INVERTIS
UNIVERSITY BAREILLY
Established by Govt. of U.P. u/s 2F of UGC Act, 1956 vide U.P. Act 22 of 2010.

Scheme of Instruction & Syllabi

Of

Bachelor of Technology

(Computer Science and Engineering)

(Effective Session 2021-22)

(Dr. Gaurav Agarwal)
HOD CSE

(Dr. R.K. Shukla)
Dean Engineering

(Dr. Y D S Arya)
Vice- Chancellor

Invertis Institute of Engineering &Technology
INVERTIS UNIVERSITY

Invertis Village, Bareilly-Lucknow NH-24, Bareilly

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STUDY AND EVALUATION SCHEME
(With effective from academic session 2021-2022)
B.Tech. in Computer Science and Engineering YEAR III, SEMESTER V

S. No.	Category	Course Code	Course Title / Subjects	Hours Per Week			Evaluation Scheme		Total	Credits
				L	T	P	CA	EE		
1	Professional Core Courses	BCS-501	Formal Language And Automata Theory	3	0	0	25	50	75	3
2	Professional Core Courses	BCS-502	Data Base Management System	3	0	0	25	50	75	3
3	Professional Core Courses	BCS-503	Java Programming	2	0	0	15	35	50	2
4	Humanities & Social Sciences Including Management Courses	HAS-501	Professional Law And Ethics	3	0	0	25	50	75	3
5	Engineering Science Courses	BCS-505	Introduction to Microprocessor	3	0	0	25	50	75	3
6	Professional Elective Courses	BCS-051-054	Elective-1	3	0	0	25	50	75	3
7	Mandatory Courses	BMC-003	Constitution Of India	-	-	-	-	-	-	0
PRACTICALS AND PROJECTS										
8	Professional Core Courses	BCS- 552	DBMS Lab	0	0	4	15	35	50	2
9	Professional Core Courses	BCS-553	Java Programming Lab	0	0	4	15	35	50	2
			TOTAL	17	0	8	170	355	500	21

L-Lecture, **T**- Tutorial, **P**- Practical, **CT –** Cumulative Test, **TA –**Teacher Assessment,

AT – Attendance, **E-Sem –** End Semester Marks

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STUDY AND EVALUATION SCHEME
(With effective from academic session 2021-2022)
B.Tech. in Computer Science and Engineering YEAR III, SEMESTER VI

S. No.	Category	Course Code	Course Title / Subjects	Hours Per Week			Evaluation Scheme		Total	Credits
				L	T	P	CA	EE		
1	Professional Core Courses	BCS- 601	Computer Networks	3	0	0	25	50	75	3
2	Professional Elective Courses	BCS- 061-065	Elective II	3	0	0	25	50	75	3
3	Professional Core Courses	BCS- 602	Compiler Design	3	0	0	25	50	75	3
4	Professional Elective Courses	BCS- 066-070	Elective III	3	0	0	25	50	75	3
5	Open Elective Courses	BOE- 601-605	Open Elective-I	3	0	0	25	50	75	3
PRACTICALS AND PROJECTS										
6	Professional Core Courses	BCS- 651	Computer Networks Lab	0	0	4	15	35	50	2
7	Professional Core Courses	BCS- 652	Compiler Lab	0	0	4	15	35	50	2
8	Project	BCS- 655	Project -I	0	0	6	25	50	75	3
			TOTAL	15	0	14	180	370	550	22

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CS ELECTIVES

CS ELECTIVE-I

BCS-051 Principles of Programming Language
BCS-052 Fuzzy logic
BCS-053 Multimedia Systems
BCS-054 Soft Computing
BCS-055 Discrete Mathematics

CS ELECTIVE-II

BCS-061 Software Testing
BCS-062 Graph Theory
BCS-063 System Programming
BCS-064 PHP
BCS-065 Linux Administration

CS ELECTIVE-III

BCS-066 Software Project Management
BCS-067 Pattern Recognition
BCS-068 Parallel Algorithm
BCS-069 Internet Technology
BCS-070 Introduction to IoT

