University of Kalyani

Part-III Semester-1 & 2
Syllabus

for

Bachelor of Technology

on

Information Technology

Department of Engineering and Technological Studies

PART –III, 1ST SEMESTER (IT)

NO. OF THEORETICAL SUBJECT	: 07	CREDITS ON THEORETICAL SUBJECTS	: 18
NO. OF SESSIONAL SUBJECT	: 02	CREDITS ON SESSIONAL	: 4
		TOTAL SEMESTER CREDITS	: 22

A. THEORETICAL SUBJECTS							
Sl. No.	Subject Code	Subject Name	Contacts (Periods/Week)				Credits
			L	T	P	Total	
1.	IT501	Signals & Systems	3			3	3
2.	IT502	Database Management Systems	3			3	3
3.	IT503	Design and Analysis of Algorithms	3			3	3
4.	IT504	Computer Organization & Architecture	3			3	3
5.	IT505	Java Programming	3			3	3
6.	IT 506A/506B	Elective I (Computer Graphics/Graph Theory)	3			3	3
7.	HU501	Constitution of India	3			3	0
		Total of Theoretical Subjects				21	18
B. SESSIONAL SUBJECTS							
6.	IT591	Database Management Systems Lab			4	4	2
7.	IT592	Java Programming Lab			4	4	2
		Total of Sessional Subjects				8	4
		Total of Semester				29	22

Subject : Signals & Systems
Paper Code : IT501 Subject Category: Theoretical
Full Marks : 100 [End Semester Examination: 70 Marks + Internal Assessment: 30 Marks]
Contact Hours per week = 3L *Credits: 3*
Duration of the semester: 12 weeks *Assumed total contact hours in a semester: 36*

Sl No.	Details of the lesson	Contact Hours
1.	Concepts of Laplace Transform, Properties of Laplace Transform, Laplace Transform of some standard time domain signals, Application. Concepts of Fourier Transform, Properties of Fourier Transform, Fourier Transform of some standard time domain signals.	*4L*
2.	Introduction-Signal representation: Continuous and discrete time signals: Classification of Signals – Periodic aperiodic, even-odd, energy and power signals- Deterministic and random signals- complex exponential and sinusoidal signals- periodicity- unit step impulse functions- Transformation of independent variable of signals: time shifting	*7L*
3.	Continuous time Signals and Systems: Basic properties of continuous time systems: Linearity, Causality, time invariance, stability, magnitude and Phase representations of frequency response of LTI systems- Analysis and characterization of LTI systems: Computation of impulse response and transfer function convolution, co-relation, signal energy, signal power, energy spectral density, power spectral density.	*7L*
4.	Sampling Theorem: Representation of continuous time signals by its sample - Sampling theorem – Reconstruction of Signal from its samples, aliasing zero-order hold ck,	*4L*
5.	Z – Transforms: Basic principles of z-transform definition- region of convergence – properties of ROC – Properties of z-transform – Poles and Zeros – inverse z-transform using Contour integration – Residue Theorem, Power Series expansion and Partial fraction expansion, Relationship between z-transform and Fourier transform.	*7L*
6.	Filter: Concept of analog passive filters, LPF, HPF, BPF, BRF	7L

Recommended Books:

1.	"Signals and Systems", P. Rameshbabu and R. Anadanatarajan

Subject : Database Management Systems
Paper Code : IT502 Subject Category: Theoretical
Full Marks : 100 [End Semester Examination: 70 Marks + Internal Assessment: 30 Marks]
Contact Hours per week = 3L *Credits: 3*
Duration of the semester: 12 weeks *Assumed total contact hours in a semester: 36*

Sl No.	Details of the lesson	Contact Hours
7.	Module 1 Database system architecture: Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML). Data models: Entity-relationship model, network model, relational and object oriented data models, integrity constraints, data manipulation operations.	
8.	Module 2: Relational query languages: Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server. Relational database design: Domain and data dependency, Armstrong's axioms, Normal forms, Dependency preservation, Lossless design. Query processing and optimization: Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms.	
9.	Module 3: Storage strategies: Indices, B-trees, hashing.	
10.	Module 4: Transaction processing: Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery.	
11.	Module 5: Database Security: Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, SQL injection.	
12.	Module 6: Advanced topics: Object oriented and object relational databases, Logical databases, Web databases, Distributed databases, Data warehousing and data mining.	

