden – Programming Languages : Principles and Practice, 2/e, Thomson Learning India Edition, 2005.

CS 7107 DIGITAL IMAGE PROCESSING

Module I

Introduction: Background, Digital Image Representation, Fundamental Steps in Image Processing, Elements of a Digital Image Processing System.

Digital Image Fundamentals: Elements of Visual Perception, A Simple Image Model, Sampling and Quantization, Some Basic Relationships between Pixels, Imagining Geometry.

Module II

Image Transforms: Introduction to the Fourier Transform, The Discrete Fourier Transform, Some Properties of the Two-Dimensional Fourier Transform, Other Separable Image Transforms.

Module III

Image Enhancement : Spatial Domain Methods, Frequency Domain Methods, Some Simple Intensity

Transformations, Histogram Processing, Image Subtraction, Image Averaging, Background, Smoothing Filters, Sharpening Filters, Lowpass Filtering, Highpass Filtering, Generation of Spatial Masks from Frequency Domain Specifications.

Module IV & V

Image Restoring: Degradations Model - Definitions, Degradation Model for Continuous Functions, Diagonalization of Circulant and Block-Circulant Matrices, Circulant Matrices, Block Circulant Matrices, Effects of Diagonalization on the Degradation Model, Algebraic Approach to Restoration, Unconstrained Restoration, Constrained Restoration, Inverse Filtering – Formulation, Removal of Blur Caused by Uniform Linear Motion, Restoration in the Spatial Domain, Geometric Transformation.

Module VI & VII

Image Compression: Fundamentals – Coding Redundancy, Interpixel Redundancy, Psychovisual Redundancy, Fidelity Criteria. Image Compression Models – The Source Encoder and Decoder, The Channel Encoder and Decoder. Elements of Information Theory – Measuring Information, The Information Channel, Fundamental Coding Theorems, Using Information Theory. Error-Free Compression – Variable-Length Coding, Bit-Plane Coding, Lossless Predictive Coding. Lossy Compression – Lossy Predictive Coding, Transform Coding.

Text Book:

1. Rafael. C. Gonzalez & Richard E.Woods.- Digital Image Processing, 2/e Pearson Education, New Delhi - 2006

Reference Books:

1. W.K.Pratt.-Digital Image Processing ,3/e Edn., John Wiley & sons, Inc. 2006
2. M. Sonka et.al Image Processing, Analysis and Machine Vision, 2/e, Thomson, Learning, India Edition, 2007.

CS 7029 FREE/OPEN SOURCE SOFTWARE

Module 1:

Open Standards for Enterprise Applications Application examples from Banking and e-Governance, Enterprise level requirements, Layered Architecture applications

Module 2:

Open Standards, Royalties, FOSS Licensing & Business models

Module 3:

FOSS Development Methodology & Tools, Collaborative Software Development : FOSS Community structure & dynamics,

Module 4:

Mailing lists, chat, wiki, messaging, Integrated Development Environments, Version Control (tagging, branching, merging), Issue tracking (bugs, new features), Documentation.

Module 5:

Presentation Layer, Client Environment : Browsers (extensions, cookies, applets), Handheld devices, Thin clients, Web page design & Clientside scripting (XHTML, WML, AJAX, CSS, XSL).

Module 6:

Datastore Layer, Data modeling refresher : RDBMS fundamentals, Dublincore, Database Administration, Access control, Security; Disaster recovers (Backups, Replication)

Module 7:

Business Logic Layer Model View Controller (MVC) Framework, Serverside programming (CGI, page templates), Data access, database connectivity , Report generation.

Text Book:

"Understanding Open Source Software Development", J Feller and B Fitzgerald, Addison Wesley, 2002

"Enterprise Application Development using FOSS", ed. NRCFOSS Team, An NRCFOSS (Anna University) Publication.

CS 7029 INFORMATION SECURITY AND ASSURANCE

Module 1 : Network Security

Introduction, Network Attacks and Security Issues, Network Communications, Some Example Security Attacks, Security Attacks, Services, and Architecture, Protection and Prevention, Firewalls and Perimeter Security, Cryptographic Protocols, Detection, Assessment and Response

Module 2

Introduction, Identification and Authentication, Password-Based Authentication, Insecure Communication Channels, Challenge-Response Systems, Authentication in Distributed Systems, Access Control, Access Control Based on Subject-Object, Relationships, Protection Matrix Model,

Module 3:

An Information Flow Policy for Confidentiality, Bell-LaPadula Model, Clark-Wilson Model, Role-Based Access Control, Access Control in Distributed Systems, Overview of Relevant Standards, Advanced Approaches,

Digital Identity Management, Shibboleth, CardSpace, Higgins Trust Framework

Module 4 Network Survivability

Introduction, Prevention Techniques, Survivable Network Design and Traffic Restoration Concepts, Typical Network Architecture, Basic Survivability Concepts, Basic Network Management Concepts, Protection versus Restoration, Other Issues, Transport Network Recovery Techniques, Automatic Protection Switching, Ring-Based Survivability, Span Restoration, Shared Path Protection, Shared Path Restoration, p-Cycles, Survivable Network Design Techniques, Multilayer Issues.

Module 5 System Survivability

Introduction and Background, Survivability and the Impact of Fault Models, Dependability Considerations, Survivability Considerations, Design for Survivability, Identification of Essential Functionalities, Tolerating Faults, Dealing with Common-Mode Faults, Applying the Notion of Optimality, Decentralized Storage, Survivability of Large Distributed Systems, Borrowing from Well-established Fields, Problem Transformation, Scheduling Problems, Case Study: Autonomous Mobile Agents

Module 6 Taxonomy and Framework for Integrating Dependability and Security

Introduction, Basic Concepts and Related Work, Dependability, Integration of Dependability and Security, Proposed Taxonomy and Framework, Key Notations of the Feedback Control System Model, Definitions of Basic Concepts of Dependability and Security within the Proposed Framework, Dependability, Security, and their Attributes, Taxonomy of Faults, The Means to Attain Dependability and Security, Fault Prevention, Fault Tolerance, Fault Removal

Module 7 Stochastic Modeling Techniques for Secure and Survivable Systems

Introduction, Survivability and Security, Analytical Modeling Techniques, Markov Models, Semi-Markov Process, Higher-Level Model Formalisms, Security Modeling, Intrusion-Tolerant Systems, Security Modeling of SITAR Security System, Survivability Modeling, System Description

Text Book :

Qian Y., Joshi J., Tipper D., Krishnamurty P., *“Information Assurance : Dependability and Security in Networked Systems”*, 1st Edition, Morgan Kauffman Publication, 2008

3. CS 7117 OPTIMIZATION TECHNIQUES

2. Module I

Introduction to Linear Programming: Prototype Example, the Linear Programming Model, Assumptions of Linear Programming, Additional Examples, Some Classic Case Studies.

Solving Linear Programming Problems - The Simplex Method: The Essence of the Simplex Method, Setting Up the Simplex Method, the Algebra of the Simplex Method, the Simplex Method in Tabular Form, Tie Breaking in the Simplex Method, Adapting to Other Model Forms, Postoptimality Analysis.

3. Module II

The Theory Of The Simplex Method: Foundations of the Simplex Method, The revised Simplex Method, A Fundamental Insight.

Duality Theory And Sensitivity Analysis: The Essence of Duality Theory, Economic Interpretation of Duality, Primal-Dual relationships, Adapting to Other Primal Forms, the Role of Duality Theory in Sensitivity Analysis.

