

ACADEMIC CURRICULA 2012-13

BACHELORS' DEGREE PROGRAMME

B.Tech

Detailed Syllabi for students admitted to KIIT University



KIIT UNIVERSITY
(Declared U/S 3 of UGC Act, 1956)
Bhubaneswar, Odisha, India

ACADEMIC CURRICULA 2012-13

BACHELORS' DEGREE PROGRAMME B.Tech

**Course Structures and Detailed Syllabi
for students admitted during session
2011-12 & 2012-13**



KIIT UNIVERSITY

ESTABLISHED 1993, AFFILIATED, 1996

Bhubaneswar, Odisha, India

A.I./P.O.-KIIT, Bhubaneswar - 751024



**FIRST SEMESTER
(SCHEME-II)**

Theory		Subject	L	T	P	Total	Credit
Sl. No.	Course Code						
1.	MA-101	Mathematics – I	3	1	0	4	4
2.	PH-101	Physics – I	2	1	0	3	3
3.	CS-101/201	Computer Systems & Programming	3	0	0	3	3
4.	EC-101/201	Basic Electronics	3	0	0	3	3
5.	HU-101/201	Professional Communication	3	0	0	3	3
Total of Theory						16	16
Practical							
1.	PH-191	Physics Lab – I	0	0	3	3	2
2.	EC-191/291	Basic Electronics Lab	0	0	3	3	2
3.	CS-191/291	Computer Programming Lab	0	0	3	3	2
Total of Practical						9	6
Sessionals							
1.	ME-281/181	Basic Manufacturing Systems	0	0	3	3	2
2.	HU-281/181	Professional Communication Lab	0	0	2	2	1
Total of Sessionals						5	3
Grand Total						30	25

**SECOND SEMESTER
(SCHEME-II)**

Theory		Subject	L	T	P	Total	Credit
Sl. No.	Course Code						
1.	MA-201	Mathematics – II	3	1	0	4	4
2.	PH-201	Physics – II	2	1	0	3	3
3.	CH-201/101	Chemistry	3	1	0	4	4
4.	ME-201/101	Engg. Mechanics	3	1	0	4	4
5.	EE-201/101	Electrical Science	2	1	0	3	3
Total of Theory						18	18
Practical							
1.	PH-291	Physics Lab – II	0	0	3	3	2
2.	CH-291/191	Chemistry Lab	0	0	3	3	2
3.	EE-291/191	Electrical Science Lab	0	0	3	3	2
Total of Practical						9	6
Sessionals							
1.	CE-281/181	Engg. Graphics	0	0	3	3	2
Total of Sessional						3	2
Grand Total						30	26
2.	EAA – 1	Extra Academic Activity					P/NP



COURSE STRUCTURE FOR B.TECH IN COMP. SC. & ENGINEERING

SEMESTER III

Theory							
Sl No	Subject Code	Course Title	L	T	P	Total	Credits
1	MA-302	Discrete Mathematics	3	1	0	4	4
2	CS-301	Data Structures & Algorithms	3	1	0	4	4
3	IT-301	Object Oriented Programming	3	1	0	4	4
4	MA-301	Mathematics III	3	1	0	4	4
5	EC-301	Analog Electronic Circuits -I	3	1	0	4	4
Total of Theory						20	20
Practical							
1	IT-391	Object Oriented Programming Laboratory	0	0	3	3	2
2	CS-391	Data Structures Laboratory	0	0	6	6	4
Total of Practical						9	6
Total of Semester							29
1	EAA-2	Extra Academic Activity (EAA-II)					P/NP

SEMESTER IV

Theory							
Sl No	Subject Code	Course Title	L	T	P	Total	Credits
1	CS-402	Database Management Systems	3	1	0	4	4
2	CS-401/ 501	Operating Systems	3	1	0	4	4
3	CS-403	Principles of Programming Languages	3	1	0	4	4
4	EC-402	Digital Electronics	3	1	0	4	4
5	MA401	Mathematics- IV	3	1	0	4	4
Total of Theory						20	20
Practical							
1	CS-492	Database Systems Laboratory	0	0	3	3	2
2	CS-491	Operating Systems Laboratory	0	0	3	3	2
3	EC-492	Digital Electronics Laboratory	0	0	3	3	2
Total of Practical						9	6
Total of Semester							29



SEMESTER V - COMP. SC. & ENGINEERING

Theory							
Sl No	Subject Code	Course Title	L	T	P	Total	Credits
1	CS-502	Design and Analysis of Algorithms	3	1	0	4	4
2	CS-505/ 605	Computer Organization & Architecture	3	1	0	4	4
3	IT-502/ 602	Computer Graphics & Multimedia	3	1	0	4	4
4	CS-504	Theory of Computation	3	1	0	4	4
5	EC-506/406	Introduction to Digital Communication	3	1	0	4	4
Total of Theory						20	20
Practical							
1	CS-592	Algorithms Laboratory	0	0	3	3	2
2	IT-592/ 692	Computer Graphics Laboratory	0	0	3	3	2
3	CS-594	Advanced Programming Laboratory	0	0	3	3	2
Total of Practical						9	6
Total of Semester						29	26

SEMESTER VI - COMP. SC. & ENGINEERING

Theory							
Sl No	Subject Code	Course Title	L	T	P	Total	Credits
1	IT-603	Computer Networks	3	1	0	4	4
2	IT-601/ 501	Software Engineering	3	1	0	4	4
3	CS-603/ 503	Microprocessors-& Interfacing	3	1	0	4	4
4	CS-601	Compiler Design	3	1	0	4	4
5		Institute Elective-I	3	1	0	4	4
Total of Theory						20	20
Practical							
1	CS-691	Compiler Design Laboratory	0	0	3	3	2
2	IT-691	Computer Networks Laboratory	0	0	3	3	2
3	CS-693/ 593	Microprocessor Laboratory	0	0	3	3	2
Total of Practical						9	6
Total of Semester						29	26



SEMESTER VII - COMP. SC. & ENGINEERING

Theory							
Sl No	Subject Code	Course Title	L	T	P	Total	Credits
1	IT-703	Object Oriented System Design	3	1	0	4	4
2	CS-701	Artificial Intelligence	3	1	0	4	4
3		Dept. Elective – I/Open Elective	3	1	0	4	4
4		Dept. Elective – II/ Open Elective	3	1	0	4	4
5		Institute Elective-II	3	0	0	3	3
Total of Theory						19	19
Sessionals							
1	CS-782	Minor Project	0	0	6	6	3
2	CS-781	Industrial Training	0	0	0	0	2
Total of Sessionals						6	5
Total of Semester						25	24

SEMESTER VIII - COMP. SC. & ENGINEERING

Theory							
Sl No	Subject Code	Course Title	L	T	P	Total	Credits
1	CS-810	Advanced Computer Architecture	3	1	0	4	4
2		Dept. Elective – III/ Open Elective	3	1	0	4	4
3		Dept. Elective – IV/ Open Elective	3	1	0	4	4
4	CH-801	Environmental Sciences	2	0	0	2	2
Total of Theory						14	14
Sessionals							
1	CS-881	Seminar	0	0	6	6	2
2	CS-882	Major Project	0	0	9	9	5
3	CS-883	General Viva Voce	-	-	-	-	2
Total of Sessionals						15	9
Total of Semester						29	23



Electives offered by School of Computer Engineering

Institute Elective – I

Sl. No	Subject Code	Subject Name	Credit
1	HU-401/501/601	Engineering Economics	4
2	HU-402/502/602	Public Finance	4
3	HU-403/503/603	International Trade & Policy	4

Institute Elective – II

1	HU-606/706/806	Entrepreneurship	3
2	HU-605 /705/805	Management Concepts & Practices	3
3	HU-611/711	Human Resource Management	3

Dept. Elective – I

1	CS-706	Parallel and Distributed Computing	—83
2	CS-711	Bio-informatics	—84
3	CS-713	Real-Time Systems	—84
4	IT-710	Mobile Computing	—92
5	IT-702	Computer Security	—91

Dept. Elective – II

1	CS-715	Pattern Recognition	—85
2	IT-712	Image Processing	—93
3	IT-714	Enterprise Computing using Java	—93
4	IT-715	Information Retrieval	—94
5	CS-716	Distributed Database Systems	—85

Dept. Elective – III

1	IT-811	Data Mining & Data Warehousing	4
2	IT-812	Management Information System	4
3	IT-813	Software Project Management	4
4	IT-814	Software Testing	4
5	IT-817	Service Oriented Architecture	4

Dept. Elective – IV

1	CS-816	Natural Language Processing	4
2	IT-815	Soft Computing	4
3	IT-816	E-Commerce and ERP	4
4	CS-812	Simulation and Modeling	4
5	CS-813	Embedded System	4



CH-801

Environmental Science

CR-2

Overview on Environment: Introduction, Chemical composition and components of earth and atmosphere.

Air pollution: Natural and anthropogenic sources of atmospheric pollutants, significance of these pollutants and their reactions in atmosphere, controlling measures, some important atmospheric phenomena such as green house effect, ozone layer depletion and acid rain.

Water pollution: Types, sources and consequences of water pollution, chemical analysis of water quality parameters, sewage and waste water treatment, controlling measures.

Waste management: Sources and generation of solid wastes, their nature and chemical composition, characterization and classification of solid wastes, management of solid wastes.

Biochemical effect of some pollutants: Biochemical pathways and toxic effects of some toxic metals like Pb, Cd, Hg and As, radioactive and bio-medical wastes.

Environmental impact assessment: Origin, development and its management.

Text Books:

1. *Environmental Chemistry: A.K. De, New Age International*

Reference Books:

1. *Environmental Chemistry: P.S Sindhu, New Age International*
2. *A Text Book of Environmental Studies: Environmental Sciences, Gurdeep R. Chatwal and Harish Sharma, Himalaya*

MATHEMATICS COURSES

MA-101

Mathematics –I

CR-4

Differential Calculus (Two and Three variables)

Taylor's Theorem, Maxima and Minima and Lagrange's multipliers

First Order ODE

Basic concepts and definitions of 1st order differential equations; Formation of differential equations; solution of differential equations: variable separable method, homogeneous, equations reducible to homogeneous form, exact differential equation, equations reducible to exact form, linear differential equation, equations reducible to linear form (Bernoulli's equation); orthogonal trajectories and their applications. Solutions of differential equations by using Picard's Iteration Method.