Recommended Books:

1.	"Database System Concepts", 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill.
2.	*"Principles of Database and Knowledge – Base Systems", Vol 1 by J. D. Ullman, Computer Science Press.*
3.	*"Fundamentals of Database Systems", 5th Edition by R. Elmasri and S. Navathe, Pearson Education*
4.	*"Foundations of Databases", Reprint by Serge Abiteboul, Richard Hull, Victor Vianu, Addison-Wesley*

Subject : Design and Analysis of Algorithms
PaperCode: IT503 Subject Category: Theoretical Full
Marks : 100 [End Semester Examination: 70 Marks + Internal Assessment: 30 Marks] *Contact Hours per week = 3L* *Credits: 3*
Duration of the semester: 12 weeks *Assumed total contact hours in a semester: 36*

Sl. No.	Details of the lesson	Contact hours

1.	Module 1: Introduction: Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behavior; Performance measurements of Algorithm, Time and space trade-offs, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters' theorem.	
2.	Module 2: Fundamental Algorithmic Strategies: Brute-Force, Greedy,Dynamic Programming, Branchand-Bound and Backtracking methodologies for the design of algorithms; Illustrations of these techniques for Problem-Solving , Bin Packing, Knap Sack TSP. Heuristics – characteristics and their application domains.	
3.	Module 3: Graph and Tree Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm.	
4.	Module 4: Tractable and Intractable Problems: Computability of Algorithms, Computability classes – P, NP, NP-complete and NP-hard. Cook's theorem, Standard NP-complete problems and Reduction techniques.	
5.	Module 5: Advanced Topics: Approximation algorithms, Randomized algorithms, Class of problems beyond NP – P SPACE	

Recommended Books:

1.	Introduction to Algorithms, 4TH Edition, Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, MIT Press/McGraw-Hill.
2.	Fundamentals of Algorithms – E. Horowitz et al.
3.	Algorithm Design, 1ST Edition, Jon Kleinberg and ÉvaTardos, Pearson.
4.	*Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Michael T Goodrich and Roberto Tamassia, Wiley.*
5.	*Algorithms—A Creative Approach, 3RD Edition, UdiManber, Addison-Wesley, Reading, MA.*

Subject: COMPUTER ORGANIZATION AND ARCHITECTURE **Code:** IT504
Subject Category: Theoretical **Full Marks:** 100
[End Semester Examination: 70 Marks + Internal Assessment: 30Marks]
Contact Hours per week: 3L + 1T **Credits:** 3
Duration of the semester: 12 weeks Assumed total contact hours in a semester: 36

Sl. No.	Details of lesson	Contact Hours
1.	Concepts & Terminology: Digital computer concepts; Von-Neumann concept; Hardware & Software and their dual nature, Role of operating system (OS). Features of PCs, Minis, Workstations and Mainframes.	3L
2.	Memory Unit: Memory classification, characteristics; Organization of RAM, address decoding, Registers and Stack, ROM/PROM/EEPROM basic cells: Organization and erasing schemes, Magnetic memories, recording formats & methods, Concept of memory map, memory hierarchy, Associative memory organization; Cache introduction, techniques to reduce cache misses, concept of virtual memory & paging. Bipolar and MOS storage cells. Instruction sequencing with examples. Microprogramming concept and variation in microprogramming configuration.	9L
3.	CPU Design: ALU organization, Serial & Parallel Adders; implementation of highspeed Adders, Carry Look Ahead & carry Save Adders; Multiplication of signed binary numbers - Booth's algorithm; Divide algorithms - Restoring & Non-Restoring; Floating point number arithmetic;	9L