Module III

Other Algorithms for Linear Programming: The Dual Simplex Method, Parametric Linear Programming, the Upper Bound Techniques, an Interior-Point Algorithm.

Network Optimization Models: Prototype Example, the Terminology of Networks, The Shortest-Path Problem, The Minimum Spanning Tree Problem, The Maximum Flow Problem, The Minimum Cost flow Problem, The Network Simplex Method.

Module IV

Dynamic Programming: A Prototype Example for Dynamic Programming, Characteristics of Dynamic Programming Problems, Deterministic Dynamic Programming, Probabilistic Dynamic Programming.

Module V

Integer Programming: Prototype Example, Some BIP Applications, Innovative Uses of Binary Variables in Model Formulation, Some Formulation examples, Some Perspectives on Solving Integer Programming problems, The Branch-and-Bound Technique and Its Application to Binary Integer Programming, A Branch-and-Bound Algorithm for Mixed Integer.

Module VI

Nonlinear Programming: Sample Applications, Graphical Illustration of Nonlinear Programming Problems, Types of Nonlinear Programming Problems, One-Variable Unconstrained Optimization, Multivariable Unconstrained Optimization, The Karush-Kuhn-Tucker (KKT) Conditions for Constrained Optimization, Quadratic Programming, Separable Programming, Convex Programming.

Module VII

Queuing Theory: Prototype Example, Basic Structure of queuing Models, Examples of Real Queuing Systems, The role of the Exponential Distribution, the Birth-and-Death Process, Queuing Models Based on the Birth-and-Death Process, Queuing Models Involving Non-exponential Distributions.

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Text Book:

S. Hiller & G.J. Lieberman – Operations Research, 8th Edn, TMH, New Delhi – 2006.

Reference Books:

H.A.Taha – Operations Research, 8/e, Pearson Education, New Delhi-2007.

J.K. Sharma – Operations Research, 3/e, Mcmillan, India Ltd, 2007.

EC7201 MOBILE & CELLULAR COMMUNICATION

MODULE- I

Mobile Communication Systems & Standards: Evolution of Mobile Radio Communications, Elements of cellular communication systems, Different generations of Cellular Networks, Introduction to GSM, GPRS, UMTS, WLAN, WLL, Bluetooth, PAN.

MODULE- II

The Cellular Concept: Frequency Reuse, Hand-off strategies, Schemes to enhance cellular system capacity and range extension, Spectral efficiency.

MODULE- III

Mobile Radio Interferences & System Capacity: Co-channel interference and Adjacent channel interference, Power control, Inter-symbol interference, Interference and system capacity.

MODULE- IV

Propagation & Fading: Free-space propagation model, Propagation path loss, Outdoor propagation models (Okumura model & Hata model), Indoor propagation models (Partition Losses in the same floor and between floors), Multipath fading, time dispersive and frequency dispersive channels, delay spread and coherence bandwidth, LCR and ADF.

MODULE- V

Diversity & Combining Techniques: Diversity Schemes (Space, frequency, field and polarization diversities) and combining techniques.

MODULE- VI

Antenna Design Parameters: Antennas used for Mobile Communications, Radiation patterns, smart antenna (basic concept), Antenna location, Spacing and height.

MODULE- VII

Multiple Access Techniques: FDMA, TDMA, CDMA, SDMA, OFDM, DS-CDMA, FH-CDMA, TH-CDMA, Capacity of Cellular CDMA.

Text Book:

1. Theodore S Rappaport, "Wireless Communication: Principles and Practice" Prentice Hall of India, New Delhi, 2006, 2/e.

Reference Book:

1. William C. Y. Lee, "Mobile Communications Engineering" Tata McGraw Hills Education Pvt. Ltd., 2010 , 2/e, (Indian reprint)

CS 8113 COMPUTATIONAL GEOMETRY

Module I

Geometric Data Structures: Points, Polygons, Edges, Geometric objects in space, finding intersection of a line and a triangle.

Module II & III

Incremental Insertion: Finding star shaped polygons, finding convex hulls, point enclosure : The ray – shooting and the signed angle method, line clipping, polygon clipping, triangulating monotone polygons.

Module IV

Incremental selection: Different methods for finding convex hulls, removing hidden surfaces, Intersection of convex polygons, Finding Delaney triangulations.

Module V

Plane – sweep algorithms: Finding the intersections of line segments, finding convex hulls, contour of the union of rectangles, Decomposing polygons into monotone pieces.

Module VI

Divide and conquer Algorithms: Computing the intersection of half planes, finding the kernel of polygon, finding voronoi regions, Merge Hull, closest points, polygon triangulation.

Module VII

Spatial subdivision Methods: The Grid method, quad trees, Two-dimensional search tree, removing hidden surfaces.

Text Book:

1. Michael J. Laszlo - Computational Geometry and computer graphics in C++, PHI, New Delhi, 1999.

CS 7033 MULTIMEDIA TECHNOLOGY

MODULE I

Multimedia An Overview : Introduction, Multimedia presentation and production, Characteristics of a multimedia presentation, Multiple media, Utilities of multisensory perception, Hardware and Software requirements, Uses of multimedia, Promotion of multimedia based content, Steps for creating a multimedia presentation.

Digital Representation: Introduction, Analog representation, Waves, Digital representation, Need for digital representation, Analog to Digital conversion, Digital to Analog conversion, Relation between sampling rate and Bit Depth, Quantization error, Fourier representation, Pulse modulation, Importance and drawbacks of digital representation.

MODULE II

Text: Introduction, Types of text, Unicode standard, Font, Insertion of text, Text compression, File formats.

Images: Introduction, Image types, Seeing color, Color models, Basic steps for image processing, Scanner, Digital camera, Interface standards, Specifications of digital images, Color management system(CMS), Device independent color models, Gamma and Gamma correction, Image processing software, File formats, Image output on monitor, Image output on printer.

MODULE –III

Audio: Introduction, Acoustics, Nature of sound waves, Fundamental characteristics of sound, Musical note and pitch, PsychoAcoustics, Elements of audio systems, Microphone, Amplifier, Loudspeaker, Audio Mixer, Digital Audio, Synthesizers, Musical instrument digital interface (MIDI), MIDI messages, MIDI connections, General MIDI (GM) specifications, Basics of staff notation, Sound Card, Audio transmission, Audio recording devices, Audio file formats and CODECs, Software audio players, Audio recording systems, Digital audio broadcasting, Audio and Multimedia.

MODULE IV

Video: Introduction, Analog Video camera, Transmission of video signals, Video signal formats, Television broadcasting standards, Digital Video, Digital Video standards, PC Video, Video recording formats and systems, Video file formats and CODECs, Video editing.

MODULE-V

Animation: Introduction, Historical background, Uses of Animation, Keyframes and Tweening, Types of Animation, Computer assisted animation, Creating movement, Principles of animation, Some techniques of animation, Animation on the web, 3D animation, Camera, Special effects, Creating animation, Rendering algorithm

MODULE VI

Compression: Introduction, CODEC, Types of compression, Types of redundancies, Lossless/Statistical compression techniques, GIF image coding standard, Lossy/Perceptual compression techniques, JPEG image coding standard, MPEG standards overview, MPEG1 Audio, MPEG1 Video, MPEG-2 Audio, MPEG2 Video, MPEG4, MPEG7, Fractals.

MODULE: VII

Multimedia Architecture: Introduction, User interfaces, Windows multimedia support, Hardware support, Distributed multimedia applications, Realtime protocols, Playback Architectures, Streaming technologies, Temporal relationships, Synchronization, Multimedia database systems(MMDBS), Feature extraction of image, Feature extraction of audio, Feature of extraction of video, Benchmarking of MMDBS.