Linear Differential equations of 2nd and higher order

Second order linear homogeneous equations with constant coefficient; differential operators; solution of homogeneous equations; Euler-Cauchy equation; linear dependence and independence; Wronskian; existence and uniqueness theory, solution of non-homogeneous equations: general solution, complementary function, particular integral; solution by variation of parameters; undetermined coefficients; higher order linear homogeneous equations; applications in electrical circuits.

Matrices, determinants, linear system of equations

Basic concepts of algebra of matrices; types of matrices; Vector Space, Sub-space, Basis and dimension, linear system of equations; consistency of linear systems; rank of matrix; Gauss elimination; inverse of a matrix by Gauss Jordan method; linear dependence and independence, linear transformation; inverse transformation, partitioning of matrices; applications of matrices; determinants; Cramer's rule;

Matrix-Eigen value problems

Eigen values, eigen vectors, Cayley Hamilton theorem, basis, complex matrices; quadratic form; Hermitian, Skew-Hermitian forms; similar matrices; diagonalization of matrices; transformation of forms to principal axis (conic section).



Text Books

1. Kreyszig E., Advanced Engineering Mathematics, Wiley & Sons, 8th edition.

Reference Books:

1. Grewal B.S., Higher Engineering Mathematics, Khanna Publishers
2. Dass H.K., Introduction to engineering Mathematics, S.Chand & Co Ltd.
3. Ramana B.V., Higher Engineering Mathematics, TMH

MA-201

Mathematics – II

CR-4

Series Solution of Differential Equations

Power series; radius of convergence, power series method, Frobenious method; Special functions: Gamma function, Beta function; Bessel's and Legendre's equations; Bessel's function, Legendre's function, orthogonal functions; generating functions. Sturm-Lioville Problems.

Transforms

Laplace Transform, Inverse Laplace Transform, Linearity, transform of derivatives and Integrals, Unit Step function, Second Shifting theorem, Differentiation and Integration of Transforms, Convolution, Integral Equation, Application to solve differential and integral equations, Systems of differential equations

Fourier series, Integrals and Transforms

Periodic functions, Even and Odd functions, Fourier series, Half Range Expansion, Fourier Integrals, Fourier sine and cosine transforms, Fourier Transform

Vector Differential Calculus

Vector Algebra, Dot and Cross Product, Vector and Scalar functions and fields, Derivatives, Gradient of a scalar field, Directional derivative, Divergence of a vector field, Curl of a vector field.

Vector Integral Calculus

Line integral, Double Integral, Green's theorem, Surface Integral, Triple Integral, Divergence Theorem for Gauss, Stoke's Theorem

Text books

1. Kreyszig E., Advanced Engineering Mathematics, Wiley & Sons, 8th edition.

Reference Books

1. Grewal B.S., Higher Engineering Mathematics, Khanna Publishers
2. Dass H.K., Introduction to engineering Mathematics, S.Chand & Co Ltd.
3. Ramana B.V., Higher Engineering Mathematics, TMH

MA-301

Mathematics-III

CR-4

Partial Differential Equation

Basic concepts, Solution of PDE by Variable Separable method, Solution of one dimensional Wave equation, Classification of PDE and transformation into its Normal form, D'Alembert's solution of Wave equation, Solution of one dimensional Heat equation, Steady state flow of heat in a rectangular bar, Solution of one dimensional heat equation by Fourier Integral, Solution of 2 dimensional wave equation, Laplace Equation in Polar, Cylindrical and Spherical coordinates, Solution of PDE by use of Laplace Transform.

Complex Analysis

Basic concept and operations of complex number, complex plane, polar form, Roots, Derivatives, Analyticity, Cauchy Riemann equations, Conformal mapping, Exponential, Trigonometric, hyperbolic, Logarithmic functions, general powers, Bilinear transformation. Line integral, Line Integral of independent path, Cauchy's integral theorem, Cauchy's integral formula, Derivatives of analytic function. Taylor's series, Maclaurin's series, Laurent's series, Expansion of functions, singularities, Residues, Residue Integration method, Evaluation of Real Integrals.

Text Books: Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons, INC.

Reference Books: Higher Engineering Mathematics by B. V. Ramanna, TMH

**MA-302****Discrete Mathematical Structure****CR- 4****Logic**

Proposition, Truth values, Connectives, Logical equivalence of composite statement (using truth table & without truth table), Predicates and Quantifiers, Rules of Inference, Methods of Induction.

Set, Relation & Function

Set, Operations on set, Principles of Inclusion and Exclusion, Relation, Types of relations, Properties on Binary Relation, Equivalence relation, partial ordering, relation, Hasse diagram, Lattice, Definition of function, Injection, Bijection, Surjection, Permutation function.

Recurrence Relation and other solutions.

Discrete numeric function and other manipulation, Generating Function,

Concept of Recurrence Relation with constant coefficients, Solution of Recurrence Relation.(Direct Method and by using generating function).

Group and Ring

Concept of binary operations, Algebraic structures, Semigroup, monoid, Group, Abelian group with examples. Properties of groups, Cyclic groups and its generator, Sub group, Normal subgroup, cosets, Lagrange's Theorem, ring, field, Integral domain (Definition with examples), Homomorphism and Isomorphism

Graph Theory

Basic Terminology, Types, Isomorphic Test, Adjacency & Incident Matrix, Paths, Circuit, shortest path Algorithms (Dijkstra), Tree, Rooted Tree, Binary Tree, spanning tree, cut set, MST Algorithms.(PRIM & KRUSKHAL), Planar Graph

Boolean Algebra

Lattices and Algebraic system, principles of duality law, Basic properties, Boolean function and Boolean Expressions, DNF & CNF.

Text Book: *Discrete Mathematical Structure, PHI by Kolman, Busby & Ross*

Reference Book: *Elements of Discrete Mathematics, TMH By-C.L. Liu*

MA-401**Mathematics-IV****CR- 4****Numerical Solution of non-linear equations**

Error in approximation, Solutions of equations by Bisection Method, Newton Raphson Method, Fixed Point iteration method, Regula falsi and Secant Method, rate of Convergence.

Interpolation & Approximation

Finite Difference, Operators and their Relationships. Interpolation, interpolating polynomial by Lagrange, Newton's divided difference, Newton's forward and backward difference. Fitting of curves by least square method

Numerical Differentiation and Integration

Numerical Differentiation of 1st and 2nd order using difference table.

Numerical Integration

Trapezoidal rule, Simpson's 1/3rd & 3/8th rules, Gauss-Legendre 2 points & 3 points formula, Error.

Numerical solution of ODE

Taylor series method, Euler's method, Modified Euler's method, Runge-Kutta method of order 2&4, Reduction of second order ODE to 1st order ODE and its numerical solution by R.K. Method of order-4.

Probability and Statistics:

Introduction to Probability, random variables and Probability Distribution, mean and Variance of probability distribution, mathematical expectation, moments and moment generating function, binomial distribution, Poisson and Hypergeometric distribution, Normal Distribution, Correlation Coefficient

Solution of system of linear equations by Gauss Seidel and Gauss Jacobi Methods, LU factorization.

Eigen value and Eigen vector of matrices by numerical methods

Text Book: *Advanced Engineering Mathematics by Erwin Kryeszig, John Wiley & Sons, INC.*

Reference Books: *Higher Engineering Mathematics by B. V. Ramanna, TMH*



COMPUTER SCIENCE & ENGINEERING COURSES

CS-101/201

Computer Systems & Programming

Fundamentals of Computer

Basic concepts of computer organizations. CPU. Memory. I/O units such as hard disk, floppy disk, pen drives, CD ROM/Writer, scanner, printers, keyboards etc. Number System Representation.

Introduction to programming languages

Evolution of programming languages, structured programming, the compilation process, object code, source code, executable code, operating systems, interpreters, linkers, loaders, fundamentals of algorithms, flow charts.

C Language Fundamentals

Character set, Identifiers, Keywords, Data Types, Constant and Variables, Statements, Expressions, Operators, Precedence of operators, Input-output Assignments, Control structures, Decision making and Branching, Decision making & looping.

C Functions

User defined and standard functions, Formal and Actual arguments, Functions category, function prototypes, parameter passing, Call-by-value, Call-by-reference, Recursion, Storage Classes.

Arrays and Strings

One dimensional Array, Multidimensional Array declaration and their applications, String Manipulation.

Pointers

Pointer variable and its importance, Pointer Arithmetic, passing parameters by reference, pointer to pointer, linked list, pointers to functions, dynamic memory allocation.

Structures, Unions

Declaration of structures, declaration of unions, pointer to structure & unions.

File Handling

Console input output functions, Disk input output functions, Data files.

Additional Features in C

Command line arguments, bit wise operators, enumerated data types, type casting, macros, the C preprocessor, more about library functions.

Text Books

1. *Programming in C - Gottfried B.S., TMH*
2. *The 'C' programming language - B.W.Kernighan, D.M.Ritchie, PHI*

Reference Books

1. *Programming in ANSI C - Balaguruswami, TMH*
2. *C The Complete Reference - H.Sohildt, TMH*
3. *Let us C - Y.Kanetkar, BPB Publications*
4. *A Structured Programming Approach using C - B.A. Forouzan & R.F. Gillberg, THOMSON Indian Edition*
5. *Computer fundamentals and programming in C - Pradip Dey & Manas Ghosh, OXFORD*

CS-301

Data Structures & Algorithms

CR-4

Introduction: Basic Terminology: Elementary Data Organization, Data Structure Operations, Abstract Data Types, Analysis of Algorithms, Time-Space Trade off.