	Overflow detection, status flags.	
4.	Control Design– Timing diagrams; T-States, Controlling arithmetic & logic instruction, control structures; Hardwired & Micro-programmed, CISC & RISC characteristics.	3L
5.	Parallel Processing: Pipelining-general concept, speed up, instruction & arithmetic pipeline; Examples of some pipeline in modern processors, pipeline hazards; Flynn's classification – SISD, SIMD, MISD, MIMD architectures-Vector and Array processors & their comparison, Concept of Multiprocessor; Centralized & distributed architectures.	9L
6.	Instruction Set Architecture- Choice of instruction set; Instruction word formats; Addressing modes. Input/output Organization: Introduction to Bus architecture, effect of bus widths, Programmed & Interrupt I/O, DMA.	3L

Recommended Books

1.	"Computer Architecture & Organization", Hayes, 3/e, McGraw Hill
2.	"Computer Architecture (Schaum Series)", Carter, Tata McGraw Hill
3.	"Computer System Architecture", Mano M. M., Prentice Hall India
4.	"Computer Organization & Design", Chaudhury P. Pal, Prentice Hall India
5.	"Computer Organization", Hamacher, 5/e, McGraw Hill

Subject : Java Programming **Paper Code:** IT505
Subject Category: Theoretical **Full Marks:** 100
[End Semester Examination: 70 Marks + Internal Assessment: 30 Marks]
Contact Hours per week: 3L + 1T **Credits:** 3
Duration of the semester: 12 weeks Assumed total contact hours in a semester: 36

Sl. No.	Details of the Lesson	Contact Hour
1.	Overview of JAVA, Object oriented programming, OOPs principle, advanced features over OOPs, Operators, Data types, Variable, Arrays, control statements: loops, if, switch, Data conversion, Keyboard I/O, Vector, Arraylist.	8L
2.	Methods & Classes, constructor, overloading constructor and methods, parameter passing, Inheritance: access specifier for different members, types of inheritance, overriding, inner class, abstract class, use of final key word, garbage collection. Static class, static blocks.	10L
3.	Package: Objective, access protection, interfaces, and implementations, Exception Handling: fundamentals, use of try, catch, throw, throws, finally.	10L
4.	Multithread programming: Thread creation, synchronization, different operations on thread, I/O, Java Applet, String handling, Some overview of Java servlet, JSP and Java beans.	8L

Recommended Books:

1.	Herbert Schieldt, "The Complete Reference : Java2", McGraw Hill
2.	Bhave, "Programming with Java", Pearson Education
3.	Naughton, Schildt, "The Complete Reference JAVA2", McGraw Hill.
4.	Balagurusamy E, "Programming in JAVA", McGraw Hill.

Subject : Computer Graphics
PaperCode: IT506A Subject Category: Theoretical Full Marks : 100 [End Semester Examination: 70 Marks + Internal Assessment: 30 Marks] *Contact Hours per week = 3L* *Credits: 3*
Duration of the semester: 12 weeks *Assumed total contact hours in a semester: 36*

Sl. No.	Details of the lesson	Contact hours
1.	Introduction to computer graphics & graphics systems: Overview of computer graphics, representing pictures, preparing, presenting & interacting with pictures for presentations; Visualization & image processing; RGB color model, direct coding, lookup table; storage tube graphics display, Raster scan display, 3D viewing devices, Plotters, printers, digitizers, Light pens etc.; Active & Passive graphics devices; Computer graphics software.	*6*
2.	Scan conversion: Points & lines, Line drawing algorithms; DDA algorithm, Bresenham's line algorithm, Circle generation algorithm; Ellipse generating algorithm; scan line polygon, fill algorithm, boundary fill algorithm, flood fill algorithm.	*8*
3.	2D transformation & viewing: Basic transformations: translation, rotation, scaling; Matrix representations & homogeneous coordinates, transformations between coordinate systems; reflection shear; Transformation of points, lines, parallel lines, intersecting lines. Viewing pipeline, Window to view port co-ordinate transformation, clipping operations, point clipping, line clipping, clipping circles, polygons & ellipse. Cohen and Sutherland line clipping, Sutherland-Hodgeman Polygon clipping, Cyrus-beck clipping method	*8*
4.	3D transformation & viewing: 3D transformations: translation, rotation, scaling & other transformations. Rotation about an arbitrary axis in space, reflection through an arbitrary plane; general parallel projection transformation; clipping, view port clipping, 3D viewing.	*4*
5.	Curves: Curve representation, surfaces, designs, Bezier curves, B-spline curves, end conditions for periodic B-spline curves, rational B-spline curves.	*6*
6.	Hidden surfaces: Depth comparison, Z-buffer algorithm, Back face detection, BSP tree method, the Painter's algorithm, scan-line algorithm; Hidden line elimination, wire frame methods , fractal - geometry.	*2*
7.	Color & shading models: Light & color model; interpolative shading model; Texture. Introduction to Ray-tracing: [3L] Human vision and color, Lighting, Reflection and transmission models.	*2*