Text Book:

1. R. Parekh – Principles of Multimedia, 2nd Edition, TMH, New Delhi, 2006

Reference Books:

1. R. Steinmetz & K. Nahrstedt Multimedia: Computing, Communications and Applications, Pearson Edn., New Delhi, 2006.
2. P.K. Andleigh & K. Thakrar Multimedia Systems Design, PHI, New Delhi, 2005.

6. CS 8111 NATURAL LANGUAGE PROCESSING

Module I

Introduction: Knowledge in Speech and Language Processing, Ambiguity, Models and Algorithms, Language, Thought, and Understanding, The State of the Art and the Near-Term Future.

Regular Expressions and Automata: Regular Expressions, Finite-State Automata, Regular Languages and FSAs.

Module II

Word Classes and Part-of –Speech Tagging: (Mostly) English Word Classes, Tagsets for English, Part-of –Speech Tagging, Rule-Based Part-of –Speech Tagging, Stochastic Part-of –Speech Tagging, Transformation-Based Tagging, Other Issues.

Module III

Context-Free Grammars for English: Constituency, Context-Free Rules and Trees, Sentences-Level Constructions, The Noun Phrase, Coordination, Agreement, The Verb Phrase and Subcategorization, Auxiliaries, Spoken Language Syntax, Grammar Equivalence and Normal Form, Finite-State and Context- Free Grammars, Grammars and Human Processing.

Module IV

Parsing with Context-Free Grammars: Parsing as Search, A Basic Top-Down Parser, Problems with the Basic Top-Down Parser, The Early Algorithm, Finite – State Parsing Methods.

Module V

Features and Unification: Feature Structures, Unification of Features Structures, Features Structures in the Grammar, Implementing Unification, Parsing with Unification Constraints, Types and Inheritance.

Module VI

Representing Meaning: Computational Desiderata for Representations, Meaning Structure of Language, First Order Predicate Calculus, Some Linguistically Relevant Concepts.

Semantic Analysis: Syntax-Driven Semantic Analysis, Attachments for a Fragment of English, Integrating Semantic Analysis into the Early Parser, Idioms and Compositionality, Robust Semantic Analysis.

Module VII

Discourse: Reference Resolution, Text Coherence, Discourse Structure, Psycholinguistic Studies of Reference and Coherence.

Natural Language Generation: Introduction to Language Generation, An Architecture for Generation, Surface Realization, Discourse Planning, Other Issues.

Text Book:

D.Jurafsky & J.H.Martin- Speech and Language Processing, 4th Edn, Pearson Education, 2005.

Reference Book:

1. J. Allen – Natural Language Understanding, Pearson Education, New Delhi, 2006.

CS 8029 PARALLEL AND DISTRIBUTED SYSTEMS

Module-I

Introduction: Computational Demand of Modern Science, Advent of Practical processing, Parallel Processing Terminology- Contrasting Pipelining and Data parallelism, Control Parallelism, Scalability, Control-Parallel Approach, Data-Parallel Approach with I/O.

Module-II

PRAM Algorithm: A Model of Serial Computation, The PARAM Model of Parallel Computation, PARAM Algorithm- Parallel Reduction, Prefix Sums, List Ranking, Preorder Tree Traversal, Merging Two Sorted Lists, Graph Colouring, Problem defining Fast Solutions on PRAMS.

Module-III

Elementary Parallel Algorithm: Classifying MIMD Algorithm, Reduction. Matrix Multiplication: Sequential Matrix Multiplication, Algorithms for Processor Array, Algorithms for Multiprocessors.

Module-IV

Solving Linear Systems: Terminology, Back Substitution, ODD-EVEN Reduction, Gaussian Elimination, The JACOBI Algorithm, The Gauss-Seidel Algorithm, Jacobi Overrelaxation and Successive Overrelaxation, Mulyigrid Methods, Conjugate Gradient.

Module-V

Basic Algorithms in Message-Passing Systems: Formal Models for Message Passing Systems, Broadcast and Convergecast on a Spanning Tree, Flooding and Building a Spanning Tree, Constructing a Depth-First Search Spanning Tree for a Specified Root, Constructing a Depth-First Search Spanning Tree without a Specified Root. Leader Election in Rings: The Leader Election Problem, Anonymous Rings, Asynchronous Rings, Synchronous Rings.

Module-VI

Mutual Exclusion in Shared Memory: Formal Model for Shared Memory Systems, The Mutual Exclusion Problem, Mutual Exclusion using Powerful Primitives, Mutual Exclusion using Read/Write Registers. A formal Model for Simulations: Problem Specifications, Communication Systems, Processes, Admissibility, Simulations, Pseudocode Conventions.

Module- VII

Broadcast and Multicast: Specification of Broadcast Services, Implementing a Broadcast Service, Multicast in Groups, An Application: Replication Distributed Shared Memory: Linearizability Shared Memory, Sequentially Consistent Shared Memory, Algorithms, Lower Bounds.

Text Books:

1. H. Attiya & J. Welch- Distributed Computing- Fundamentals, Simulations and Advanced Topics, 2nd Edn., Wiley India Publication, New Delhi, 2006.
2. M.J. Quinn-Parallel Computing-Theory and Practice, 2nd Edn., McGraw Hill Inc., New York.

CS 8121 PATTERN RECOGNITION

Module I

Pattern Recognition Overview: Overview, Pattern Recognition, Classification and Description, Patterns and Feature Extraction, Training and Learning in PR Systems, Pattern Recognition Approaches.

Module II

Statistical Pattern Recognition: Introduction, The Gaussian case and Class Dependence Discriminate Functions, Extensions, Classifier Performance, RISK and Errors.

Module III

Supervised Learning: Parametric Estimation and Supervised Learning, Maximum Likelihood Estimation Approach, Bayesian Parameter Estimation Approach, Non – Parametric Approaches, Parzen Windows, K-nn Non-Parametric Estimation. Nearest Neighbour Rule.

Module IV

Linear Discriminate Functions and The Discrete and Binary Feature Cases: Introduction, Discrete and Binary Classification Problems, Techniques to Directly Obtain Linear Classifiers.

Module V & VI

Syntactic Pattern Recognition: Overview Quantifying Structure in Pattern Description and Recognitions, Grammar Based Approach and Application, String Generation as Pattern Description. Recognition by String Matching and Parsing. The Cocke-Younger Kasami ((ck) parsing algorithm.

Module VII

Neural Pattern Recognition: Introduction to Neural Networks, Neural Network Structure from Pattern Recognition Applications. Physical Neural Network. The Artificial Neural Network Model, Neural Network Based Pattern Associators.

Text Book:

19. Robert Salkoff - Pattern Recognition, Statistical, Structural and Neural Approach, John Wiley, Indian Edition, 200.

Reference Books:

8. R. U. Duda – Pattern Classification, John Wiley, Indian Edition, 2006.

EC4201 VLSI DESIGN

Module – 1:

Circuits and System Representation: Behavioral, structural and physical representation, example of a triangular waveform generator and its behavioural, structural and physical description

Text Book:

Principle of CMOS VLSI Design A System Perspective, Weste Neil H E & Eshraghian K, Pearson Education, 1993.

Module – 2:

Basic CMOS Technology: Basic n-well CMOS Process, p-well process, twin-tub process, silicon on insulator, CMOS process enhancements, metal interconnect, polysilicon / refractory

metal interconnect, local interconnect, circuit elements like resistors, capacitors, EAROM, bipolar transistors and thin film transistor.