Arrays: Array Definition and Analysis, Representation of Linear Arrays in Memory, Traversing of Linear Arrays, Insertion and Deletion, Single Dimensional Arrays



Stacks and Queues: ADT Stack, Array Implementation Multiple Stacks, Applications of Stacks: Conversion from Infix to Postfix, Evaluation of Postfix Expressions, Prefix Notation, etc. ADT queue, Linear Queue, Circular Queue, Priority Queue, Array Implementations of Queues, Applications of Queues.

Linked Lists: Singly linked lists: Representation of linked lists in memory, Traversing, Searching, Insertion into, Deletion from linked list, Linked Stacks and Queues. Polynomial Addition, Header nodes, Doubly linked list. Circular Linked Lists.

Trees: Tree Terminology, ADT Binary Tree, Binary Tree Implementations, Binary Tree Traversals, Threaded Binary Tree, Binary Search Tree, AVL Tree, Suitable Applications of Binary Trees. B Tree, B⁺ Tree.

Sorting: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort, Performance and Comparison of sorting Techniques, Hashing.

Graph: Terminology and Representations, Graph search and traversal

Text Book:

1. *Fundamentals Of Data Structures In C, Horowitz, Sahni , Universities Press*

Reference Books:

1. *Classic Data Structures, Debasis Samanta ,Prentice-hall Of India Pvt Ltd*
2. *Data Structures Using C & C++, Y.Langsam,M.j.Augenstein,Aaron M.Tanenbaum,PHI*
3. *Data Structures: A Pseudocode Approach with C, 2nd Ed. By Richard F.Gilberg & Behrouz A.Forouzan. ",THOMSON publication.*

CS401/501

Operating Systems

CR-4

Introduction: Operating system and functions, Evolution of operating system, Batch, Interactive, Time Sharing, Real Time System, Multi-Threading System.

Operating System Structure: System Components, System structure, Operating System Services.

Concurrent Processes: Process concept, Principle of Concurrency, Critical Section problem, Semaphores, Classical problems in Concurrency, Inter Process Communication, Introduction to monitor, Process Generation, Process Scheduling.

CPU Scheduling: Scheduling Concept, Performance Criteria, Scheduling Algorithm, Evolution, Multiprocessor Scheduling.

Deadlock: System Model, Deadlock Characterization, Prevention, Avoidance and Detection, Recovery from deadlock combined approach.

Memory Management: Resident monitor, Multiprogramming with fixed partition, Multiprogramming with variable partition, Multiple base register, Paging, Segmentation, Virtual memory concept, Demand paging, Performance, Page replacement algorithms, Allocation of frames, Thrashing, Cache memory, Organization, Impact on performance.

I/O Management & Disk Scheduling: I/O devices and organization of I/O function, I/O Buffering, DISK I/O, Operating System Design Issues.

File System: File Concept, File Organization and Access Mechanism, File Directories, File Sharing, Implementation Issues.

Operating system Protection & Security, Introduction to distributed operating system, Case Studies - The UNIX operating system,

Text Book:

1. *Operating System Concepts, A. Silverschwatz, P. Galvin & G.Gange , Willey*

Reference Books:

1. *Operating System Concepts, Milenkovic, McGraw Hill*
2. *An introduction to operating system, Dietel, Addison Wesley*
3. *Operating system design and implementation, Tannenbaum, PHI*



CS-402

Database Management Systems

CR-4

Introduction

General introduction to database systems; Database - DBMS Definition, approaches to building a database, data models, three-schema architecture of a database, challenges in building a DBMS, various components of a DBMS.

Relational Data Model

Concept of relations and its characteristics, schema-instance, integrity constraints, E/R Model - Conceptual data modeling - motivation, entities, entity types, various types of attributes, relationships, relationship types, E/R diagram notation, Extended E/R Model, Converting the database specification in E/R and Extended E/R notation to the relational schema. Data Storage and Indexes - file organizations, primary, secondary index structures, hash-based indexing, dynamic hashing techniques, multi-level indexes, B+ trees.

Relational Query Language

Relational Algebra operators: selection, projection, cross product, various types of joins, division, example queries, tuple relation calculus, domain relational calculus, QBE. Introduction to SQL, Data definition in SQL, Table, Key and Foreign key definitions, Data manipulation in SQL, Nested queries, Notion of aggregation, PL/SQL.

Relational Database Design

Dependencies and Normal forms - Importance of a good schema design, problems encountered with bad schema designs, motivation for normal forms, dependency theory - functional dependencies, Armstrong's axioms for FD's, closure of a set of FD's, minimal covers, definitions of 1NF, 2NF, 3NF and BCNF, decompositions and desirable properties of them, algorithms for 3NF and BCNF normalization, multi-valued dependencies and 4NF, join dependencies and definition of 5NF.

Transaction Processing

Concepts of transaction processing, ACID properties, concurrency control, locking based protocols, recovery and logging methods.

Text Books:

1. *Database System Concepts by Sudarshan, Korth (McGraw-Hill Education)*
2. *Fundamentals of Database System By Elmasari & Navathe- Pearson Education*

Reference Books:

1. *An introduction to Database System – Bipin Desai, Galgotia Publications*
2. *Database Management System by Leon & Leon (Vikas publishing House).*
3. *Database Modeling and Design: Logical Design by Toby J. Teorey, Sam S. Lightstone, and Tom Nadeau, 4th Edition, 2005, Elsevier India Publications, New Delhi*
4. *Fundamentals of Database Management System – Gillenson, Wiley India.*

CS-403

Principles of Programming Languages

CR-4

The study of programming languages: A short history of programming languages, what makes a good language, effects of environment on languages.

Language design issues: The structure and operation of a computer, virtual computers and binding times, language paradigms.

Language translation issues: Programming language syntax, stages in translation, formal translation models.

Data types: Properties of types and objects, elementary data types, structured data types.

Abstract data type: Abstract data types, encapsulation by subprograms, type definition, storage management.

Advances in language Design: Variations on subprogram control, parallel programming, formal properties of languages, language semantics, Hardware development, software architecture.



Paradigms and languages: Simple procedural languages, block structured procedural languages, object based languages, functional languages, logic programming language.

Text Books:

1. *Programming languages: Design and Implementation*, Terrence W. Pratt & Marvin V. Zelkowitz, Pearson Addison Wesley Publication
2. *Programming languages: Concept and Construct*, Ravi Sethi, Pearson Addison Wesley Publication

Reference Books:

1. *Programming languages: Principle and paradigm*, Allen B Tucker & Robert Noonan, McGraw Hill.
2. *Principle of Programming Language* by Hurwitz Sahani, Galgotia Publication

CS-502

Design & Analysis of Algorithms

CR-4

Introduction: Algorithm Design paradigms- motivation, concept of algorithmic efficiency, run time analysis of algorithms, Asymptotic Notations.

Divide and conquer: Structure of divide-and-conquer algorithms, max-min problem, Binary search, quick sort, randomized quick sort, merge sort, Analysis of divide and conquer run time recurrence relations..

Greedy Method: Overview of the greedy paradigm ,knapsack problem, Optimal storage on tapes, Job sequencing with deadlines, Activity selection problem, minimum cost spanning tree, Single source shortest path, Huffman's code.

Dynamic programming: Overview, difference between dynamic programming and divide and conquer, Applications: 0/1 knapsack, Shortest path in graph, Matrix chain multiplication, Traveling salesman Problem, longest Common subsequence.

Graph searching and Traversal: Overview, Traversal methods (depth first and breadth first search)

Back tracking: Overview, 8-queen problem, sum of subset, and Knapsack problem

Branch and bound: LC searching Bounding, FIFO branch and bound, LC branch and bound application: 0/1 Knapsack problem, Traveling Salesman Problem

Computational Complexity: Complexity measures, Polynomial Vs non-polynomial time complexity; NP-hard and NP-complete classes, examples, Approximation Algorithm for travelling sales person problem.

Text Books:

1. T. H. Cormen, Leiserson, Rivest and Stein, "Introduction of Computer algorithm," PHI
2. E. Horowitz, S. Sahni, and S. Rajsekaran, "Fundamentals of Computer Algorithms," Galgotia Publication

Reference Books:

1. Sara Basse, A. V. Gelder, " Computer Algorithms," Addison Wesley
2. *Algorithm Design:Foundation, Analysis&Internet examples* By Michael T.Goodrich, Roberto Tamassia , John Wiley & Sons

CS-503/ 603

Microprocessors and Interfacing

CR-4

Overview of Microcomputer Structure and Operation, Microprocessor Evolution and Types, 8086 Internal Architecture. 8086 Instruction Description and Assembler Directives, 8086 Family Assembler Language Programming – Instruction Templates, MOV Instruction Coding Format and Examples, MOV Instruction Coding Examples, Writing Programs for use with an Assembler, Assembly Language Program Development Tools

Implementing Standard Program Structures in 8086 Assembly Language: Simple Sequence Programs, Jumps, Flags, and Conditional Jumps, If-Then, If-Then-Else, and Multiple If-Then-Else Programs, While-Do Programs, Repeat-Until Programs, Instruction Timing and Delay Loops

Strings, Procedures, and Macros: The 8086 String Instructions, Writing and Using Procedures, Writing and Using Assembler Macros

8086 System Connections Timing: A Basic 8086 Microcomputer System, Addressing Memory and Ports in Microcomputer Systems, 8086 and 8088 Addressing and Address Decoding, How the 8088 Microprocessor Accesses Memory and Ports, 8086 Timing Parameters



8086 Interrupts and Interrupt Applications: 8086 Interrupts and Interrupt Responses, Hardware Interrupt Applications, 8259A Priority Interrupt Controller, Software Interrupt Applications

Digital Interfacing: Programmable Parallel Ports and Handshake Input/output, Methods of Data Transfer, Implementing Handshake Data Transfer, 8255A Internal Block Diagram and System Connections, 8255A Operational Modes and Initialization, Constructing and Sending 8255A Control Words

Text Books:

1. *Microprocessors and Interfacing*, Douglas V. Hall, Revised 2nd Edition, TMH, 2006.
2. *8086 microprocessor & Architecture* by Liu, Gibson; PHI.