Recommended Books:

	Hearn, Baker – "Computer Graphics (C version 2nd Ed.)" – Pearson education
	Z. Xiang, R. Plastock – " Schaum's outlines Computer Graphics (2nd Ed.)" – TMH
	D. F. Rogers, J. A. Adams – "Mathematical Elements for Computer Graphics (2nd Ed.)" – TMH

Subject : Graph Theory
PaperCode: IT506B Subject Category: Theoretical Full Marks : 100 [End Semester Examination: 70 Marks + Internal Assessment: 30 Marks] *Contact Hours per week = 3L* *Credits: 3*
Duration of the semester: 12 weeks *Assumed total contact hours in a semester: 36*

Sl. No.	Details of the lesson	Contact hours
1.	Introduction to Graph Theory : Definitions and Examples, Subgraphs, Complement of a graph, Graph Isomorphism, Degree, Directed and undirected graphs, weighted and unweighted graphs, dual graph.	*6*
2.	Connected graphs and paths: Walks, trails, paths, Cycle, Euler Trails and Circuits, Planar Graphs, Hamilton Paths and Cycles, connected graphs, distance, cut-vertices, cut-edges, blocks, connectivity, weighted graphs, shortest path algorithms, Vertex coloring, Edge coloring, Chromatic Polynomials. Graph Traversals, Shortest Path Algorithms,	*6*
3.	Trees : Definitions, Properties and Examples, Characterizations, Rooted Trees, Trees and Sorting, Binary Trees, Weighted Trees and Prefix Codes, number of trees, minimum spanning trees, Minimal Spanning Trees algorithms.	*6*
4.	Special classes of graphs: Bipartite graphs, line graphs, chordal graphs Eulerian graphs: Characterization, Fleury's algorithm, chinese-postman-problem Hamilton graphs: Necessary conditions and sufficient conditions	*6*
5.	Independent sets, coverings, matchings: Basic equations, matchings in bipartite graphs, perfect matchings, greedy and approximation algorithms	*3*
6.	Vertex colorings: Chromatic number and cliques, greedy coloring algorithm, coloring of chordal graphs,Brook's theorem Edge colorings: Gupta-Vizing theorem, Class-1 graphs and class-2 graphs, equitable edge-coloring	*3*
7.	Planar graphs: Basic concepts,Eulers formula, polyhedrons and planar graphs, charactrizations, planarity testing, 5-color-theorem Directed graphs: Out-degree, in-degree, connectivity, orientation,Eulerian directed graphs, Hamilton directed graphs, tournaments	6

Recommended Books:

1.	West D.B.: Introduction to Graph Theory, Prentice Hall.
2.	Wilson: Introduction to graph theory, Pearson Edication.
3.	Balakrishnan: Graph Theory (Schaum's Outline Series), TMH.
4.	J.A.Bondy and U.S.R.Murty: Graph Theory and Applications (Freely downloadable from Bondy's website; Google-Bondy)

Subject : CONSTITUTION OF INDIA
PaperCode: HU501 Subject Category: Theoretical
Full Marks : 100 [End Semester Examination: 70 Marks + Internal Assessment: 30 Marks]
Contact Hours per week = 3L *Credits: 0*
Duration of the semester: 12 weeks *Assumed total contact hours in a semester: 36*