Text Book:

Principle of CMOS VLSI Design A System Perspective, Weste Neil H E & Eshraghian K, Pearson Education, 1993.

Module – 3:

Layout Design Rules: *Layer representations, CMOS n-well rules, design rule backgrounder, layer assignment, latch-up problem, latch-up triggering, internal latch-up prevention techniques, resistance estimation, and capacitance estimation.*

Text Book:

Principle of CMOS VLSI Design A System Perspective, Weste Neil H E & Eshraghian K, Pearson Education, 1993.

Module – 4:

Basic Physical Design of Simple Logic Gates: *Inverter, NAND and NOR gates, complex logic gates layout, CMOS standard cell design, gate array layout, sea-of-gates layout, general CMOS logic gate layout guidelines, layout optimisation for performance, transmission gate layout consideration, 2-input multiplexers, I/O structures, V_{DD} and V_{SS} pads, output & input pads, tri-state and bi-directional pads, miscellaneous pads.*

Text Book:

Principle of CMOS VLSI Design A System Perspective, Weste Neil H E & Eshraghian K, Pearson Education, 1993.

Module – 5:

CMOS Analogue Design Method: *Opamp design, opamp as a comparator, sample and hold, analogue layout considerations, transistor layouts, centroid design, capacitor matching, resistor layout, noise consideration.*

Text Book:

Analog Integrated Circuits Design, Johns Dand Martin K, John Wiley & Sons, 1997.

Module – 6:

CMOS Digital Design Methods: *Structured design strategies, hierarchy, regularity, modularity, locality, design options like PL, re-programmable gate arrays, Standard Cell design, behavioural synthesis, RTL synthesis, logic optimisation, structural to layout synthesis, placement, routing*

Text Book:

Principle of CMOS VLSI Design A System Perspective, Weste Neil H E & Eshraghian K, Pearson Education, 1993.

Module – 7:

CMOS Subsystem Design: *Single bit address, bit parallel adder, transmission gate adder, asynchronous counter, synchronous counter, RAM, finite state machines, multilevel logic.*

Text Book:

Principle of CMOS VLSI Design A System Perspective, Weste Neil H E & Eshraghian K, Pearson Education, 1993.

CS 8125 COMPUTER VISION

Module I

1. **Cameras:** Pinhole Cameras, Cameras with Lenses, The Human Eye, Sensing.
2. **Radiometry- Measuring Light:** Light in Space, Light at Surfaces, Important Special Cases, Notes.

Module II

Sources, Shadows, and Shading: Qualitative Radiometry, Sources and Their Effects, Local Shading Models, Application: Photometric Stereo, Interreflections: Global Shading Models.

Module III

Color: The Physics of color, Human Color Perception, Representing Color, A Model for Image Color, Surface Color from Image Color.

Module IV

Linear Filters: Linear Filters and Convolution, Shift Invariant Linear Systems, Spatial Frequency and Fourier Transforms, Sampling and Aliasing, Filters as Templates.

Edge Detection: Noise, Estimating Derivatives, Detecting Edges.

Module V

Segmentation By Clustering: What Is Segmentation, Human Vision: Grouping and Gestalt , Applications: Shot Boundary Detection and Background Subtraction, Image Segmentation by Clustering Pixels, Segmentation by

Graph-Theoretic Clustering.

Module VI

Segmentation by Fitting a Model: The Hough Transform, Fitting Lines, Fitting Curves, Fitting as a Probabilistic Inference Problem.

Module VII

Tracking With Linear Dynamic Models: Tracking as an Abstract Inference Problem, Linear Dynamic Models, Kalman Filtering, Data Association.

Text Book:

1. D.A. Forsyth & J. Ponce – Computer Vision: A Modern Approach, Pearson Education, New Delhi-2003.

7. CS 8127 COMPUTING AND COMPLEXITY THEORY

Module I

The Church- Turing Thesis: Turing Machines- Formal definition of a Turing machine, Examples of Turing machines; Variants of Turing Machines- Multitape Turing machines, Nondeterministic Turing machines, Enumerators, Equivalence with other models; The Definition of Algorithm- Hilbert's problems, Terminology for describing Turing machines.

1. **Module II**

Decidability: Decidable Languages- Decidable problems concerning regular languages, Decidable problems concerning context-free languages; The Halting Problem- The diagonalization method, The halting problem is undecidable.

2. **Module III**

Reducibility: Undecidable Problems from Language Theory- Reductions via computation histories; A Simple Undecidable Problem; Mapping Reducibility-Computable functions, formal definition of mapping reducibility.

3. **Module IV**

Advanced Topics In Computability Theory:- The Recursion Theorem, Self-reference, Terminology for the recursion theorem, applications; Decidability of logical theories- A decidable theory, An undecidable theory; Turing Reducibility; A Definition of Information- Minimal length descriptions, Incompressible strings and randomness.

4. Module V & VI

Time Complexity: Measuring Complexity- Big-O and small-o notation, Analyzing algorithms, Complexity relationships among models; The Class P- Polynomial time, Examples of problems in P; The Class NP- Examples of problems in NP, The P versus NP question; NP-completeness- Polynomial time reducibility, Definition of NP-completeness, The Cook-Levin Theorem; Additional NP-complete Problems- The vertex cover problem, The Hamiltonian path problem, The subset sum problem.

5. Module VII

Space Complexity: Savitch's Theorem, The Class PSPACE, PSPACE-completeness – The TQBF problem, Winning strategies for games, Generalized geography; The Classes L and NL, NL-completeness- Searching in graphs; NL equals coNL.

Intractability: Hierarchy Theorems- Exponential space completeness; Relativization- Limits of the diagonalization method; Circuit Complexity.

Text Book:

9. Michael Sipser – Introduction to the Theory of Computation, 2/e, Thomson Learning – India Edition 2006.

Reference Books:

20. R.G Taylor – Models of Computation and Formal Languages, Oxford University New York, 1998.
2. B.M. Moret – The Theory of Computation, Pearson Education, New Delhi – 2002.

CS 7123

BIO-INFORMATICS

Module I

Molecular Biology and Biological Chemistry: The Generic Material: Nucleotides, Orientation, Base Pairing, The Central Dogma of Molecular Biology, Gene Structure and Information Content: Promoter Sequences, The Genetic Code, Open Reading Frames, Introns and Exons, Protein Structure and Function: Primary Structure, Secondary, Tertiary, and Quaternary Structure, The Nature of Chemical Bonds: Anatomy of an Atom, Valence, Electronegativity, Hydrophilicity and Hydrophobicity, Molecular Biology Tools: Restriction Enzyme Digests, Gel Electrophoresis, Blotting and Hybridization, Cloning, Polymerase Chain Reaction, DNA Sequencing, Genomic Information Content: C-Value Paradox, Reassociation Kinetics.

Module II

Data Searches and Pairwise Alignments: Dot Plots, Simple Alignments, Gaps: Simple Gap Penalties, Origination and Length Penalties, Scoring Matrices, Dynamic Programming: The Needleman and Wunsch Algorithm, Global and Local Alignments: Semiglobal Alignments, The Smith-Waterman algorithm, Database Searches: BLAST and Its Relatives, FASTA and Related Algorithms, Alignment Scores and Statistical Significance of Database Searches, Multiple Sequence Alignments.

Module III

Substitution Patterns: Estimating Substitution Numbers: Jukes-Cantor Model, Transitions and Transversions, Kimura's Two-Parameter Model, Models With Even More Parameters, Substitutions Between Protein Sequences, Variations in Evolutionary Rates Between Genes.