Reference Books:

1. *Advanced Microprocessors & IBM-PC assembly Language Programming*, K.Udaya Kumar & B.S. Umashankar, TMH 2003.
2. *The Intel Microprocessors*, Barry B. Brey, Pearson/PHI 2006. 7th Edition
3. *The Intel Microprocessor Family: Hardware and Software Principles and Applications*, James L. Antonakos, Thomson, 2007.
4. *Microprocessors and Microcomputer- Based System Design*, M. Rafiquzzaman, UBS Publication.

CS-504

Theory of Computation

CR-4

Introduction: Automata Theory, Complexity Theory, Computability Theory. Mathematical Notations: sets, sequences and tuples, Functions and relations, Graphs, strings and languages, Boolean logic. Definitions, Theorems and proofs: Finding proofs. Types of Proof: Proof by Induction, Proof by contradiction and Proof by construction.

Finite Automata: Formal Definition of finite automaton, formal definition of computation, Designing finite automata, regular operations. Non-determinism: Formal definition of NFA, equivalence of NFAs and DFAs, Formal definition of Regular Expression, Equivalence of regular expression with Finite automata, Minimization of Finite automata, Mealy and Moore machine.

Basic Definition of formal languages and grammars: Chomsky classification of languages, Regular sets and regular grammars, Closure properties of regular sets, pumping lemma of regular sets.

Formal definition of CFG: Designing Context free grammar, Derivation tree, Ambiguity, simplification of context free grammars (removal of useless symbols, removal of ϵ -productions, removal of unit production, CNF, GNF), Formal Definition of PDA, Equivalence with CFG, Pumping lemma for Context free languages.

The Church-Turing Thesis: Turing Machine formal definition, Variants of Turing machine (Multi-tape Turing Machine, Nondeterministic TM, Enumerators, Equivalence with other models). Decidability: Decidable Languages, Decidable problems concerning regular languages and CFG, The halting problem (Diagonalization method, the halting problem is undecidable, A Turing unrecognizable language). Reducibility: Undecidable problems from Language theory, a simple

Text Books:

1. *Introduction to the Theory of Computation*, Michel Sipser, Thomson Brooks/Cole

Reference Books:

1. *Introduction to Automata Theory Languages and Computation*, J.E. Hopcroft, R Motwani and J.D. Ullman, Pearson Education.
2. *The Theory of Computation*, Bernard M. Moret, Pearson Education
3. *An Introduction to Formal Languages and Automata*, Peter Linz, Jones & Bartlett Publishers
4. *Theory of Computer Science*, K L P Mishra and Chandrasekhran, PHI

CS-505/605

Computer Organization and Architecture

CR-4

Basic Structure of Computers: Computer Types, Functional Units, Basic Operational Concepts, Bus Structures, Machine Instructions and Programs: Memory Location and Addressing mechanism, Memory Operations, Instructions and Instruction Sequencing.



Assembly Language, Basic Input and Output Operations, Subroutines, Additional Instructions, Encoding of Machine Instructions, Addressing Modes, Types of instruction, instruction format, Instruction length.

Basic Processing Unit: Some Fundamental Concepts, Execution of a Complete Instruction, Single and Multiple Bus Organization, Hard-wired Control, Micro programmed Control unit.

Arithmetic: Multiplication of Positive Numbers, Signed Operand Multiplication, Fast Multiplication, Integer Division, Floating-point Numbers and Operations.

Memory System: Basic Concepts, Semiconductor RAM Memories, Read Only Memories, Speed, Size, and Cost, memory module design, Cache Memories – Mapping Functions, Replacement Algorithms, Memory interleaving, Memory Performance Considerations Virtual Memories..

Input/Output Organization: Accessing I/O Devices, Interrupts – Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Controlling Device Requests, Exceptions, Direct Memory Access, Interface Circuits, Standard I/O Interfaces – PCI Bus, SCSI Bus, USB

Parallel Processing: Flynn's classification, Introduction to Pipelining and hazards, RISC vs CISC.

Text Book:

1. *Computer Organization*, Carl Hamacher, Zvonko Vranesic, Safwat Zaky, 5th Edition, TMH, 2002.

Reference Book:

1. *Computer Organization & Architecture*, William Stallings, 7th Edition, PHI, 2006.

CS-601 **Compiler Design** **CR-4**

Overview of Compilation: Cousins of the Compiler, Phases of Compilation, Grouping of Phases, Lexical Analysis, Compiler construction tools, Lexical Analysis, Role of Lexical Analyzer, Input Buffering, Specification of Tokens, Finite state machines and regular expressions and their applications to lexical analysis, Implementation of lexical analyzers, LEX lexical analyzer generator.

Syntax Analysis: Context-free grammars, Top-down Parsing – Backtracking, LL(1), recursive descent parsing, Predictive parsing, Bottom-up parsing – Shift Reduce parsing, LR and LALR parsing, Error recovery in parsing, handling ambiguous grammar, YACC – automatic parser generator.

Semantic analysis: Intermediate forms of source Programs – abstract syntax tree, polish notation and three address codes. Attributed grammars, Syntax directed translation, Conversion of popular Programming languages language Constructs into Intermediate code forms, Type checker.

Symbol Tables: Symbol table format, organization for block structures languages, hashing, tree structures representation of scope information. Block structures and non block structure storage allocation: static, Runtime stack and heap storage allocation, storage allocation for arrays, strings and records.

Code optimization: Consideration for Optimization, Scope of Optimization, local optimization, loop optimization, frequency reduction, folding, DAG representation.

Data flow analysis: Flow graph, data flow equation, global optimization, redundant sub expression elimination, Induction variable elements, Live variable analysis, Copy propagation.

Object code generation: Object code forms, machine dependent code optimization, register allocation and assignment generic code generation algorithms, DAG for register allocation.

Text Book:

1. *Compilers- Principles, Techniques and Tools*, By A.V. Aho, M.S. Lam, R Sethi and J.D.Ullman, Pearson Education.

Reference Books:

1. *lex & yacc* – John R. Levine, Tony Mason, Doug Brown, O'reilly
2. *Engineering a Compiler*, by Cooper & Linda, Elsevier.
3. *Compiler Construction*, K.C. Louden, Thomson Brooks/Cole.

CS-701 **Artificial Intelligence** **CR-4**

Introduction: Overview; Foundation; History; The State Of Art.

Intelligent Agents: Agents and environment; Rationality; The nature of environment; The structure of agents.



Solving Problems by Searching: Problem-solving agents; Example problems; Searching for solution; Uninformed search strategies.

Informed Search and Exploration: Informed search strategies; Heuristic functions; On-line search agents and unknown environment.

Constraint Satisfaction Problems: Constraint satisfaction problems; Backtracking search for CSPs.

Adversarial search: Games; Optimal decisions in games; Alpha-Beta pruning.

Logical Agents: Knowledge-based agents; The wumpus world as an example world; Logic; Propositional logic Reasoning patterns in propositional logic; Effective propositional inference; Agents based on propositional logic.

First-order Logic: Representation revisited; Syntax and semantics of first-order logic; Using first-order logic; Knowledge engineering in first-order logic.

Inference in First-Order Logic: Propositional versus first-order inference; Unification and lifting; Forward chaining; Backward chaining; Resolution.

Knowledge Representation: Ontological engineering; Categories and objects, Actions, situations, and events; Mental events and mental objects; The Internet shopping world; Reasoning systems for categories; Reasoning with default information; Truth maintenance systems.

Planning: The planning problem; Planning with state-space approach; Planning graphs; Planning with propositional logic.

Text Book:

1. *Artificial Intelligence: A Modern Approach* – Stuart Russel, Peter Norvig, 2nd Edition, Pearson Education, 2003.

Reference Books:

1. *Artificial Intelligence - Elaihe Rich, Kevin Knight and Shivashankar B Nair*, 3rd Edition, Tata McGraw Hill.
2. *Principles of Artificial Intelligence* – Nils J. Nilsson, Elsevier, 1980.

~~CS-810~~

~~Advanced Computer Architecture~~

~~CR-4~~

Introduction: Introduction to Parallel Computing, Need for Parallel Computing, Parallel Architectural classification schemes, Flynn's, Shores, Fengs classification, Performance of Parallel Processors. Amdahl Law Distributed Processing and Quantitative Approach.

Memory: Processor & memory hierarchy, bus, cache & shared memory introduction to super scalar architectures, Quantitative evaluation of performance gain using memory, cache miss/hits.



Pipeline Processing: Introduction to Pipeline Processing, SIMD parallel processors, Arithmetic pipelines, steady state analysis of pipeline, Pipelined instruction processing, interlocks, hazards, hazards detentions and resolution memory systems used in pipelines, scheduling of dynamic pipelines.

Synchronous Parallel Processing: SIMD Parallel algorithm, recurrence and matrix computations, Distributed array processor, Processor Arrays, Multiprocessors, cache coherence protocols.

Interconnection Network: Introductions, Elementary Permutations used in Interconnection Network, Network Classification Cross bar network, commonly used Interconnection Network, Cross bar, Data Manipulator, Network Routing, Multistage Data Manipulator.

Text Books:

1. *Quantitative approach to computer Architecture*, Patterson & Hanesy, Morgan Kaufman.
2. *Advanced Computer Architecture*, Hwang and Briggs, McGraw Hill.

Reference Books:

3. *Parallel Computing, Theory and Practices*, Quin, McGraw Hill.
4. *Parallel Computing*, Bhujde, New Age International.
5. *Architecture of Computer Hardware & Software System*, Englander, Jon Willey & Sons.



INFORMATION TECHNOLOGY COURSES

IT-301

Object Oriented Programming

CR-4

Object oriented paradigm: Evolution of programming paradigm, structured versus object-oriented development, elements of object-oriented programming, objects, classes, encapsulation and data abstraction, inheritance, delegation – object composition, polymorphism, exception handling.

Moving from C to C++ : Introduction, streams based I/O, scope resolution operator (::), variable definition at the point of use, variable aliases-reference variables, strict type checking, parameters passing by reference, inline function, function overloading, default arguments.