Sl. No.	Details of the lesson	Contact hours
1.	Meaning of the constitution law and constitutionalism Historical perspective of the Constitution of India Salient features and characteristics of the Constitution of India	*3L*
2.	Scheme of the fundamental rights	*3L*
3.	The scheme of the Fundamental Duties and its legal status	*3L*
4.	The Directive Principles of State Policy - Its importance and implementation	*3L*
5.	Federal structure and distribution of legislative and financial powers between the Union and the States	*3L*
6.	Parliamentary Form of Government in India - The constitution powers and status of the President of India	*3L*
7.	Amendment of the Constitutional Powers and Procedure	*3L*
8.	The historical perspectives of the constitutional amendments in India	*3L*
9.	Emergency Provisions : National Emergency, President Rule, Financial Emergency	*3L*
10.	Local Self Government - Constitutional Scheme in India	*3L*
11.	Scheme of the Fundamental Right to Equality Scheme of the Fundamental Right to certain Freedom under Article 19	*3L*
12.	Scope of the Right to Life and Personal Liberty under Article 21.	*3L*

Subject : Database Management System Lab
PaperCode : IT591 Subject Category:
SessionalFull Marks : 100
Contact Hours per week = 3P *Credits: 2*
Duration of the semester: 12 weeks *Assumed total contact hours in a semester: 36*

Sl. No.	Details of the lesson
1.	Structured Query Language - Creating Database Creating a Database , Creating a Table, Specifying Relational Data Types, Specifying Constraints, Creating Indexes
2.	Structured Query Language - Table and Record Handling INSERT statement, Using SELECT and INSERT together , DELETE, UPDATE, TRUNCATE statements, DROP, ALTER statements
3.	Structured Query Language - Retrieving Data from a Database The SELECT statement , Using the WHERE clause, Using Logical Operators in the WHERE clause , Using IN, BETWEEN, LIKE , ORDER BY, GROUP BY and HAVING Clause , Using Aggregate Functions, Combining Tables Using JOINS , Subqueries
4.	Structured Query Language -Database Management Creating Views, Creating Column Aliases, Creating Database Users, Using GRANT and REVOKE
5.	Cursors in Oracle PL / SQL
6.	Writing Oracle PL / SQL Stored Procedures

Subject: Java Programming Lab **Code:** IT592
Subject Category: Sessional **Full Marks:** 100
Contact Hours per week : 3P **Credits:** 2
Duration of the semester: 12 weeks Assumed total contact hours in a semester: 36

Sl. No	Details of the lesson
1.	Assignments on class, object, constructor, garbage collection, functions, different types of parameter passing.
2.	Assignments on developing interfaces- multiple inheritances, extending interfaces Assignments on creating and accessing packages
3.	Assignment on Inheritance: single level, multilevel, multiple level, hierarchical, hybrid, overriding,
4.	Assignments on multithreaded programming, handling errors and exceptions, and JSP.

PART –III, 2ND SEMESTER (IT)

NO. OF THEORETICAL SUBJECT	: 06	CREDITS ON THEORETICAL SUBJECTS	: 17
NO. OF SESSIONAL SUBJECT	: 03	CREDITS ON SESSIONAL	: 7
		TOTAL SEMESTER CREDITS	: 24

A. THEORETICAL SUBJECTS							
Sl. No.	Subject Code	Subject Name	Contacts (Periods/Week)				Credits
			L	T	P	Total	
1.	IT601	Compiler Design	3	0	0	3	3
2.	IT602	Computer Networks	3	0	0	3	3
3.	IT603A	Elective II (Soft Computing)	3	0	0	3	3
4.	IT604A	Elective III (Image Processing)	3	0	0	3	3
5.	HU601	Cyber Law & Ethics	3	0	0	3	3
6.	HU602	Introduction to Industrial Management	2	0	0	2	2
		Total of Theoretical Subjects				17	17
B. SESSIONAL SUBJECTS							
1.	IT691	Elective II Lab	0	0	4	4	2
2.	IT692	Elective III Lab	0	0	4	4	2
3.	IT693	Project-I	0	0	6	6	3
		Total of Sessional Subjects				14	7
		Total of Semester				31	24