Module IV

History of Molecular Phylogenetics: Advantages to Molecular Phylogenies, Phylogenetic Trees: Terminology of Tree Reconstruction, Rooted and Unrooted Trees, Gene vs. Species Trees, Character and Distance Data, Distance Matrix Methods: UPGMA, Estimation of Branch Lengths, Transformed Distance Method, Neighbor's Relation Method, Neighbor-Joining Methods, Maximum Likelihood Approaches, Multiple Sequence Alignments.

Module V

Character – Based Methods of Phylogenetics: Parsimony: Informative and Uninformative Sites, Unweighted Parsimony, Weighted Parsimony, Inferred Ancestral Sequences, Strategies for Faster Searches: Branch and Bound, Heuristic Searches, Consensus Trees, Tree Confidence: Bootstrapping, Parametric Tests, Comparison of Phylogenetic Methods, Molecular Phylogenies: The Tree of life, Human Origins.

Module VI

Genomics and Gene Recognition: Prokaryotic Genomes, Prokaryotic Gene Structure: Promoter Elements, Open Reading Frames, Conceptual Translation, Termination Sequences, GC Content in Prokaryotic Genomes, Prokaryotic Gene Density, Eukaryotic Genomes, Eukaryotic Gene Structure: Promoter Elements, Regulatory Protein Binding Sites, Open Reading Frames: Introns and Exons, Alternative Splicing, GC Content in Eukaryotic Genomes: CpG Islands, Isochores, Codon Usage Bias, Gene Expression: cDNAs and ESTs, Serial Analysis of Gene Expression, Microarrays.

Module VII

Protein and RNA Structure Prediction: Amino Acids, Polypeptide Composition, Secondary Structure: Backbone Flexibility, Accuracy of Predictions, The Chou-Fasman and GOR Methods, Tertiary and Quaternary Structure: Hydrophobicity, Disulfide Bonds, Active Structures vs. Most Stable Structures, Algorithms for Modeling Protein Folding: Lattice Models, Off-Lattice Models, Energy Functions and Optimization, Structure Prediction: Comparative Modeling, Threading : Reverse Protein Folding, Predicting RNA Secondary Structures.

Text Book:

1. D.E. Krane & M.L. Raymer - Fundamental Concepts of Bioinformatics, Pearson Education, New Delhi-2003.

Reference Books:

1. S.C. Rastogi et.al.- Bioinformatics: Methods and Applications, PHI, New Delhi-2005.
2. V.R. Srinivas - Bioinformatics: A Modern Approach, PHI, New Delhi-2005.
3. A.M. Lesk – Introduction to Bioinformatics, Oxford (Indian Edn), New Delhi-2004.

CS 7125 **OBJECT-ORIENTED ANALYSIS & DESIGN**

Module I

What Is Object-Orientation: Introduction, Basic Concepts, The Origins of Object-Oriented languages Today.

Modelling Concepts: Introduction, Models and diagrams, Drawing Activity Diagrams.

Module II & III

Requirements Capture: Introduction, User Requirements, Fact Finding Techniques, User Involvement, Documenting Requirements, Use Cases, Requirements Capture and Modelling.

Requirements Analysis: Introduction, What Must a Requirements Model Do, Use Case Realization, The Class Diagram, Drawing a Class Diagram, CRC (Class Responsibility Collaboration) Cards, Assembling the Analysis Class Diagram.

Refining The Requirements Model: Introduction, Component-based Development, Adding Further Structure, Software Development Patterns.

Module IV

Object Interaction: Introduction, Object Interaction and Collaboration, Interaction Sequence Diagrams, Collaboration Diagrams, Model Consistency.

Specifying Operations: Introduction, The Role of Operation Specifications, Contracts, Describing Operation Logic, Object Constraint Language, Creating an Operation Specification.

Module V

Specifying Control: Introduction, States and Events, Basic Notation, Further Notation, Preparing a Statechart, Consistency Checking, Quality Guidelines, Summary.

Moving Into Design: Introduction, How is Design Different from Analysis, Logical and Physical Design, System Design and Detailed Design, Qualities and Objectives of Analysis and Design, Measurable Objectives of Analysis and Design, Measurable Objectives in Design, Planning for Design.

Module VI

System Design: Introduction, The Major Elements of System Design, Software Architecture Concurrency, Processor Allocation, Data Management Issues, Development Standards, Prioritizing Design Trade-offs, Design for Implementation.

OBJECT DESIGN: Introduction, Class Specification, Interfaces, Criteria for Good Design, Designing Associations, Integrity Constraints, Designing Operations, Normalization.

Module VII

Design Patterns: Introduction, Software Development Patterns, Documenting Patterns-Pattern Templates, Design Patterns, How to Use Design Patterns, Benefits and Dangers of Using Patterns.

Designing Boundary Classes: Introduction, The Architecture of the Presentation Layer, Prototyping the User Interface, Designing Classes, Designing Interaction with Sequence Diagrams, The Class Diagram Revisited, User Interface Design Patterns, Modelling the Interface Using Statecharts.

Text Books:

1. S.Bennett, S.Mc Robb and R.Farmer – Object- Oriented Systems Analysis and Design Using UML 2nd edn, TMH, New Delhi – 2007.

Reference Book:

1. M.Balaha and J.Runbhangh – Object- Oriented Modeling and Design with UML 2./e, Pearson Education, New Delhi,2007.
2. J.W. Satzinger, B.R. Jackson and S.D. Burd – Object –Oriented Analysis and Design, Thomson Learning, India Edition, 2007.
3. G. Booch – Object Oriented Analysis and Design with Applications,2/e, CA;Benjamin/Cumming,1994.

CS 8123 REAL TIME SYSTEMS

Module I

Basic Real-Time Concepts: Terminology, Real-Time System Design Issues, Example Real-Time Systems, Common Misconceptions, Brief History.

Module II

Hardware Considerations: Basic Architecture, Hardware Interfacing, Central Processing Unit, Memory, Input/Output, Enhancing Performance, Other Special Devices, Non-von-Neumann Architectures.

Module III

Real-Time Operating Systems: Real-Time Kernels, Theoretical Foundations of Real-Time Operating Systems, Intertask Communication and Synchronization, Memory Management, Case Study: POSIX.

Module IV

Software Requirements Engineering: Requirements-Engineering Process, Types of Requirements, Requirements Specification for Real-Time Systems, Formal Methods in Software Specification, Structured Analysis and Design, Object-Oriented Analysis and the Unified Modeling Language, Organizing the Requirements Document, Organizing and Writing Requirements, Requirements Validation and Review.

Module V

Software System Design: Properties of Software, Basic Software Engineering Principles, The Design Activity, Procedural-Oriented Design, Object-Oriented Design, Appendix: Case Study in Software Requirements Specification for Four-Way Traffic Intersection Traffic Light Controller System.

Module VI

Programming Languages and the Software Production Process: Introduction, Assembly Language, Procedural Languages, Object-Oriented Languages.

Module VII

Performance Analysis and Optimization: Theoretical Preliminaries, Performance Analysis, Application of Queuing Theory, I/O Performance, Performance Optimization.

Text Book:

21. Phillip A. Laplante- Real-Time Systems: Design and Analysis, John Wiley- India Edition, 2006.

Reference Books:

1. Rajib Mall- Real Time Systems; Theory and Practice, Pearson Edition, New Delhi- 2007.
22. J.W.S.Liu – Real Time Systems, Pearson Education, New Delhi – 2004.
23. C.M.Krishna & K.G. Shiv – Real Time Systems, Mc Graw Hill – 1997.