OPEN ELECTIVES

OPEN ELECTIVE-I

BOE-601 Total Quality Management
BOE-602 Human Computer Interaction
BOE-603 Entrepreneurship Development
BOE-604 Non-Conventional Energy Resource
BOE-605 Operational Research

BCS-501	FORMAL LANGUAGE AND AUTOMATA THEORY	L T P 3 0 0	3 Credits

Course Objectives:

CO1	To learn fundamentals of Regular and Context Free Grammars and Languages
CO2	To understand the relation between Regular Language and Finite Automata and machines.
CO3	To learn how to design Automata's and machines as Acceptors, Verifiers and Translators.
CO4	To understand the relation between Contexts free Languages, PDA and TM.
CO5	To learn how to design PDA as acceptor and TM as Calculators.

Detailed Syllabus

MODULE-I

Finite Automata and Regular Expressions: Finite State Systems, Basic Definitions NonDeterministic finite automata (NDFA), Deterministic finite automata (DFA), Equivalence of DFA and NDFA Finite automata with E-moves, Regular Expressions, Equivalence of finite automata and Regular Expressions, Regular expression conversion and vice versa, Arden's Theorem. Introduction to Machines: Concept of basic Machine, Properties and limitations of FSM.Moore and mealy Machines, Equivalence of Moore and Mealy machines.

MODULE-II

Properties of Regular Sets: The Pumping Lemma for Regular Sets, Applications of the pumping lemma, Closure properties of regular sets, Myhill-Nerode Theorem and minimization of finite Automata, Minimization Algorithm. Grammars: Definition, Context free and Context sensitive grammar, Ambiguity regular grammar, Reduced forms, Removal of useless Symbols and unit production, Chomsky Normal Form (CNF), Griebach Normal Form (GNF).

MODULE-III

Pushdown Automata: Introduction to Pushdown Machines, Acceptance of PDA, PDA to CFG and CFG to PDA, Application of Pushdown Machines Turing Machines: Deterministic and Non-Deterministic Turing Machines, Design of T.M,Halting problem of T.M., PCP Problem. Chomsky Hierarchies: Chomsky hierarchies of grammars, unrestricted grammars, Context sensitive languages, Relation between languages of classes. Computability: Basic concepts, Primitive Recursive Functions.

Text Book:

1. Introduction to automata theory, language & computations- Hopcroaft&O.D.Ullman, R Mothwani, 2001, Addison Wesley

Reference Books:

1. Theory of Computer Science (Automata, Languages and computation): K.L.P.Mishra & N.Chandrasekaran, 2000, PHI.
2. Introduction to formal Languages & Automata-Peter Linz, 2001, Narosa.

CO1	Students will be able to define the mathematical principles behind theoretical computer science.
CO2	Students will be able to identify the different computational problems and their associated complexity.
CO3	Students will be able to differentiate and give examples for the different types of automata like finite automata, push down automata, linear bounded automata and Turing machine.
CO4	To apply the techniques of designing grammars and recognizers for several programming languages.
CO5	Students will be able to correlate the different types of automata to real world applications.

BCS-502	DATA BASE MANAGEMENT SYSTEMS	L T P 3 0 0	3 Credits

Pre-requisites: None

Course Objectives:

CO1	To describe a sound introduction to the discipline of database management systems.
CO2	To give a good formal foundation on the relational model of data and usage of Relational Algebra.
CO3	To introduce the concepts of basic SQL as a universal Database language.
CO4	To demonstrate the principles behind systematic database design approaches by covering conceptual design, logical design through normalization.
CO5	To provide an overview of physical design of a database system, by discussing Database indexing techniques and storage techniques.

Detailed Syllabus

MODULE-I

Introduction: An overview of database management system, database system Vs file system, Database system concept and architecture, data model schema and instances, data independence and database language and interfaces, data definitions language, DML, Overall Database Structure.

Data Modeling:

ER Data model, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, reduction of an ER diagrams to tables, extended ER model, relationship of higher degree.

Relational data model concepts, integrity constraints, entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra, relational calculus, tuple and domain calculus.