Subject : Complier Design
PaperCode: IT601 Subject Category: Theoretical Full
Marks: 100 [End Semester Examination: 70 Marks + Internal Assessment: 30 Marks]
Contact Hours per week = 3L *Credits: 3*
Duration of the semester: 12 weeks *Assumed total contact hours in a semester:*

Sl No.	Details of the lesson	Contact Hours
1.	Introduction: Phases of compilation and overview.	*6L*
2.	Lexical Analysis (scanner): Regular languages, finite automata, regular expressions, from regular expressions to finite automata, scanner generator (lex).	*5L*
3.	Syntax Analysis (Parser): Context-free languages and grammars, push-down automata, LL(1) gram-mars and top-down parsing, operator grammars, LR(O), SLR(1), LR(1), LALR(1) grammars and bottom-up parsing, ambiguity and LR parsing, LALR(1) parser generator (yacc)	*5L*
4.	Semantic Analysis: Attribute grammars, syntax directed definition, evaluation and flow of attribute in a syntax tree.	*5L*
5.	Symbol Table: Its structure, symbol attributes and management. Run-time environment: Procedure activation, parameter passing, value return, memory allocation, and scope. Intermediate Code Generation: Translation of different language features, different types of intermediate forms.	*5L*
6.	Code Improvement (optimization): Analysis: control-flow, data-flow dependence etc.; Code improvement local optimization, global optimization, loop optimization, peep-hole optimization etc. Architecture dependent code improvement: instruction scheduling (for pipeline), loop optimization (for cache memory) etc. Register allocation and target code generation	*5L*
7.	Advanced topics: Type systems, data abstraction, compilation of Object Oriented features and non-imperative programming languages.	*5L*

Recommended Books

4.	"Compilers: Principles, Techniques, and Tools", by Alfred Aho, Monica Lam, Ravi Sethi, Jeffrey Ullman

Subject : Computer Network **Paper Code:** IT602
Subject Category: Theoretical **Full Marks:** 100
[End Semester Examination: 70 Marks + Internal Assessment: 30 Marks]
Contact Hours per week: 3L **Credits:** 3
Duration of the semester: 12 weeks Assumed total contact hours in a semester: 36

Sl. No.	Details of the Lesson	Contact Hour
1.	Module 1: Data communication Components: Representation of data and its flow Networks, Various Connection Topology, Protocols and Standards, OSI model, Transmission Media, LAN: Wired LAN, Wireless LANs, Connecting LAN and Virtual LAN, Techniques for Bandwidth utilization: Multiplexing - Frequency division, Time division and Wave division, Concepts on spread spectrum	5L
2.	Module 2: Data Link Layer and Medium Access Sub Layer: Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, Multiple access protocols -Pure ALOHA, Slotted ALOHA, CSMA/CD, CDMA/CA	12L
3.	Module 3: Network Layer: Switching, Logical addressing – IPV4, IPV6; Address mapping – ARP, RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routing protocols.	10L
4.	Module 4: Transport Layer: Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service.	6L
5.	Module 5: Application Layer: Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls.	3L

Recommended Books:

1.	Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, McGrawHill.
2.	Data and Computer Communication, 8th Edition, William Stallings, Pearson Prentice Hall India.
3.	Computer Networks, 8th Edition, Andrew S. Tanenbaum, Pearson New International Edition.
4.	Internetworking with TCP/IP, Volume 1, 6th Edition Douglas Comer, Prentice Hall of India
5.	TCP/IP Illustrated, Volume 1, W. Richard Stevens, Addison-Wesley, United States of America.