CS 7127 SOFTWARE PROJECT MANAGEMENT

Module I

Managing Software Project: Process & Project Management, Project Management and the CMM, Project Management at Infosys, Introduction to CMMI, PCMM.

The Project Planning Infrastructure: The process data base, The process capability Baseline, Process Assets and the Body of Knowledge System.

Module II

Process Planning: The Infosys Development Process, Requirement Change Management

Effort Estimation & Scheduling: Estimation and Scheduling Concepts, Effort – Estimation, Scheduling.

Module III

Quality Planning: Quality Concepts, Quantitative quality Management Planning, Defect Prevention Planning.

Risk Management: Concepts of Risks and Risk Management, Risk Assessment, Risk Control, Examples.

Module IV

Measurement and Tracking Planning: Concepts in measurement, Measurements, Project tracking.

Project Management Plan: Team Management, Customer Communication and Issue Resolution, Structure of the Project Management Plan.

Module V

Configuration Plan: Concepts in Configuration Management, Configuration Management Process.

Reviews: The Reviews, Review process Data Collection, Monitoring & Control, Introduction of Reviews & the NAH Syndrome.

Module VI

Project Monitoring & Control: Project tracing, Milestone Analysis, Activity Level Analysis using SPC, Defect Analysis & Prevention Process Monitoring & audit.

Module VII

Project Closure: Project closure Analysis.

Text Book:

Pankaj Jalote – Software Project Management in Practice, Pearson Education, New Delhi, 2002

Reference Books:

B.Huges and M.Cotterell – Software Project Management, 3/e, Tata Mcgraw Hill, New Delhi, 2004.

Pankaj Jalote – CMM in Practice, Pearson Education, New Delhi, 2002

W. Humphrey – Managing the Software Process, Addison – Wesley, 1989.

CS 8031 DATA MINING & DATA WAREHOUSING**Module - I**

Data Mining : Introduction, Relational Databases, Data Warehouses, Transactional databases, Advanced database Systems and Application, Data Mining Functionalities, Classification of Data Mining Systems, Major Issues in Data Mining.

Module - II

Data Warehouse : Introduction, A Multidimensional data Model, Data Warehouse Architecture, Data Warehouse Implementation, Data Cube Technology, From Data warehousing to Data Mining.

Module - III

Data Processing : Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and concept Hierarchy Generation.

Data Mining Primitives, Languages and System Architecture : Data Mining Primitives, DMQL, Architectures of Data Mining Systems.

Module – IV

Concept Description : Data Generalization & Summarization – Based Characterization, Analytical Characterization, Mining class Comparisons, Mining Descriptive Statistical Measures in Large Databases.

Module - V

Mining Association Rules in Large Databases : Association Rule Mining, Single – Dimensional Boolean Association Rules, Multilevel Association Rules from Transaction Databases, Multi Dimensional Association

Rules from Relational Databases, From Association Mining to Correlation Analysis, Constraint – Based Association Mining.

Module - VI

Classification and Prediction : Classification & Prediction, Issues Regarding Classification & Prediction, Classification by decision Tree Induction, Bayesian Classification, Classification by Back propagation, Classification based on concepts & Association Rule, Other Classification, Prediction, Classification Accuracy.

Module - VII

Cluster Analysis : Types of Data in Cluster Analysis, Partitioning methods, Hierarchical methods, Density – Based Methods, Grid – Based Methods, Model – Based Clustering Methods, Outlier Analysis.

Mining Complex Types of Data.

Text Books :

24. Jiawei Han & Micheline Kamber - Data Mining Concepts & Techniques
Publisher Harcourt India. Private Limited.

Reference Books :

10. G.K. Gupta – Introduction to Data Mining with case Studies, PHI, New Delhi – 2006.
11. A. Berson & S.J. Smith – Data Warehousing Data Mining, COLAP, TMH, New Delhi – 2004
12. H.M. Dunham & S. Sridhar – Data Mining, Pearson Education, New Delhi, 2006.

(MSH 1131) PRINCIPLES OF MANAGEMENT

Module-1 : Introduction of Management: Definition, Nature, Objective, Functions of Management, Managerial Skills, Managerial Role.

Module-2 : Evolution of Management Thought: Classical Theory- Max Weber's Beaurocratic Theory's, Taylor's Scientific Theory, Fayol's Functional Theory's.

Module-3: Planning: Definition, Nature, Purpose, Importance, Types of planning, and Types of plan.

Module-4: Organizing: Definition, Basic concepts of organization, Organizing process and its importance, Formal & Informal organization, Tall & Flat structure, Span of control.

Module-5: Staffing: Recruitment, Selection, Placement, Training & Development, Performance Appraisal.

Module-6 : Directing: Meaning Leadership- Styles and Theories, Motivation, Maslow theory of motivation, Communication process.

Module-7 : Controlling : Nature, Purpose, Basic Elements of Control and Process.

Books Recommended

1. Elements of Management – Koontz and O'Donnell
2. Principles and Practices of Management – L.M.Prasad
3. Management Today – principles and Practices by Gene Burton & Manab Thakur
4. Management by Stoner & Freeman.

(PE5009) INDUSTRIAL ORGANISATION AND MANAGEMENT PE5009

Module 1

Business organization

Legal forms of business organization-single ownership, partnership and joint stock company and their formation

Share & their classes, rights and privileges, borrowing of capital through mortgages, debentures, unsecured notes and bonds, ownership and operation of a joint stock company through board of directors

Module 2

Principles of Management

Elements of managerial functions-planning organizing, staffing, direction and control, authority and responsibility, leadership and principles of co-ordination, uses of committee as a management tool, span of control

Module 3

Organization Structure

Line, line and staff, Functional, Lateral (Fayol's Bridge) and Metric organization structures, organization chart and organization manual

Module 4

Budget and Budgetary control

Functions, types and preparation of budgets, working of budgetary control

Module 5

Marketing Management

Functions of sales and marketing, channels of distribution, Sales promotion, advertising and publicity, product packaging and product printing

Module 6

Human Resource Development

Main functions of personnel department, morale, motivation and behavior, handling of Industrial grievances through joint consultation and collective bargaining, workers participation in management.

Module 7

Industrial legislations

Factories act, trade unions, trade dispute act, workmen's compensation act, payment of wages act.

Text Books

1. **Industrial Organization and Management** Riggs, et al.
2. **Industrial Engineering and Management** O P Khanna

References

1. **Principles of Management** Koonze o'Donell

ORGANIZATIONAL BEHAVIOR (MSH 1125)

Module 1: Introduction to OB

Meaning and importance of study of OB; It's cross cultural implications

Module 2: Behavior and its Causes

Introduction to personality, perception, learning and attitude

Module 3: Motivation

Importance, Theories of motivation - Maslow's Hierarchy of Needs, Alderfer's ERG, Herzberg's Two Factor Theory and Vroom's Expectancy Theory; motivational tools

Module 4: Group behavior and team dynamics

Formal and informal groups, conflict – types, sources, negotiation

Module 5: Communication and Feedback

Interpersonal communication, Importance and hindrances; Introduction to TA

Module 6: Organizational change and Development

Introduction to Organizational Change; Concept of OD, Phases of OD and OD interventions

Module 7: Morale and Job Satisfaction

Introduction, Determinants and outcome of morale and job satisfaction

Text Books:

- a) Robbins, S.P. & Sanghi Organizational Behaviour (Prentice Hall India: New Delhi)

Reference Books:

- a) Luthans, F. Organizational Behaviour (McGraw Hill: New Delhi)
- b) Newstrom, J.W. and Davis, K. Organizational Behaviour: Human Behaviour at Work (Tata McGraw Hill: New Delhi)

(AR3039)Art & Culture

Objectives:

- Analyse the development of Indian and European art and culture for the periods covered.