Object and Classes: Specifying and using classes, private and public data members, constructor and destructor, objects as function arguments, memory considerations for objects, new and delete operators, functions, static function, friend function.

Inheritance: Derived and base classes, Class hierarchies, public and private inheritance, constructors in derived classes, destructors in derived classes, constructors invocation and data members initialization, classes within classes, container classes.

Polymorphism: Pointer to objects, pointer to derived class, use of this pointer, run time and compile time polymorphism, virtual functions, abstract base classes, pure virtual functions, virtual destructors.

Files and Streams: : Introduction, hierarchy of file stream classes, opening and closing of files, testing for errors, file modes, file pointers and their manipulators, sequential access to a file, I/O with multiple objects.

Exception handling: : Introduction, error handling, exception handling model, exception handling constructs, handler throwing the same exception again, list of exceptions, catch all exceptions, handling uncaught exceptions.

Templates: Class templates with multiple parameters, function template with multiple parameters, components of STL.
Introduction to windows programming.

Text Book:

1. *Mastering C++, Venugopal ,Tata Mc Graw Hill*

Reference Books:

1. *C++ complete reference, Herbert Schildt, TMG Hill*
2. *Object Oriented Programming In Turbo C ++ , Robert Lafore , Galgotia Publications Pvt Ltd*
3. *C++ How to Program, Deitel and Deitel ,Pearson Education Asia*

Introduction: Software and its characteristics, application. Software engineering: a layered technology. The software process, software process Models: Classical waterfall model, iterative waterfall model, prototyping mode, evolutionary model, spiral model, RAD model.

Software Project Management: Responsibilities of a Software project manager, project planning, Metrics for project size estimation, Project estimation techniques, Empirical estimation techniques, COCOMO models, Scheduling, Organization & team structure, Staffing, Risk management, Software configuration management.

Structural Analysis & Design: Requirements Analysis, Requirements elicitation for software analysis, Analysis principles, Specifications (SRS document), Software Design: cohesion & coupling, neat arrangement, Function-Oriented software design: Structural Analysis, Structural Design (DFD and Structured Chart), Object Oriented Analysis & Design.

Testing Strategies: Coding, Code Review, Testing: - Unit testing, Black-box Testing, White-box testing, Debugging, Integration testing, System testing

Software Reliability and Software Maintenance: Software reliability, SEI CMM, Characteristics of software maintenance, software reverse engineering, software reengineering.

Text Books:

1. *Fundamentals of Software Engineering, Rajib Mall , PHI*
2. *Software Engineering, A Practitioner's Approach, Roger S. Pressman ,TMG Hill.*

Reference Book :

1. *Software Engineering, I.Sommerville, Pearson Education, Asia.*

Introduction to Computer Graphics, Use of computer graphics, Elements of picture creation, Display technologies, Graphics display devices, Graphics input primitives and devices;

Two dimensional output primitives, Different forms of line drawing algorithms, Circle generating algorithms, Ellipse generating algorithm, Filled area primitives;

The geometries of transformations, Translation, Rotation in plane, Rotation in space, Reflection, Homogeneous coordinates, Composite transformations, Polygons, Two dimensional viewing, Window to view port transformations, Line clipping, Polygon clipping, projection;

Three dimensional shapes representations: Spline, Bezier curves and surfaces, Octrees, BSP trees, Fractal geometry, Visible surface detection; Solid modeling; Shading; Advanced modeling techniques; Animation;

Introduction to Multimedia; Multimedia authoring tools; Graphics and image data representation; Color in Image & Video; Basics of Video and Audio; Compression; Content based retrieval.



Text Books:

1. *Computer Graphics, C Version, D. Hearn and M. P. Baker, Pearson, 2nd Ed, 2003.*
2. *Fundamentals of Multimedia, Ze-Nian Li, M. S. Drew, Prentice Hall, 1st Ed, 2004.*

Reference Books:

1. *Computer Graphics - Principles and Practice, J. D. Foley, A. Van Dam, S. K. Feiner and J. F. Hughes, Second Edition in C, Addison Wesley, 2nd Ed, 2003.*
2. *Mathematical Elements for Computer Graphics, D. F. Rogers, J. A. Adams, McGraw Hill, 2nd Ed, 2001*
3. *Principles of Multimedia, Ranjan Parekh, McGraw Hill, 1st Ed, 2006.*
4. *Introduction to Computer Graphics and Multimedia, A. Mukhopadhyay, A. Chatopadhyay, Vikas, 2nd Ed, 2007.*

IT-603

Computer Networks

CR-4

Introduction: Overview: Definitions of Data Communications and Networking, OSI reference Model, Topologies, LAN, MAN, WAN.

Physical Layer: Digital Signals, Nyquist Theorem, Line coding, Block coding, Sampling, Transmission mode, Transmission Media: Guided Media, Unguided media. Switching: Circuit switching, Packet switching.

Data Link Layer: Error Detection and correction: Type of Errors, Detection, Error Correction. Data Link Control and Protocols: Flow and error Control, Stop-and-wait ARQ, Go-Back-N ARQ, Selective Repeat ARQ, HDLC. Point-to-Point Access: Point-to-Point Protocol, Channelization, Multiple Access, Random Access, Controlled Access., Local area Network: Ethernet. Wireless LANs: IEEE 802.11, Token Ring, FDDI.

Network Layer: Host to Host Delivery: Internetworking, Addressing and Routing. Network Layer Protocols: ARP, IPV4, ICMP, Intro to IPV6.

Transport Layer: Process to Process Delivery: UDP; TCP congestion control and Quality of service.

Application Layer: Client Server Model, Domain Name System (DNS): Electronic Mail (SMTP) and file transfer (FTP), HTTP and WWW.

Text Books:

6. *Data Communications and Networking: Third Edition. Behrouz A. Forouzan, Tata McGraw-Hill Publishing Company Limited.*
7. *Computer Networks, A.S.Tanenbaum, Pearson Education, IV Edition, 2003*

Reference Book:

1. Computer Networks - A system Approach, Larry L Peterson and Bruce S. Davie, Elsevier, Third Edition,

IT-702

Computer Security

CR-4

The Security Problem in Computing: The meaning of computer Security, Computer Criminals, Methods of Defense, Elementary Cryptography: Substitution Ciphers, Transpositions, Making "Good" Encryption Algorithms, The Data Encryption Standard, The DES, Blowfish, AES Encryption Algorithm

Asymmetric Key cryptography: Overview, RSA, Cryptographic Hash function: MD5, SHA, MAC, HMAC, PKI.

Program Security: Secure Programs, Non-malicious Program Errors, viruses and other malicious code, Targeted Malicious code, controls Against Program Threats, Protection in General-Purpose operating system protected objects and Trusted Operating System Security polices, models of security, trusted Operating System design, Assurance in trusted Operating System, Implementation Examples.

Data Base Security : Security requirements, Reliability and integrity, Sensitite data, Inference, multilevel database, proposals for multilevel security.

Security in Network.

Threats in Network, Network Security Controls, Firewalls, Intrusion Detection Systems, Secure E-mail.

Advanced Topics: Legal Privacy and Ethical Issues in Computer Security: Software failures, Computer Crime, Ethical issues in Computer Security.



Text Book:

1. *Security in Computing Third Edition Charles, P. Pfleeger, shari Lawrence Pfleeger, PHI.*

Reference Books:

1. *Cryptography and networks security: Principles and Practice, William Stalling, Prentice Hall, New jersey.*
2. *In troduction to cryptography, Johannes A Buchmann, Springer-verlag*

✓ IT-703

Object-Oriented System Design

CR-4

Introduction: An Overview of Object Oriented Systems Development, Object Basics, Object-Oriented Systems Development Life Cycle.

Object Oriented Methodologies: Rumbaugh Methodology, Booch Methodology, Jacobson Methodology, Object Oriented Programming, Object Oriented Design, Object Oriented Analysis. Elements of Object Model.

UML : Unified Modeling Language, Conceptual Model of the UML, Iterative development, Unified approach.

Object Oriented Analysis: Understanding requirements, Identifying use cases; Object Analysis: Classification; Identifying Object relationships, Attributes and Methods.

Object Oriented Design: Object-Oriented Design, Design Models: GRASP, Design Patterns, Framework, object-oriented testing, Process and Design Axioms; Designing Classes; Access Layer: Object Storage, Object Interoperability; Designing Interface Objects.

Object Oriented Data Model: Quarry Languages, OODBMS, Object Relational Database.

Text Books:

1. *Object Oriented Systems Development, Ali Bahrami, Tata McGraw-Hill.*
2. *Applying UML and Patterns, Criag Larman, Pearson Education.*

Reference Books:

1. *Introduction to Object Oriented Analysis and Design, Stephen R. Schach, Tata McGraw-Hill, 2003.*
2. *The Unified Modeling Language Reference Manual, James Rumbaugh, Ivar Jacobson, Grady Booch, Addison Wesley, 1999.*
3. *Practical Object-Oriented Design with UML, Mark Priestley, 2nd Edition, Tata McGraw-Hill, 2003.*
4. *Object-Oriented Design with UML and JAVA, K. Barclay, J. Savage, Elsevier, 2008.*

Internet Fundamentals of Web, Internet, WWW, Web Browsers and Web Servers, URLs, MIME, HTTP

Javascript: Overview of Javascript, Object orientation and Javascript, Syntactic characteristics, Primitives, operations, and expressions, Screen output and keyboard input, Control statements, Object creation and modification, Arrays, Functions, Constructors, Pattern matching using regular expressions, Errors in scripts, Examples.

Javascript and HTML Documents, Dynamic Documents with Javascript: The Javascript execution environment, The Document Object Model, Element access in Javascript, Events and event handling, Handling events from the Body elements, Button elements, Text box and Password elements, The DOM 2 event model

Multi Threaded Programming: Thread concepts, Thread class and Runnable interface, Use of join() and isAlive() methods, Synchronization; Inter thread communication, producer-consumer problems.

AWT: Active and passive components, Label, Button, Choice etc, layout managers

Applet Event Handling: The delegation event model, Event classes, Sources of events, Event listener interfaces, Adapter classes, Inner classes.