Subject: Elective II Soft Computing **Code:** IT603A
Subject Category: Theoretical **Full Marks:** 100
[End Semester Examination: 70 Marks + Internal Assessment: 30Marks]
Contact Hours per week: 3L **Credits:** 3
Duration of the semester: 12 weeks Assumed total contact hours in a semester: 36

Sl. No.	Details of lesson	Contact Hours
1.	Genetic Algorithm: Genetic algorithms (GAs), Evolution strategies (ESs), Evolutionary programming (EP), Genetic Programming (GP), Selection,	10L

	crossover, mutation, schema analysis, analysis of selection algorithms; convergence, constrain handling, concept on multi-objective GA.	
2.	Fuzzy Logic-I: Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion.	7L
3.	Fuzzy Logic –II: Membership functions, interference in fuzzy logic, fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzyfications & Defuzzificataions, Fuzzy Controller, Industrial applications	6L
4.	Neural Networks-I: Neuron, Nerve structure and synapse, Artificial Neuron and its model, activation functions, Neural network architecture: single layer and multilayer feed forward networks, recurrent networks. Various learning techniques.	7L
5.	Neural Networks-II: Architecture: perceptron model, solution, single layer artificial neural network, multilayer perception model; back propagation learning methods, effect of learning rule co-efficient; back propagation algorithm, factors affecting backpropagation training, applications.	6L

Recommended Books:

1.	"Neuro-Fuzzy and Soft computing", Jang, Sun, Mizutani, Pearson Education
2.	"Genetic Algorithms", Goldberg, Pearson Education
3.	"Principle of Soft Computing", 2nd edition, S. N. Sivanandam, S. N. Deepa, Wiley India
4.	S. Rajsekaran & G.A. Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis and Applications" Prentice Hall of India.

Subject: Elective III Image Processing **Code:** IT604A
Subject Category: Theoretical **Full Marks:** 100
[End Semester Examination: 70 Marks + Internal Assessment: 30Marks]
Contact Hours per week: 3L **Credits:** 3
Duration of the semester: 12 weeks Assumed total contact hours in a semester: 36

Sl. No.	Details of lesson	Contact Hours
1.	DIGITAL IMAGE FUNDAMENTALS: Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels – Color image fundamentals – RGB, HSI models, Two-dimensional mathematical preliminaries, 2D transforms – DFT, DCT.	10L
2.	IMAGE ENHANCEMENT: Point processing, Contrast Enhancement - Linear & Nonlinear Stretching, Gray level transformations – Histogram processing – Basics of Spatial Filtering– Smoothing and Sharpening Spatial Filtering, Frequency Domain: Introduction to Fourier Transform– Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters, Homomorphic filtering, Color image enhancement.	10L
3.	IMAGE SEGMENTATION: Edge detection, First order and second order edge operators, multi-scale edge detection, Canny's edge detection algorithm, Edge linking via Hough transform – Thresholding – Region based segmentation – Region growing – Region splitting and merging – Morphological processing- erosion and dilation, Segmentation by morphological watersheds – basic concepts – Dam construction – Watershed segmentation algorithm.	12L
4.	IMAGE COMPRESSION AND RECOGNITION: Need for data	4L

	compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, JPEG standard, MPEG. Boundary representation, Boundary description.	

Recommended Books:

1.	Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing, Pearson
2.	"Digital Image Processing and Analysis", B. Chanda and D. Dutta Majumder, Prentice-Hall India
3.	William K. Pratt, Digital Image Processing John Wiley, New York, 2002

Subject: Cyber Law & Ethics **Code:** HU 601
Subject Category: Theoretical **Full Marks:** 100
[End Semester Examination: 70 Marks + Internal Assessment: 30Marks]
Contact Hours per week: 3L **Credits:** 3
Duration of the semester: 12 weeks Assumed total contact hours in a semester: 36