MODULE-II

Introduction on SQL: Characteristics of SQL, advantage of SQL. SQl data type and literals, Types of SQL commands, SQL operators, Tables, views and indexes, Insert, update and delete operations, Queries and sub queries Aggregate functions, Joins, Unions, Intersection, Minus, Cursors, Triggers.

Data Base Design & Normalization: Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependence, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design.

MODULE-III

Transaction Processing Concept: Transaction system, Testing of serializability, serializability of schedules, Types of serializability, recoverability, Recovery from transaction failures, log based recovery, checkpoints, deadlock handling.

Concurrency Control Techniques: Concurrency control, Locking Techniques for concurrency control, Time stamping protocols for concurrency control, validation based protocol, multiple granularity, Multi version schemes, Recovery with concurrent transaction, case study of Oracle.

Text Books:-

1. Date C J, " An Introduction to Database Systems", Addision Wesley
2. Korth, Silbertz, Sudarshan," Database Concepts", McGraw Hill

Reference Books:-

1. Elmasri, Navathe, " Fudamentals of Database Systems", Addision Wesley
2. O'Neil, Databases, Elsevier Pub.
3. Leon &Leon,"Database Management Systems", Vikas Publishing House
4. Bipin C. Desai, " An Introduction to Database Systems", Gagotia Publications
5.Majumdar& Bhattacharya, "Database Management System", TMH

Course Outcomes: After the completion of the course the student will be able to:

CO1	Understand the role of a database management system in an Organization.
CO2	Understand basic database concepts, including the structure andOperation of the relational data model.
CO3	. Construct simple and moderately advanced database queries usingStructured Query Language (SQL).
CO4	Understand and successfully apply logical database design Principles, including E-R diagrams and database normalization.
CO5	Understand the concept of a database transaction and related database facilities, including concurrency control, journaling, backup and recovery, and data object locking and protocols.

BCS-503	JAVA PROGRAMMING	L T P 1 1 0	2 credits

Pre-requisites: Computer Fundamentals & Principle of Computer Programming, Programming Concepts of C and C++

Course Objectives:

CO1	To understand object-oriented concepts
CO2	To learn the basic concept of JAVA language.
CO3	To learn how to design GUI applications.
CO4	To understand the concept of JDBC
CO5	To learn to build applications in JAVA language

Detailed Syllabus

MODULE-I

The Java Language: History and evolution of Java, Java's Lineage, The Creation of Java, Java's Magic Code; The Byte Code, The Java's Class File Format, The java's Buzzwords, The Evolution of Java. Object Orientation concepts; Class, Object and its significance. Environment variable. Data Types, Variables and Array: Strongly typed Language, Primitive type, Non Primitive type, Wrapper classes, Scope & lifetime of the variables, Type Conversion and casting, Automatic Type promotions, Operators: Arithmetic operator, The Bitwise operator, Relational operator, Assignment operator, The ? Operator, Operator precedence. Control Statements: Selection Statement, Iteration Statement, Jump Statement. **Introducing classes:** Class Fundamentals, Object Garbage Collection, Creating and Operating Objects, methods, Nested, Inner Class &Anonymous Classes, Abstract Class & Interfaces, Defining Methods, Argument Passing Mechanism, Method Overloading, Recursion, Garbage collection, Finalize () Method.

Module II

Inheritance: Use and Benefits of Inheritance in OOP, Types of Inheritance in Java, Inheriting Data Members and Methods. Role of Constructors. Overloading concept &. Polymorphism in inheritance. **Package:** Organizing Classes and Interfaces in Packages. Package as Access Protection Defining Package CLASSPATH Setting for Packages, **Exception Handling:** The Idea behind Exception ,Exceptions & Errors Types of Exception, Control Flow In Exceptions, JVM reaction to Exceptions, Use of try, catch, finally, throw, throws in Exception Handling, Inbuilt and User Defined Exceptions, Checked and Un-Checked Exceptions, **Thread:** Understanding Threads, Needs of Multi-Threaded Programming, Thread Life-Cycle, Thread Priorities, Synchronizing Threads, Inter Communication of Threads, **Array &String :**Defining an Array, Initializing & Accessing Array, Multi–Dimensional Array, Operation on String