Swings: The origins of Swing, Swing features: Components and Containers, Swing Application, JLabel and ImageIcon; JTextField, The Swing Buttons, JTabbedPane, JScrollPane, JList, JComboBox, JTable.

JDBC: JDBC Driver Types; JDBC Packages; A Brief Overview of the JDBC process; Database Connection; Associating the JDBC/ODBC Bridge with the Database; Statement Objects, ResultSet, Transaction Processing.



Servlets: Background, The Life Cycle of a Servlet, Using Tomcat for Servlet Development, A simple Servlet, The Servlet API, The javax.servlet Package, The javax.servlet.http package; Handling HTTP Requests and Responses; Using Cookies; Session Tracking.

JSP, RMI, Java Beans: JSP Elements, JSP Tags, Using Tomcat for JSP. Remote Method Invocation concept; Server side, Client side application using RMI. Java Bean Architecture, Introspection

Enterprise Java Beans: Enterprise java Beans, Deployment Descriptors, Session Java Bean, Entity Java Bean; Message-Driven Bean; The JAR File.

Text Books:

1. *J2EE - The Complete Reference*, Jim Keogh, Tata McGraw Hill, 2007.
2. *Java Script Bible*, Danni Goodman, 2nd Ed. Comdex Computer Pub.1997

Reference Books:

1. *Internet & World Wide Web How to Program*, M. Deitel, P.J. Deitel, A. B. Goldberg, 3rd Edition, Pearson education, 2004.
2. *The J2EE Tutorial*, Stephanie Bodoff et al, 2nd Edition, Pearson Education, 2004

IT-715

Information Retrieval

CR-4

Introduction: Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries and Data Warehouses. **Information Retrieval System Capabilities:** Search, Browse, Miscellaneous. Cataloging and Indexing: Objectives, Indexing Process, Automatic Indexing, Information Extraction.

Data Structures: Introduction, Stemming Algorithms, Inverted file structures, N-gram data structure, PAT data structure, Signature file structure, Hypertext data structure.

Automatic Indexing: Classes of automatic indexing, Statistical indexing, Natural language, Concept indexing, Hypertext linkages, Document and Term Clustering: Introduction, Thesaurus generation, Item clustering, Hierarchy of clusters.

User Search Techniques: Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, Weighted searches of Boolean systems, Searching the internet and hypertext, **Information Visualization:** Introduction, Cognition and perception, Information visualization technologies.

Text Search Algorithms: Introduction, Software text search algorithms, Hardware text Search Systems. **Information System Evaluation:** Introduction, Measures used in system evaluation, Measurement example – TREC results.

Text Books:

1. *Information Retrieval Data Structures and Algorithms*, Frakes, W.B., Ricardo Baeza-Yates, Prentice Hall, 1992.
2. *Information Retrieval Systems: Theory and Implementation*, Kowalski, Gerald, Mark T Maybury, Kluwer Academic Press, 1997.

Reference Books:

1. *Modern Information Retrieval*, Yates, Pearson Education.
2. *Information Storage & Retrieval*, Robert Korfhage John Wiley & Sons.

IT-811

Data Mining & Data Warehousing

CR-4

Introduction:

Basic Data Mining Tasks, Data Mining Issues, Data Mining Metrics, Data Mining from a Database Perspective.

Data Mining Techniques:

A Statistical Perspective on Data Mining, Similarity Measures, Decision Trees, Neural Networks, Genetic Algorithms.

Classification:

Statistical-Based Algorithms, Distance-Based Algorithms, Decision Tree-Based Algorithms, Neural Network-Based Algorithms, Rule-Based Algorithms, Combining Techniques.



Clustering:

Similarity and Distance Measures, Hierarchical Algorithms, Partition Algorithms, Clustering Large Databases, Clustering with Categorical Attributes.

Association Rules:

Basic Algorithms, Parallel and Distributed Algorithms, Incremental Rules, Advanced Association Rule Techniques, Measuring the Quality of Rules.

Advanced Techniques:

Web Mining, Spatial Mining, Temporal Mining.

Text Book:

1. *Data Mining: Concepts and Techniques*, J. Han and M. Kamber, 2nd Ed. Morgan Kaufman. 2006.

Reference Books:

1. *Data Mining: Introductory and Advanced Topics*, M. H. Dunham, Pearson Education. 2001.
2. *Data Mining: Practical Machine Learning Tools and Techniques*, I. H. Witten and E. Frank Morgan Kaufmann. 2000.
3. *Principles of Data Mining*, D. Hand, H. Mannila and P. Smyth, Prentice-Hall. 2001.

Introduction to Neura Fuzzy And Soft Computing: Introduction, Soft Computing Constituents and Conventional AI, Neuro-Fuzzy and Soft Computing Characteristics

Fuzzy Set Theory: Fuzzy Sets, Basic Definition and Terminology, Set-theoretic Operations, Member Function Formulation and Parameterization, Fuzzy Rules and Fuzzy Reasoning, Extension Principle and Fuzzy Relations, Fuzzy If-Then Rules, Fuzzy Reasoning, Fuzzy Inference Systems, Mamdani Fuzzy Models, Sugeno Fuzzy Models, Tsukamoto Fuzzy Models, Input Space Partitioning and Fuzzy Modelling.

Optimization: Derivative-based Optimization, Descent Methods, The Method of Steepest Descent, Classical Newton's Method, Step Size Determination, Derivative-free Optimization, Genetic Algorithms, Simulated Annealing, Random Search, Downhill Simplex Search.

Neural Networks: Supervised Learning Neural Networks, Perceptrons, Adaline, Backpropagation Mutilayer Perceptrons, Radial Basis Function Networks, Unsupervised Learning Neural Networks, Competitive Learning Networks, Kohonen Self-Organizing Networks, Learning Vector Quantization, Hebbian Learning, Hop-field networks.

Neuro Fuzzy Modelling: Adaptive Neuro-Fuzzy Inference Systems, Architecture, Hybrid Learning Algorithm, Learning Methods that Cross-fertilize ANFIS and RBFN, Coactive Neuro Fuzzy Modeling, Framework Neuron Functions for Adaptive Networks, Neuro Fuzzy Spectrum. Introduction to Neuro Fuzzy Control.

Text Book:

1. *Neuro-Fuzzy and Soft Computing*, J.S.R.Jang, C.T.Sun and E.Mizutani, PHI/Pearson Education.

References Books:

1. *Fuzzy Logic with Engineering Applications*, Timothy J.Ross, McGraw-Hill, 1997.
2. *Genetic Algorithms: Search, Optimization and Machine Learning*, Davis E.Goldberg, Addison Wesley, N.Y., 1989.
3. *Neural Networks: A Comprehensive Foundation*, Simon Haykin, Prentice Hall
4. *Neural Network Design*, M. T. Hagan, H. B. Demuth, Mark Beale, Thomson Learning, Vikash Publishing House.
5. *Neural Networks, Fuzzy Logic and Genetic Algorithms*, S. Rajasekaran and G.A.V.Pai, PHI, 2003



ELECTRICAL ENGINEERING COURSES

EE-101/201

Electrical Science

CR-3

Review Of Electrostatics

Electric field intensity, potential, flux density, flux, potential gradient, dielectric strength. Capacitance of capacitor, energy stored, charging and discharging of capacitors.

DC Circuits

Ohm's law, Kirchoff's law, mesh current and node voltage methods, Superposition theorem, Thevenin's theorem, Norton's theorem.

Review Of AC Fundamentals

Solution of series and parallel circuits, power & power factor, resonance in series and parallel circuits.

Three Phase AC circuits

Three phase voltage and current, star & delta connections, measurement of power & power factor by two-wattmeter.

Magnetic Circuits

MMF, magnetizing force, magnetic flux, flux density, permeability, reluctance, permeance, B-H curve, simple magnetic circuits, leakage flux, hysteresis and eddy current loss.

Single-Phase Transformer

Construction, principle of operation, emf equation, losses and efficiency.

Three-Phase Transformer

Construction & connections.

DC Generator

Construction, emf equation, various types and their characteristic.

DC Motor

Principle, torque and speed formula, types and their characteristic, speed control and applications.

Three-Phase Induction Motor

Construction, principle of operation, torque-slip characteristic, speed control and applications.

Three-Phase Alternator

Construction, principle and emf equation.

Measurement of Electrical Quantity

PMMC instruments, voltmeter, ammeter, dynamometer type wattmeter, induction type energy-meter.

Text Book

1. *Basic Electrical Engineering- Abhijit Chakrabarti, Sudipta Nath, Chandan Kumar Chanda. Tata McGraw-Hill Publishing Company Limited, New Delhi.*

Reference Books

1. *Basic Electrical Engineering- D.P. Kothari, I. J. Nagrath. Tata McGraw-Hill Publishing Company Limited, New Delhi.*

2. *Principles of Electrical engineering and Electronics- V.K. Mehta, Rohit Mehta. S. Chand and company, New Delhi*

EE-303

Electrical Circuit Analysis

CR-4

Network Theorems

Star delta transformation, superposition theorem, Thevenin's Theorem, Norton's Theorem, Reciprocity Theorem, Maximum Power transfer theorem, Millman's Theorem.

Resonance in AC Circuits

Series & parallel resonance, properties of resonant circuits, selectivity and bandwidth, Q factor.

Coupled Circuits

Dot conventions for coupled circuits, coefficient of coupling, loop analysis of coupled circuits, tuned coupled circuits.



ELECTRONICS & TELECOMMUNICATION ENGINEERING COURSES

EC-101/201

Basic Electronics

CR-3

Semiconductors

Energy band concept of materials, difference between metal, insulator and semiconductor, Intrinsic and extrinsic semiconductors (n-type & p-type), current conduction in semiconductor, direct and indirect bandgap semiconductors, Photodiode, photo-transistor, LED and seven-segment display.

Junction Diodes

Operation of p-n junction diode, diode characteristics, half-wave, full-wave and bridge rectifiers, rectifiers with C, LC and LC π filter, clipper and clamper circuits, breakdown mechanisms, Zener diode and voltage regulator.