Sl. No.	Details of lesson	Contact Hours
1.	Unit-1: Introduction to Cyber Law Evolution of computer technology, emergence of cyber space. Cyber Jurisprudence, Jurisprudence and law, Doctrinal approach, Consensual approach, Real Approach, Cyber Ethics, Cyber Jurisdiction, Hierarchy of courts, Civil and criminal jurisdictions, Cyberspace-Web space, Web hosting and web Development agreement, Legal and Technological Significance of domain Names, Internet as a tool for global access.	8L
2.	Unit-2: Information Technology Act Overview of IT Act, 2000, Amendments and Limitations of IT Act, Digital Signatures, Cryptographic Algorithm, Public Cryptography, Private Cryptography, Electronic Governance, Legal Recognition of Electronic Records, Legal Recognition of Digital Signature, Certifying Authorities, Cyber Crime and Offences, Network Service Providers Liability, Cyber Regulations Appellate Tribunal, Penalties and Adjudication.	8L
3.	Unit-3: Cyber Law and Related Legislation Patent Law, Trademark Law, Copyright, Software – Copyright or Patented, Domain Names and Copyright disputes, Electronic Data Base and its Protection, IT Act and Civil Procedure Code, IT Act and Criminal Procedural Code, Relevant Sections of Indian Evidence Act, Relevant Sections of Bankers Book Evidence Act, Relevant Sections of Indian Penal Code, Relevant Sections of Reserve Bank of India Act, Law Relating To Employees And Internet, Alternative Dispute Resolution , Online Dispute Resolution (ODR).	8L
4.	Unit-4: Electronic Business and Legal Issues Evolution and development in E-commerce, paper vs paper less contracts E-Commerce models- B2B, B2C, E security. Business, taxation, electronic payments, supply chain, EDI, E-markets, Emerging Trends.	6L
5.	Unit-5: Cyber Ethics The Importance of Cyber Law, Significance of cyber Ethics, Need for Cyber regulations and Ethics. Ethics in Information society, Introduction to Artificial Intelligence Ethics: Ethical Issues in AI and core Principles,	6L

	Introduction to Block chain Ethics.	

Subject:Introduction to Industrial ManagementCode: HU 602 **Subject Category:** Theoretical **Full Marks:** 100 [End Semester Examination: 70 Marks + Internal Assessment: 30Marks]
Contact Hours per week: 3L **Credits:** 3
Duration of the semester: 12 weeks Assumed total contact hours in a semester: 36

Sl. No.	Details of lesson	Contact Hours
1.	Introduction to Industrial Management: Brief history of industries in India, Management – Definition, Characteristics, and Functions of management (Planning, Organizing, Staffing, Leading and Controlling). Management Vs Administration. Levels and Skills of Management.	6L
2.	Evolution of Management Thoughts: Introduction to Schools of Management thoughts, Scientific Management, Principles of Management.	6L
3.	Basics of Organization: Definition, Types of organization for ex. Line and staff organization, Project organization, Matrix organization, Informal organization.	6L
4.	Introduction to Industrial Psychology: Motivation theory and study of Maslow's Need Hierarchy Theory, Leadership, Performance Evaluation.	4L
5.	LayoutPlanningandAnalysis*:* Introduction, Objectives of Layout, Study of different forms of layout like line layout, process layout, product layout, combinational layout, sixth position layout etc. Importance of Layout decisions, Nature of layout problems, Redesigning of a layout, Manufacturing facility layouts, Layout Planning, Evaluating Plant Layouts.	6L
6.	Introduction to Material Management: Scope of material management, study of inventory control method, introduction to different types of inventory control techniques.	4L
7.	Introduction to Conflict Management: Definition and Sources of Conflict. Methods for Conflict Resolution.	4L

Recommended Books:

1.	Khanna O.P. : Industrial Engineering
2.	T.R. Banga : Industrial Engineering and Management
3.	Mahajan : Industrial and Process Management

Subject: Elective II Soft Computing Lab **Code:** IT 691
Subject Category: Sessional **Full Marks:** 100
Contact Hours per week : 4P **Credits:** 2
Duration of the semester: 12 weeks Assumed total contact hours in a semester: 36

Sl. No	Details of the lesson
1.	Implement GA for the suitable problem
2.	Assignment on Fuzzy applications
3.	Assignment on Neural Network applications
4.	Assignment on Advanced topics in Soft Computing.

Subject: Elective III Image Processing Lab	**Code:** IT692
Subject Category: Sessional	**Full Marks:** 100
Contact Hours per week : 4P	**Credits:** 2
Duration of the semester: 12 weeks Assumed total contact hours in a semester: 36	

Sl. No	**Details of the lesson**
1.	Enhancement techniques for digital image enhancement
2.	All types of Filter implementation in spatial and frequency domain
3.	Implementation of Hough Transform for edge linking
4.	Data compression techniques