MODULE-III

Applet: Applet & Application, Applet Architecture, Parameters to Applet,. **Event Handling:** Event-Driven Programming in Java, Event Handling Process, **GUI Programming (Java AWT):** Components and Containers: Basics of Components, Using Containers, Layout Managers, AWT Components, Adding a Menu to Window Using Swing Components., Introducing Swings: The Origin of swings, swings is built on AWT, Swings package & event Handling. Database Programming using JDBC: Introduction to JDBC, JDBC Drivers

Text Book:

1. Herbert Schieldt, "The Complete Reference: Java" Seventh Edition, TMH. Reference Books:

1. Herbert Schieldt" Java Programming Cook Book" McGraw Hill.
2. Core Java™ 2 Volume I - Fundamentals, Seventh Edition Prentice Hall PTR
3. Core Java™ 2 Volume II - Fundamentals, Seventh Edition Prentice Hall PTR

CO1	Design the process of interaction between Objects and System w.r.t. Object Oriented Paradigm.
CO2	Acquire a basic knowledge of Object Orientation with different properties as well as different features of Java, threads
CO3	Analyze basic programming concepts in Java with different object related issues and various string handling functions as well as basic I/O operations
CO4	Discuss basic Code Reusability concept w.r.t. Inheritance, Package and Interface
CO5	Implement Exception handling, Multithreading and Applet (Web program in java) programming concept in Java

HAS-501	Professional Practice, Law &Ethics	L 3	T 0	P 0	3 Credits

Pre-requisites: None

Course Objectives:

CO1	Students will understand the importance of Values and Ethics in their Personal lives and professional careers
CO2	The students will learn the rights and responsibilities
CO3	Responsibilities of employee, team member and a global citizen.
CO4	To learn profession ethics
CO5	To learn about IPR

Detailed Syllabus

Module 1

Professional Practice – Respective roles of various stakeholders: Government(constituting regulatory bodies and standardization organizations, prescribing norms to ensure safety of the citizens); Standardization Bodies (ex. BIS, IRC)(formulating standards of practice); professional bodies (ex. Institution of Engineers(India), Indian Roads Congress, IIA/ COA, ECI, Local Bodies/ Planning Authorities) (certifying professionals and offering platforms for interaction); Clients/ owners (role governed by contracts); Developers (role governed by regulations such as RERA); Consultants (role governed by bodies such as CEAI); Contractors (role governed by contracts and regulatory Acts and Standards);Manufacturers/ Vendors/ Service agencies (role governed by contracts and regulatory Acts and Standards)

Professional Ethics – Definition of Ethics, Professional Ethics, Business Ethics, Corporate Ethics, Engineering Ethics, Personal Ethics; Code of Ethics as defined in the website of Institution of Engineers (India); Profession, Professionalism, Professional Responsibility, Professional Ethics; Conflict of Interest, Gift Vs Bribery, Environmental breaches, Negligence, Deficiencies in state-of-the-art; Vigil Mechanism, Whistle blowing, protected disclosures.

Module 2:

General Principles of Contracts Management: Indian Contract Act, 1972 and amendments covering General principles of contracting; Contract Formation & Law; Privacy of contract; Various types of contract and their features; Valid & Voidable Contracts; Prime and sub-contracts; Joint Ventures & Consortium; Complex contract terminology; Tenders, Request For Proposals, Bids & Proposals; Bid Evaluation; Contract Conditions &Specifications; Critical /“ Red Flag”conditions; Contract award & Notice To Proceed; Variations & Changes in Contracts; Differing site conditions; Cost escalation; Delays, Suspensions & Terminations; Time extensions & Force Majeure; Delay Analysis; Liquidated damages & Penalties; Insurance & Taxation; Performance and Excusable Non-performance; Contract documentation; Contract Notices; Wrong practices in contracting (Bid shopping, Bid fixing, Cartels); Reverse auction; Case Studies; Build-Own-Operate & variations; Public-Private Partnerships; International Commercial Terms;

Module 3:

Arbitration, Conciliation and ADR (Alternative Dispute Resolution) system: Arbitration – meaning, scope and types – distinction between laws of 1940 and 1996;UNCITRAL model law – Arbitration and expert determination; Extent of judicial intervention; International commercial arbitration; Arbitration agreements – essential and kinds, validity, reference and interim measures by court; Arbitration tribunal – appointment, challenge, jurisdiction of arbitral tribunal, powers, grounds of challenge, procedure and court assistance; Award including Form and content, Grounds for setting aside an award, Enforcement, Appeal and Revision; Enforcement of foreign awards – New York and Geneva Convention Awards; Distinction between conciliation, negotiation, mediation and arbitration, confidentiality, resort to judicial proceedings, costs; Dispute Resolution Boards; Lok Adalats.

Text/Reference Books:

1. B.S. Patil, Legal Aspects of Building and Engineering Contracts,1974.
2. The National Building Code, BIS,2017
3. RERA Act,2017
4. Meena Rao (2006), Fundamental concepts in Law of Contract, 3rd Edn. Professional Offset
5.Neelima Chandiramani (2000), The Law of Contract: An Outline, 2nd Edn. Avinash Publications Mumbai
6. Avtarsingh (2002), Law of Contract, Eastern Book Co.
7. Dutt (1994), Indian Contract Act, Eastern Law House
8. Anson W.R. (1979), Law of Contract, Oxford University Press.
9. Kwatra G.K. (2005), The Arbitration & Conciliation of Law in India with case law on UNCITRAL Model Law on Arbitration, Indian Council of Arbitration
10. Wadhera (2004), Intellectual Property Rights, Universal Law Publishing Co.
11. T. Ramappa (2010), Intellectual Property Rights Law in India, Asia Law House
12. Bare text (2005), Right to Information Act
13. O.P. Malhotra, Law of Industrial Disputes, N.M. Tripathi Publishers
14. K.M. Desai(1946), The Industrial Employment (Standing Orders)Act

Course Outcomes: After the completion of the course the student will be able to:

CO1	Understanding basic purpose of profession, professional ethics and various moral and social issues.
CO2	Awareness of professional rights and responsibilities of a Engineer, safety and risk benefit analysis of a Engineer
CO3	Acquiring knowledge of various roles of Enbgineer In applying ethical principles at various professional levels
CO4	Professional Ethical values and contemporary issues
CO5	Excelling in competitive and challenging environment to contribute to industrial growth.

BCS-505	Introduction to Microprocessor	L T P 3 0 0	3 Credits

Pre-requisites: Basic computer knowledge

Course Objectives:

CO1	To introduce students with the architecture and operation of typical microprocessors and microcontrollers
CO2	Know the various functional units of m.icroprocessor
CO3	To familiarize the students with the programming and interfacing of microprocessors and microcontrollers.
CO4	To provide strong foundation for designing real world applications using microprocessors and microcontrollers.
CO5	Know the various peripheral devices.

Detailed Syllabus

Module 1

Introduction : Microprocessor evolution and types, microprocessor architecture and operation of its components, addressing modes, interrupts, data transfer schemes, instruction and data flow, timer and timing diagram. Interfacing devices. Architectural advancement of microprocessor. Typical microprocessor development schemes.

Module 2

8-bit Microprocessors: Pin diagram and internal architecture of 8085 microprocessor, registers, ALU, Control & statu, interrupt and machine cycle. Instruction sets. Addressing modes. Instruction formats Instruction Classification: data transfer, arithmetic operations, logical operations, branching operations, machine control and assembler directives.
16-bit Microprocessor: Architecture of 8086 microprocessor: register organization, bus interface unit, execution unit, memory addressing, memory segmentation. Operating modes. Instruction sets, instruction format, Types of instructions. Interrupts: hardware and software interrupts

Module 3

Programming: Assembly language programming based on intel 8085/8086. Instructions, data transfer, arithmetic, logic, branch operations, looping, counting, indexing, programming techniques, counters and time delays, stacks and subroutines, conditional call and return instructions
Peripheral Interfacing: Peripheral Devices: 8237 DMA Controller, 8255 programmable peripheral interface, 8253/8254programmable timer/counter, 8259 programmable interrupt controller, 8251 USART and RS232C

Text/Reference books:

1. Gaonkar , Ramesh S , "Microprocessor Architecture, Programming and Applications with 8085", Penram International Publishing.
2. Ray A K , Bhurchandi K M , "Advanced Microprocessors and Peripherals", TMH
3. Hall D V ,"Microprocessor Interfacing', TMH
4. Liu and Gibson G A , " Microcomputer System: The 8086/8088 family'' ,PHI
5. Aditya P Mathur, " Introduction to Microprocessor", TMH
6. Brey, Barry B, "INTEL Microprocessors", PHI
7. Renu Sigh & B.P.Sigh, "Microprocessor, Interfacing and Applications
8. M Rafiqzzaman, "Microprocessors, Theory and Applications",

CO1	Recall and apply a basic concept of digital fundamentals to Microprocessor based personal computer system.
CO2	Identify a detailed s/w & h/w structure of the Microprocessor.
CO3	Illustrate how the different peripherals (8255, 8253 etc.) Are interfaced with microprocessor.
CO4	Analyze the data transfer information through serial & parallel ports.
CO5	Train their practical knowledge through laboratory experiments.

BMC -003	CONSTITUTION OF INDIA	L T P 3 0 0	3 Credits

Pre-requisites: None

Course Objectives:

CO1	To Enable the student to understand the importance of constitution
CO2	To understand the structure of executive, legislature and judiciary
CO3	To understand philosophy of fundamental rights and duties
CO4	To understand the autonomous nature of constitutional bodies like Supreme Court and high court, controller and auditor general of India and election commission of India.
CO5	To understand the central and state relation, financial and administrative.

Detailed Syllabus

Module 1:

Introduction and History of Indian constitution.

Meaning of the constitution law and constitutionalism, Historical Background of the Constituent. Assembly, Government of India Act of 1935 and Indian Independence Act of 1947, Enforcement of the Constitution, Indian Constitution and its Salient Features.

Module 2

Basic Information about Indian Constitution

The Preamble of the Constitution, Fundamental Rights, Fundamental Duties, Directive Principles of State Policy, Parliamentary System, Centre-State Relations, Amendment of the Constitutional Powers and Procedure, Emergency Provisions: National Emergency, President Rule, Financial Emergency, and Local Self Government – Constitutional Scheme in India.

Module 3

Union Executive and State Executive

Powers of Indian Parliament Functions of Rajya Sabha, Functions of Lok Sabha, Powers and Functions of the President, powers of Indian President, Powers and

Functions of the Prime Minister, Judiciary – Supreme Court, Judicial Review, Public Interest Litigation, Judicial Activism, LokPal, LokAyukta, The Lokpaland Lokayuktas Act 2013, State Executives – Powers and Functions of the Governor, Powers and Functions of the Chief Minister, Functions of State Cabinet, Functions of State Legislature, Functions of High Court and Subordinate Courts.

Reference book:

1. Brij Kishore Sharma: Introduction to the Indian Constitution, PHI, New Delhi, latest edition.
2. Granville Austin: The Indian Constitution: Cornerstone of a Nation. 1966, Oxford Clarendon Press.
3. Subhash C. Kashyap: Our Constitution: An Introduction to India's Constitution and constitutional Law, NBT, 2018.

4. PM Bakshi: The Constitution of India, Latest Edition, Universal Law Publishing.
5. V.K. Ahuja: Law Relating to Intellectual Property Rights (2007)
6. Suresh T. Viswanathan: The Indian Cyber Laws, Bharat Law House, New Delhi-88
7. P. Narayan: Intellectual Property Law, Eastern Law House, New Delhi
8. Prabudh Ganguli: Gearing up for Patents: The Indian Scenario, Orient Longman.
9. BL Wadehra: Patents, Trademarks, Designs and Geological Indications.Universal Law Publishing - LexisNexis