- Identify different styles of regional and/or periodical art forms.
- Analyse the contributing factors for the development of different styles of art.
- Appreciate the painting and sculptural art objects of different region.
- Interpret art works by analysing their components' characteristics.

1. **Introduction of Art and Culture and its importance**

- Definition of “Art” and “Culture”
- Different types of Art Forms
- Importance of Art and Culture in the different facets of society and our daily life
- Importance of Art and Culture in the study of Architecture and Engineering

2. **Pre-Buddhist Indian Art –**

- Stone-Age Cave Art;
- Art and Sculpture of Indus Valley Civilisation

3. **Buddhist art in India –**

- Art of Stambhs during Mauryan Empire under Asoka - General characteristics of sculpture under Persian sculptors
- Cave Art of Ajanta; Typical distinctive features of Gandhara School of Art; Relief art on Stupas – examples from Sanchi and Bharhut

4. **Temple Art Forms in India**

(General Characteristics with few illustrative examples to be discussed)

- Central India – Khajuraho Complex (Madhya Pradesh)
- Western India- Modhera (Gujarat), Mount Abu (Rajasthan)
- Eastern India- Raja-Rani Temple (Bhubaneswar), Konarak; Bengal Terracotta Temples at Bishnupur
- Southern India- Mahavalipuram Shore Temple and Rathas; Vijayanagara Temples at Hampi; Nayaka Art at Madurai; Timber Palace Art of Kerala – Padmanabhapuram Palace

5. **Mughal Art Forms –**

- Miniature Art forms during Akbar and Jehangir
- Indian Miniature Schools – (a) Pahadi Schools and (b) Rajasthani Schools
- Architectural Art Form during Shah Jahan

6. Art Forms of Europe during Renaissance

- Pre-Renaissance art form in Church and Palaces / Forts of Europe
- Different Stages of Renaissance in Europe and their general characteristics:
 - i. Early Renaissance
 - ii. Mature Renaissance
 - iii. Late Renaissance – Baroque and Rococo

7. Salient Modern Art Forms of Europe since Industrial Revolution

Art Nouveau, Cubism, Suprematism, De Stijl, Impressionism, Expressionism, Mondrian art

Recommended Books:

1. Huntington, Susan.L. *The Art of Ancient India: Buddhist, Hindu, Jain*. New York, Weatherhill, 1985.
2. Sir Banister Fletcher, *A History of Architecture*, University of London, the Antholone Press, 1986
3. Percy Brown, *Indian Architecture (Buddhist and Hindu Period)*, Taraporevala and sons, Bombay, 1983.
4. Satish Grover, *The Architecture of India (Buddhist and Hindu Period)*, Vikas Publishing Housing Pvt. Ltd. New Delhi, 1981.
5. Biswas, S.S., *Terracotta Art of Bengal*, New Delhi, 1981.
6. A. Volwahren. *Living Architecture – India (Buddhist and Hindu)*, Oxford and IBM, London, 1969
7. Khare , Ajay, *Temple Architecture of Eastern India* , Shubhi Publications, New Delhi , 2005

8. ENVIRONMENTAL PSYCHOLOGY (MSH 1113)

9.

10. Module 1: Introduction to Environmental Psychology

11. Introduction overview and history; Theories in environmental Psychology

12.

13. Module 2: Nature & Human nature

14. Attitudes toward nature; knowing the environment; caring – quality of life, cause of fear

15.

16. Module 3: Orientations of Environmental psychology

17. Problem Oriented, interdisciplinary oriented, Space over time oriented.

18. Module 4: The Psychology of Environmental Problems

19. Social, psychoanalytical, behavioral, cognitive, physiological, health, developmental, and holistic

20. Module 5: Perceiving Environment

21. Perception of an uncertain environment, Goals of perception; image and environment

22. Module 6: Stress

23. Introduction, density & Overcrowding, violence and aggressive behavior, Social territory & community health, Uncontrollable and unpredictable noise

24. Module 7: Impact of Environment

25. Environment and health; preferred environment

26.

27. Text Books:

28. Bell, P. A., Greene, T. C., Fisher, J. D., & Baum, A. (2001). Environmental psychology. (5th ed.). Belmont, CA: Wadsworth.

29. Reference Readings:

30. Bechtel, R. B., & Churchman, A. (Eds.) (2002). Handbook of environmental psychology. New York: Wiley.

31. Gifford, R. (2007). Environmental psychology: Principles and practice, (4th ed.). Canada: Optimal Books.

PE-5011 PROJECT ENGINEERING

Module 1 The scope of project, Characteristics of a project, Stages of a project, Project constraints, Project Management Structures.

Module 2 Responsibilities of project manager, Project Productivity, The anatomy of a project.

Module 3 Environmental considerations in project evaluation, Main issues and secondary issues in Feasibility study, Social cost benefit analysis, Commissioning, Evaluation of competing projects.

- Module 4** Budgetary aspects and considerations of a project, Industrial/Engineering projects (Mining, Drilling, Refinery etc.), R & D projects, Turnkey projects.
- Module 5** Networking Modeling of a project, Deterministic & Probabilistic activity network, Line of balance, Time- Cost Trade-off in a project, Mega projects.
- Module 6** Project Scheduling Techniques, PERT, CPM Models.
- Module 7** Project Monitoring Techniques, Performance and cost evaluation (PACE), Project Staffing Requirements, Resource Leveling, Project Documentation, Computer application in Project Engineering.

Text Books:

1. Project Management by Prasanna and Chandra, Tata McGraw Hill.
2. Elements of Project Management by Pete Spinner, Prentice Hall, USA.

Reference Books:

1. Production and Operation Management by Alan Muhlemann, John Oakland and Keith Lockyer, MacMillan India Ltd.
2. A course in PERT and CPM by R. C. Gupta, Dhanpat Rai Publications(P) Ltd, Delhi.
3. Industrial Engineering and Management by O. P. Khanna, Dhanpat Rai & Sons.
4. Production and Operation Management by S. N. Chary, Tata McGraw Hill.

ECONOMICS (MSH 1137)

1. Concept, Meaning and subject matters of Economics,
2. Micro and Macro Economics, Utility Concept,
3. Demand and Demand Functions- Concept, Determining Factors, Law of Demand, Demand Schedule and Demand Curve, Shift of Demand Curve and Movement along the Demand Curve,
4. Cost Concepts- Different Types of Costs, Cost Curves, Cost-Output in Short Term and Long Term.
5. Market- Concept of Market forms according to Competition- Perfect, Imperfect Competition and Monopoly. Price determination under Perfect Competition.
6. National Income- Concept, Meaning and Measurement of National Income.
7. Money- Concept and Meaning of Money, Supply and Demand of Money. Inflation- Meaning and effect.