Bipolar Junction Transistor (BJT)

Transistor operation and current components in p-n-p and n-p-n transistors, CE, CB, CC configurations and characteristics, biasing, load line analysis.

Field Effect Transistors (FET)

Operations of p-channel and n-channel JFETs, characteristics of JFET, operation of MOSFET and its characteristics.

Power Amplifiers

Class A, B, C and push-pull amplifiers.

Feedback Concept

General feedback structure, properties and advantages of negative feedback, Barkhausen criteria for oscillation.

Operational Amplifiers (OPAMP)

Ideal OPAMP, CMRR, virtual ground, Inverting and non-inverting OPAMPS, summing amplifiers, Differential amplifier, integrator & differentiator.

Digital Electronics

Number systems, conversions and codes, Logic gates & Truth tables (OR, AND, NAND, EX-OR), flip-flops (RS flip-flop, D flip-flop, JK flip-flop and MS flip-flop).

Shift register, Asynchronous(ripple) counter.

Electronic Instruments

Operation of CRO and its applications, Signal Generator.

Text Books

1. *Electronic Devices and Circuits – D. A. Bell (PHI)*
2. *Electronics –Fundamentals & Applications –D. Chattopadhyay and P. C. Rakshit (New Age Intl)*



Reference Books

1. *Electronic Devices & Circuits – R. L. Boylestad & L. Nashelsky (PHI)*
2. *Electronic Principles – A. Malvino & D. J. Bates (TMH)*
3. *Digital Principles and Applications – A. Malvino and Leach (TMH)*
4. *Integrated Electronics – J. Millman & Halkias (TMH)*

EC – 301

ANALOG ELECTRONIC CIRCUITS – I

CR – 4

1. Transistor Biasing Circuits :

Different types of biasing circuits for BJT & FET, Stability factors & Bias compensation.

2. Small Signal Analysis of BJT :

The transistor model-hybrid model, Graphical determination of h-parameters. Low frequency small signal analysis of CE, CC and CB configurations without feedback, Simplified CE & CC hybrid model, CE amplifier with an emitter Resistance.

3. Small Signal Modeling and Analysis of FETs :

Small Signal Model of FET, Analysis of JFET CS & CD configuration. Analysis of Enhancement and Depletion MOSFETs.

4. BJT and JFET Frequency Response :

Classification of Amplifiers, Distortion in amplifiers, Frequency response of an amplifier, Lower Cut Off frequency and higher Cut Off frequency of an amplifier, Step response of an amplifier, Bandpass of cascade stages, Low frequency response of RC coupled BJT and FET amplifier, High frequency modeling and analysis of BJT and FET amplifiers, Miller effect capacitance.

5. Compound Configurations :

Differential amplifier, Differential amplifier circuit configuration, DC Analysis, AC Analysis, Constant current bias, current mirror, level translator, Cascade, Cascode and Darlington connections.

6. Feedback and Oscillator Circuits :

Feedback concept, Feedback amplifier topologies, General characteristics of negative feedback amplifier, input and output resistance with negative feedback, Method of analysis of feedback amplifiers with practical examples, Positive feedback, Barkhausen Criterion of Oscillation, Sinusoidal Oscillator, LC Oscillators, RC phase shift oscillator, Crystal Oscillator.

7. Power Amplifiers :

Definition of class A, B and C types. Distortion analysis, Series fed and transformer coupled power amplifier, Conversion efficiency, Push-pull amplifiers.

Text Book :

1. *Integrated Electronics – J. Millman & Halkias – TMH*

Reference Book :

1. *Electronics Devices and Circuit Theory – Robert L. Boylestad and Lewis Nashelsky – PHI (9th Edition)*



3. Frequency Response of an Op-amp :

Frequency response, Compensating Networks, Frequency response of compensated and non-compensated Op-amp, high frequency Op-amp equivalent circuit, open loop voltage gain as a function of frequency, Closed loop frequency response, Circuit stability.

4. Op-amp Applications:

Instrumentation amplifiers, Voltage to current converter and vice versa, Integrator, differentiator, first and second order active filter, Phase shift oscillator, Wien bridge oscillator, voltage to frequency converter, comparator : Zero crossing detector & Schmitt Trigger, Sample and Hold circuit, the 555 timer as Monostable and Astable mode, PLL and its applications, IC voltage regulators.

5. Linear Wave Shaping Circuits:

High pass and low pass circuit, Response of RC circuit to various inputs such as sinusoidal, step, pulse, square wave, exponential and ramp. High pass RC circuit as a differentiator. Low pass RC circuit as an integrator, Attenuator and its application.

6. Negative Resistance Devices:

Tunnel diode & UJT, their V – I characteristics and performance analysis.

7. Voltage Time Base Generators:

General feature of time base signal, exponential sweep circuit. Miller & Bootstrap time base generator.

8. Current Time Base Generators :

Simple current sweep, Linearity correction and Transistor current time base generator.

Text Books:

1. *Op-amp & LIC* – R. K. Gayakwad – PHI
2. *Pulse, Digital and Switching waveforms* – J. Millman & H. Taub – TMH

Reference Books:

1. *LIC* – D. Ray Choudhury & Shail Jain (New Age)
2. *Pulse Digital Circuit* – Anand Kumar - PHI

EC-402

Digital Electronic Circuits

CR-4

1. Introduction to Boolean Algebra

Signed binary number, Binary arithmetic, Codes—BCD, Gray, Excess-3, Error detection & Correcting code-Hamming code, Universal gates, Boolean Algebra, Basic theorems & properties of Boolean Algebra, De-Morgan's theorem, Minterms & Maxterms, K-map representation, simplification and realization with logic gates.

2. Combinational Circuits

Adders (Half and Full adders, parallel binary adders, look ahead carry adder generator), Magnitude comparator, decoders (3 to 8, BCD to Decimal decoder, BCD to SSD) and



Encoders, Priority Encoder, Multiplexer and Multiplexer-tree, De-multiplexer, Parity generator/checkers.

3. Sequential Logic

Shift Register (SISO, SIPO, PIPO, PISO, Bidirectional), Counter (ripple and synchronous), Ring and Johnson Counters), 555 Timer & applications, Multivibrators (astable, monostable and bistable), Schmitt Trigger.

4. Memory

Memory concepts, RAM, ROM, uv EPROM, EEPROM, Flash memory, Optical memory.

5. Programmable Logic Devices

PAL, PLA, PROM, FPGA and Programmable ASIC

6. Finite State Machine (FSM)

Model of Finite State Machine---State diagram, Mealy and Moore models, Logic diagrams, State table, State reduction, State assignment, Excitation table. Realization of memory elements (S-R, J-K, T, Master-Slave)---- State diagram, state table, Excitation table, Synthesis of Synchronous sequential circuits (Sequence detector, parity-bit generators). Minimization of completely specified sequential machine, Simplification of incompletely specified machine.

Algorithmic state machine (ASM) chart, Logic diagram and ASM chart using Multiplexer, PLAs and ROM

7. Logic Families

Transistor as switch, Characteristics (Propagation delay, Speed-power product, Noise margin, Fan-in, Fan-out), Standard logic families (RTL, TTL, ECL, CMOS).

8. D/A and A/D

Digital to Analog converter (Binary weighted resistor network & R-2R ladder network), Analog to Digital converter (Flash type, Counter type & Successive approximation type).

Text Book

1. *Fundamentals of Digital Logic – Anand Kumar - PHI*
2. *Digital Logic and Computer Design – M. Morris Mano – PHI*

Reference Books:-

1. *Digital Principles and Applications – Malvino & Leach - TMH*
2. *Digital Fundamentals – T. L. Floyd & Jain – Pearson Education*

Signal:

Signals in time domain, Fourier transform, Periodic and non periodic signal Analysis, spectral density.

Analog modulation:

Types of analog modulation, Need for modulation, principles of AM, Types of AM (DSB, SSB, VSB), power relationship, principle of FM & PM, Types of FM, spectrum of FM, Bandwidth of FM (Carson's rule).



Pulse modulation: Sampling Theorem, PAM, PWM, PPM, TDM, FDM.

PCM & Delta modulation:

Quantization process, PCM, Noise consideration in PCM system, Delta and Adaptive Delta modulation.

Digital Modulation Techniques & Data Transmission:

ASK, FSK, PSK, DPSK, QPSK, probability of error, BER calculation, matched filter, relationship between Bit error rate and symbol error rate, comparison of modulation system, Data Communication systems, parity, Asynchronous and Synchronous transmission, low speed, medium speed and high speed modems.

Basic information theory:

Information and Entropy, Binary symmetric channel and Binary error channel, Shannon's channel capacity theorem, capacity of Gaussian channel, Basics of source and channel coding (Huffman, Cyclic codes).

Text Book:

1. *Principle of Communication System* – H. Taub & D. Schlling, TMH

Reference Books :

1. *Communication Systems* – Simon Haykin, 4th Edition, John Wiley
2. *Data & Computer Communication* – W. Stallings, Pearson



MECHANICAL ENGINEERING COURSE

Engineering Mechanics

CR-4

ME-101/201

1. **Solution of Concurrent Forces in a Plane:** Free-body diagrams, Composition and resolution of forces, Equilibrium of concurrent forces in a plane, Methods of projections, Methods of moments. Friction, Static friction, Laws of dry friction, Friction in inclined plane, Ladder friction, Wedge friction.
2. **Parallel Forces in a Plane:** Two parallel forces acting in the same and opposite directions, General case of parallel forces in a plane, Centre of parallel forces, Centre of gravity, Theorem of Pappus, Centre of composite plane figures, and Curves, Distributed forces in a plane.
3. **Moment of Inertia of Plane Figures :** M I of plane figures, Parallel Axis Theorem, Perpendicular axis theorem and MI of composite figures.
4. **Force analysis of Plane Trusses and Frames:** Methods of joints, Method of Sections and Method of members.
5. **Principle of Virtual work:** Equilibrium of Ideal Systems, Virtual work.
6. **Kinematics of Rectilinear Motion:** Differential equations of rectilinear Motion, Force proportional to displacement, free vibration, D' Alembert's Principle, Momentum and Impulse, work & energy, conservation of Energy, Impact.
7. **Kinematics of Curvilinear Motion:** Normal and Tangential acceleration, Motion of a Projectile, Work and Energy in Curvilinear Motion.