CO1	Able to **understand** historical background of the constitutional making and its importance for building a democratic India, the structure of Indian government, the structure of state government, the local Administration,
CO2	Able to **apply** the knowledge on directive principle of state policy, the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.
CO3	Able to **analyze** the History, features of Indian constitution, the role Governor and Chief Minister, role of state election commission, the decentralization of power between central, state and local self-government.
CO4	Able to **evaluate** Preamble, Fundamental Rights and Duties, Zilla Panchayat, block level organization, various commissions of viz SC/ST/OBC and women.
CO5	Able to **understand** historical background of the constitutional making and its importance for building a democratic India, the structure of Indian government, the structure of state government, the local Administration,

BCS-051	Principles of Programming Language	L T P 3 0 0	3 Credits

Pre-requisites: None

Course Objectives:

CO1	To introduce the major programming paradigms, and the principles and techniques involved in design and implementation of modern programming languages
CO2	To introduce notations to describe syntax and semantics of programming languages.
CO3	To analyze and explain behavior of simple programs in imperative languages using concepts such as binding, scope, control structures, subprograms and parameter passing mechanisms.
CO4	To introduce the concepts of ADT and object oriented programming for large scale software development.
CO5	To introduce the concepts of concurrency control and exception handling

Detailed Syllabus

MODULE-I

Introduction: Evolution of language designs, Evaluation criteria, Programming environments, Issues in language translation- Syntactic and semantic rules of a Programming language, Stages in Translation. Characteristics of a good programming language, Programming language translators- compiler & interpreters. Programming Languages: Introduction to Procedural, non-procedural, structured, functional and object oriented programming language, Comparison of C & C++ programming languages.

MODULE-II

Data Type: Declarations, Assignment & initialization, Elementary data types- integer, floating point and fixed point real numbers, character, Boolean, Other numeric data types. Character string, User defined- Enumeration and subrange, Array- one and two dimensional, Records- multilevel and variant, Pointer and reference types. Names, Variables, Concept of binding and types, Type checking, Strong typing, Type compatibility, sequence control with expressions, Conditional statements, Loops.

MODULE-III

Subprograms: Fundamental of subprograms, Scope and life time of variable, Static and dynamic scope, Design issues of subprogram, Local referencing environment, Parameter passing methods, Overloaded subprograms, Generic subprograms, Coroutines. Abstract data types- Abstraction and encapsulation

Text Books:

1. Programming languages Design & implementation by T.W.Pratt, 1996, PHI.
2. Programming Languages – Principles and Paradigms by Allen Tucker & Robert Noonan, 2002, TMH.

Reference Books :

1. Fundamentals of Programming languages by Ellis Horowitz, 1984, Galgotia Publications
2. Programming languages concepts by C. Ghezzi, 1989, Wiley Publications.
3. Programming Languages–Principles and Pradigms Allen Tucker , Robert Noonan 2002, T.M.H

Course Outcomes: After the completion of the course the student will be able to:

CO1	Knowledge of, and ability to use, language features used in current programming languages.
CO2	Aware about the basics concept of programming language
CO3	An ability to program in different language paradigms and evaluate their relative benefits.
CO4	An understanding of the key concepts in the implementation of common features of programming languages
CO5	Understand the basics concept of object oriented programming

BCS-052	FUZZY LOGIC	L T P 3 0 0	3 Credits

Pre-requisites: None

Course Objectives: To provide a thorough understanding of the internals of Compiler Design

CO1	Develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory
CO2	Introduce students to artificial neural networks and fuzzy theory from an engineering perspective
CO3	Provide an understanding of the basic mathematical elements of the theory of fuzzy sets.
CO4	Explain the concepts of neural networks, fuzzy logic, and genetic algorithms
CO5	Provide an emphasis on the differences and similarities between fuzzy sets and classical sets theories.

MODULE-I

Introduction to fuzzy set theory: Probabilistic reasoning, Fuzzy sets, mathematics of fuzzy set theory, operations on fuzzy sets, comparison of fuzzy and crisp set theory.
Fuzzy mapping: One to one mapping, max-min principle, extension principle, implication rules – mamdani implications.
Membership functions: Universe of discourse, mapping inside fuzzy domain, fuzzy membership mapping methods, and application to real world problems.