Books-

Principles of Economics- S.K.Agarwala- Excel Books
Business Economics- M.J.Mankar,
Managerial Economics- D.N.Dwedi
Business Economics- Atmanand

PE-5011 ENGINEERING ECONOMY (3Credits)

Module 1

Accounting of Business Transactions

Accounting principles, journal and ledger entries, balance sheet, profit and loss statement, ratio analysis

Module 2

Cost and Cost Analysis

Cost structure, methods of allocating overhead costs, standard cost, concept of opportunity cost, sunk cost, fixed cost and variable cost

Module 3

Break Even Analysis

Drawing of break even charts, effect of different variable on break even point, cost

comparison of two or three alternatives

Module 4

Time Value of Money

Single sum and series of cash flow, uniform and gradient series, multiple compounding periods in a year, continuous compounding, bonds

Module 5

Comparison of Alternative Proposals

Bases of comparison- present worth amount, annual equivalent amount, future worth amount, rate return, defining mutually exclusive alternatives, decision criteria for selection of investment proposals, comparison of alternatives, with unequal service life, sensitivity analysis

Module 6

Replacement Analysis

Reasons for replacement, evaluation of replacement involving excessive maintenance cost, decline in efficiency inadequacy and obsolescence

Module 7

Depreciation and Decision Making Under Uncertainty

Methods of depreciation and their comparison, decision making on the basis of expected value decision tree in the evaluation of alternatives

Text Books:

1. **Modern Accountancy** I.M. Pandey
2. **Engineering Economy** E.P.Degarmo

FINANCIAL MANAGEMENT (MSH 1117)

1. Basics Of Corporate Finance

Forms of business, Concept of company (Overview of Economic-Industry-Company; Fundamental Analysis), Concept of Authorized capital and types of capital as a source of Finance.

2. Generation Of Financial Statement

Concept of static statement (Income statement and balance sheet), Approach towards formation of these statement via basic Accounting concepts, convention with golden rules.

3. Financial Decision Making

Concepts of various reports for decision making: - Overview of Dynamic statement; fund positions and cash position of company, overview of important profitability, financial and liquidity ratio which helps in Managerial decision making.

4. Financial Management an Overview

Concept and evolution of Finance, Finance Functions; Investment decision, financing decision and liquidity decision.

5. Relationship of Financial Management and Financial Accounting

Financial Management relationship with financial statements generated through Financial Accounting. Concept and relation of Items in Income statement and Balance sheet with Finance Functions.

6. Overview of tax

Indirect tax and modalities required handling such taxes: - Concepts of Excise duty, Custom duties, Sales tax, Octroi and VAT.

7. Contemporary Issues in Finance

Concepts of EVA, stakeholder's vs. shareholders, Activity based Budgeting, Corporate value analysis.

Reference Books

Financial Management by I.M Pandey-(Vikas Publications)

Corporate Finance by Ross and Taylor – (TMH Publications)

An Introduction to Financial Accounting by SN Maheshwari- Vikas Publications

IPR (INTELLECTUAL PROPERTY RIGHT) (MSH 1149)

Scope and objective of the course:

Course on Intellectual Property Rights (IPR) intends to expose engineering and science streams students to contemporary national and global sociopolitical, economic , legal environment, Indian public administration system, creation of IPR rights, benefits, research, development and management of IP and other IPR related issues. Case studies and information available on websites and Internet will also be used as part of teaching material.

Course Syllabus (in modular form):

Module-1 (1 week)

Definitions and functions of the state. Rights and duties - fundamental rights (UN charter 1948). Forms of governments e.g. anarchism, capitalism, communisms, theocratic, democratic etc., meaning, merits and demerits

Module-2 (1 week)

Indian parliamentary democratic set up: organization of ministry of government of India, administration at work, public corporations and institutions in India, local administration in India both urban local administration and rural local administration.

Module –3 (1 week)

Introduction to law and Indian legal system : Basic terms and concepts of law, judicial structure and common law principles applicable to India. Concept of free trade, regional trade treaties like SAFTA, NAFTA, SAARC and WTO, G20, WIPO.

Module-4 (2 weeks)

Intellectual property: Introduction to Patents, Design, Copyrights, Trademarks, geographical indicators, protection of new plant varieties, IC layout designs. IPR governance: Indian patent offices, NRDC. Funding agencies and public sector research organizations: DST, ISRO, AEC, DRDO, UGC, CSIR.

Module-5 (2 weeks)

Patent law fundamentals: Conditions to patenting, what can and cannot be patented, concepts of novelty, non obviousness, utility, anticipation, prior art , drafting of patent particularly claims, application procedures, revocation of patents.

Module -6 (2 week)

Licensing and litigations: scope of licenses, types of licenses, monetary considerations, valuation and royalty determination, sublicensing, general principles of patent litigation including exploration of procedures, forum and jurisdictions. Case studies.

Module –7 (2 weeks)

IP management : Harvesting inventions, open and close door models, maintaining the invention records, employer/ employee law related to ownership and proprietary information, patent search, criteria and procedure to decide whether to patent or to keep trade secrets, public disclosure/domain problems, outside inventor problems and issues related to commercialization of IP. Career opportunities in IP.

Reference Text Books :

Political theory, Eddy Asirvatham and KK Mishra, S Chand and co.

Public Administration in Theory And Practice , Dr. M. P. Sharma & Dr. B. L. Sadana
Kitab Mahal **Books**

Demystifying Intellectual Property Rights, N R Subbaram, Butterworth Wadwa, lexis Nexis

Law relating to intellectual property- Vol. 1 and 2, Dr Raghbir Singh Vice Chairman,
Intellectual property Appellate Board, Universal law publishing Co. Pvt Ltd. (
Email:unilaw@vsnl.com)

The patent Act 1970 – Bare act with short notes, Universal law publishing Co. Pvt ltd.

ENTREPRENEURSHIP AND SMALL BUSINESS MANAGEMENT (MSH 1109)

1. Introduction:

Definition, Concept of Entrepreneurship & Intrapreneurship , Characteristics and skills of entrepreneurs

2. Entrepreneurial Development:

Entrepreneurship & Economic development, Contribution of Small enterprises to the economy, Entrepreneurial environment, Types of Entrepreneurs.

3. Developing the Business Plan

Identification of Business idea, Elements of a Business Plan, Building Competitive Advantage, Conducting feasibility Analysis.

4. Sources of Finance

Equity vs. Debt Capital, Sources of Equity Finance, Institutional finance, Venture Capital, Lease Finance,

5. Forms of Business Ownership

Sole Proprietorship, Partnership, Corporations and other forms of ownership

6. Intellectual Property Management:

Importance of innovation, patents& trademarks in small businesses, introduction to laws relating to IPR in India.

7. Institutional support for small businesses in India:

Support in areas of technology, finance, inputs & infrastructure, marketing, entrepreneurship development

Text Books:

- a) Hisrich & Peters, Entrepreneurship, Tata McGraw Hill
- b) Norman M. Scarborough, Essentials of Entrepreneurship & Small Business Management, 6th ed., Prentice Hall
- c) Roy, Rajeev, Entrepreneurship, Oxford University Press
- d) Dutta , Bholanath, Entrepreneurship management ,Excel Books

BUSINESS ETHICS (MSH 1103)

MODULE-1

Introduction to business ethics, ethical principles in life, utilitarianism justice and fairness

MODULE-2

Social responsibility of business organisations

MODULE-3

Introduction to corporate governance

MODULE-4

Ethics of consumer protection, relevance of ethics in marketplace

MODULE-5

.Business and its internal constituencies, employee issues

MODULE-6

Indian value system and its utility in present context

Module-7

Roles and responsibilities of an individual in the present social context.

TEXT BOOKS:

1. Business Ethics concept and cases: Valesquez -TMH Publication
2. Human Values-A.N. Tripathi-New age Publication
3. Ethics in Management and Indian ethos-Biswanath Ghosh-vikas publication
4. Ethics in Management-arya kumar-Anne books Pvt. limited