Text Book

1. *Engineering Mechanics - Timoshenko, Young & Rao-TMH*

Reference Books

1. *Engineering Mechanics(Statics and Dynamics)- Bear and Johnson, TMH*
2. *Engineering Mechanics (Statics and Dynamics)- I.H.Shames, PHI*
3. *Applied Mechanics, I.B.Prasad*

HU-611/711

Human Resource Management

CR-3

UNIT-1- Human Resource Management-Meaning & Definition, Functions, Scope & Objectives, Qualities of HR Manager.

UNIT-2 -Human Resource Planning- Meaning & Definition, Importance of HRP, HRP Process. Barriers of HRP, Factors of sound HRP.

Recruitment - Meaning & Definition, Sources of Recruitment, Recruitment Process, Effective Recruitment.

Training & Performance Appraisal- Definition & Objective, Meaning & Definition, Performance, Appraisal process, Effective principles of performance Appraisal.

UNIT-3 -Industrial Relations- Concept & Meaning, Objective & Importance, Reasons of poor Industrial Relation
Industrial Disputes - Meaning & Definition, Causes of Industrial Dispute, Prevention of Industrial Dispute, Conditions for good Industrial Relation.

UNIT-4 Workers Participation In Management-Meaning & Need, Forms of Participation, Scheme of participation, Merits & Demerits. Collective Bargain-Meaning & Definition, Objective & Importance, Process of Collective Bargaining, Effective Conditions.

Employee Discipline-Guidelines for action, Penalties & Punishment, Rewards of Discipline.



Text Book:

1. *Human Resource Management* by- P. Subba Rao, Himalaya publishing House.

Reference Books:

1. *Human Resource Development Management*. By a. M seikh. S.chand.
2. *Industrial relation, trade union & labour legislation*. By Sinha Sekha. Pearson Publication.
3. *Human Resource Management*. By S.S. Khanka. S. Chand.



PHYSICS COURSES

PH -101

Physics-1

CR-3

Theory of Relativity

Frames of reference, Galilean transformation, postulates, Lorentz transformation of space and time, length contraction, addition of velocities, time dilation, variation of mass with velocity, equivalence of mass and energy.

Thermodynamics

Thermodynamic Processes, variables, internal energy, Enthalpy, Entropy, Gibb's free energy, T-S diagram, Carnot cycle, Maxwell's thermodynamic relations.

Interference

Conditions for interference, Interference by division of amplitude, Thin films, colours in thin films, Newton's rings, applications.

Diffraction

Types of diffraction, Fraunhofer diffraction at single slit, Plane transmission grating, determination of wavelength of light.

Lasers

Spontaneous and stimulated emission, Einstein's coefficients, population inversion, pumping, Ruby and Gas lasers, applications.

Superconductivity

Transition temperature, critical magnetic field, Meissner's effect, Type-I and Type-II superconductors, applications.

PH-201

Physics-II

CR-3

Fundamentals of electromagnetic theory

Vector Calculus, Elementary ideas of gradient, divergence and curl of a vector, Gauss' divergence theorem, Stoke's theorem (statements only). Gauss' law of electrostatics, Ampere's circuital law, displacement current, Faraday's laws of electromagnetic induction. Maxwell's electromagnetic equations in differential and integral form, electromagnetic wave equation, plane wave solution for free space, scalar and vector potentials.

Quantum physics

Particle nature of radiation, Blackbody radiation, Photoelectric effect, Compton scattering. Dual nature of matter, de-Broglie's hypothesis, Matter waves, Group velocity and Phase velocity, uncertainty relation, Schrodinger's wave equation (time independent and time dependent), wave function and its physical interpretation, one dimensional problems involving particle in a box of infinite height, Potential step, Potential barrier and tunneling.

Optical Fiber

Principles and types, numerical aperture, applications, optical detector

Science of nanomaterials

Introduction to nanomaterials, basic principles of nanoscience and nanotechnology, fabrication of nanomaterials, properties of nanomaterials, carbon nanotubes, applications of nanotechnology.

Text Books

1. *Modern Engineering Physics – A.S.Vasudeva – S.Chand*
2. *Concepts of Modern Physics – A.Beiser-TMH*
3. *Elements of electromagnetic – S.P.Seth- Dhanpat Rai Publications*

Reference Books

1. *Engineering physics – Gaur & Gupta – Dhanpat Rai Publications*
2. *Text Book of Optics – Jenkins & White – MGH*
3. *Introduction to electrodynamics- D. J. Griffith – Pearson*
4. *Elements of electromagnetics – M N O Sadiku – Oxford Univ. Press*
5. *Quantum Physics – S. Gasiorowicz – John Wilky*



CHEMISTRY COURSE

CH-101/201

Chemistry

CR-4

Structure & Bonding

Failure of classical mechanics, uncertainty principle, wave nature of particles, Schrodinger equation (need not be derived), interpretation of wave functions, Molecular Orbital theory of diatomic molecules and metallic bonding.

Kinetics & catalysis

Theories of reaction rate: Collision theory and Absolute Reaction rate theory, Kinetics of zero, 1st & 2nd order reactions, theory of catalysis, homogeneous and heterogeneous catalysis.

Spectroscopy

Interaction and relation with matter, fundamentals of all kinds of spectroscopy, UV-VIS and IR spectroscopy, basic concept of selection rule, calculation of λ_{max} and applications to molecular structure determination.

Coordination chemistry

Coordination compounds and its basic idea, bonding: VBT & CFT. Applications of CFT.

Organic reaction mechanism

Nucleophilic substitution reaction, electrophilic aromatic substitution, electrophilic and free radical addition reactions, nucleophilic addition reaction to carbonyl groups, Organometallic Compounds, study of selected organic reactions and their mechanism with reference to Organometallic Compounds

Electrochemistry

Electrochemical cell, electrode potential, emf, Nernst equation and applications, commercial cells: dry cell, secondary cell & fuel cell, corrosion and its control.

Nanomaterials

Introduction to nano materials, Graphite, fullerenes, carbon nanotubes, nanowires, nanocones, Haeckelites. Applications of nano materials in:

- i) Medicine ii) Catalysis iii) Environmental Technologies

Text Books

1. *Engineering Chemistry* – P.C. Jain & M. Jain, Dhanpat Rai Publishing Company
2. *Elementary Organic Spectroscopy* - Y. R. Sharma, S. Chand Company.

Reference Books

1. *Physical Chemistry* : P.C. Rakshit
2. *Physical Chemistry* : S.Glasstone
3. *Physical Chemistry*: Puri,Sharma and Pathania
4. *Physical Chemistry*: O.P.Agarwal
5. *Modern Inorganic Chemistry*: R.D.Madan
6. *Concise Inorganic Chemistry*: J.D.Lee
7. *Reaction Mechanism*: Mukherjee and Singh
8. *Spectroscopy*: Silverstein
9. *Nanotechnology* – Mark Ratner and Daniel Ratner (Publisher Pearson Education)

HUMANITIES COURSES

HU-101/201

Professional Communication

CR-3

Overview of Communication

Concept, Meaning & Process of Communication; Methods, Channels & Barriers of Communication; Skills of Communication (LSRW Technique); Bias-free & Plain English

Fundamentals of Grammar & Phonetics

Time & Tense, Types of Verbs; Transformation of Sentences; Basic Sounds of English, Stress & Intonation

Written Communication & Analysis

Principles of Effective Writing; Writing Business Letters; Writing Short Technical Reports

Effective Oral Communication & Analysis

Group Discussion Strategies; Meetings- Preparing Agenda & Conducting Meeting & Writing Minutes; Job Interview

Text Books

1. *Effective Technical Communication. M. Ashraf Rizvi, TMH Publication*
2. *Technical Communication Principle & Practice. Minakshi Raman & Sangeeta Sharma, OUP*

Reference Books

1. *Speaking and Writing for Effective Business Communication. Francis Soundaryaraj, Macmillan India.*
2. *Communicative Grammar. Geoffrey Leech & Jan Svartvik, Longman London*
3. *Business Communication. S.M. Rai and Urmila Rai, Himalaya Publication, Mumbai*

HU-401/501/601/701/801

Engineering Economics

CR-4

UNIT I-Introduction to economics and Engineering Economics. Basic concepts of Economics: Demand Analysis, Supply analysis, Market Equilibrium. Revenue Analysis. Demand Forecasting-Qualitative and Quantitative methods.

UNIT-II-Production and Cost Analysis: Short Run and Long Run Production Functions, Producer's Equilibrium condition. Cobb -Douglas Production Function. Cost Concepts: Short Run and Long run Cost curves, Break-Even Analysis, Market: Perfect Competition , Monopoly ,Discriminating monopolist.

UNIT III-Time Value of money, Interest Formulas and their applications. Evaluation of Investment proposals—Present Worth method of comparison, Future worth method of comparison, Annual Equivalent Method of comparison. Economic Appraisal Technique-Net Present Value,-Rate of Return,Cost Benefit analysis.

UNIT –IV-Depreciation and Income Tax consideration. Replacement Analysis, Inventory control.Make or Buy Decision. Project management.

UNIT –V-Money Banking: Functions of commercial banks, Inflation. Money market and Capital market. Business cycle and Business policies. National Income accounting. Saving and Investment Theories, Theories of Interest-IS and LM function.

Reference Books:

1. *Engineering Economics-James L. Riggs, David D. Bedworth, and Sabah U.Randhawa.*
2. *Engineering Economics –R Panneerselvam.*
3. *Managerial Economics- H.L. Ahuja.*
4. *Managerial Economics-Theory and Applications- D.M.Mithani*
5. *Money Banking-S.B. Gupta*
6. *Macro-Economics-R.D. Gupta*