MODULE-II

Fuzzy knowledge based systems: Fuzzification, Fuzzy knowledge base, rule base, Data base for fuzzy, Inference rules, defuzzification methods of defuzzification.
Fuzzy controller, Control strategies, general PID controller, Implementation of fuzzy systems in control ,Direct fuzzy controller, Fuzzy P, PI and PID controller, Indirect fuzzy controller – fuzzy in handling the inner loops of control systems.

MODULE-III

Nonlinear systems and adaptive fuzzy controller: Nonlinear systems, modification in fuzzy systems for nonlinear control, Adaptive control, Adaptive control using fuzzy, fuzzy sliding mode controls.
Hybrid systems: Neuro- fuzzy and fuzzy genetic systems, applications to engineering problems.

Text Books:

1. Fuzzy control –Drianlcov.
2. Fuzzy modeling and control –Yager.

Reference Books:

1. Timothy J. Ross, "Fuzzy Logic with Engineering Applications" Wiley India.

CO1	Students will be able to interpret fuzzy set theory and uncertainty concepts
CO2	Students will be able to identify the similarities and differences between probability theory and fuzzy set theory and their application conditions
CO3	Students will get the concept of fuzzy relations
CO4	Students are introduced to fuzzy logic
CO5	Students will be able to apply fuzzy set theory in modeling and analyzing uncertainty in a decision problem.

BCS-053	Multimedia Systems	L T P 3 0 0	3 Credits

Pre-requisites: None

Course Objectives:

CO1	To learn and understand technical aspect of Multimedia Systems.
CO2	To understand the standards available for different audio, video and text applications
CO3	To Design and develop various Multimedia Systems applicable in real time.
CO4	To learn various multimedia authoring systems
CO5	To understand various networking aspects used for multimedia applications.

Detailed Syllabus

MODULE I

Introduction to Multimedia, Multimedia Information, Multimedia Objects, Multimedia in business and work. Convergence of Computer, Communication and Entertainment products Stages of Multimedia Projects, Multimedia hardware, Memory & storage devices, Communication devices, Multimedia software's, presentation tools, tools for object generations, video, sound, image capturing, authoring tools, card and page based authoring tools.
Multimedia Building Blocks Text, Sound MIDI, Digital Audio, audio file formats, MIDI under windows environment Audio & Video Capture.

MODULE II

Data Compression Huffman Coding, Shannon Fano Algorithm, Huffman Algorithms, Adaptive Coding, Arithmetic Coding Higher, Order Modeling. Finite Context Modeling, Dictionary based Compression, Sliding Window Compression, LZ77, LZW compression, Compression, Compression ratio loss less & lossy compression.

MODULE III

Speech Compression & Synthesis Digital Audio concepts, Sampling Variables, Loss less compression of sound, loss compression & silence compression. Images Multiple monitors, bitmaps, Vector drawing, lossy graphic compression, image file formatic animations Images standards, JPEG Compression, Zig Zag Coding, Multimedia Database. Video: Video representation, Colors, Video Compression, MPEG standards, MHEG Standard Video Streaming on net, Video Conferencing, Multimedia Broadcast Services.

Text Books:

1. Tay Vaughan "Multimedia, Making IT Work" Osborne McGraw Hill.
2. Buford "Multimedia Systems" Addison Wesley.
3. Agrawal & Tiwari "Multimedia Systems" Excel.
4. Mark Nelson "Data Compression Book" BPB.
5. David Hillman "Multimedia technology and Applications" Galgotia Publications.
6. Rosch "Multimedia Bible" Sams Publishing.
7. Sleinreitz "Multimedia System" Addison Wesley.
8. James E Skuman "Multimedia in Action" Vikas.

Course Outcomes: After the completion of the course the student will be able to:

CO1	Developed understanding of technical aspect of Multimedia Systems.
CO2	Understand various file formats for audio, video and text media.
CO3	Develop various Multimedia Systems applicable in real time.
CO4	Design interactive multimedia software.
CO5	Apply various networking protocols for multimedia applications.

BCS-054	SOFT COMPUTING	L T P 3 0 0	3 Credits

Course Objectives:

CO1	Introduce students to fuzzy systems, fuzzy logic and its applications.
CO2	Explain the students about Artificial Neural Networks and various categories of ANN.
CO3	To learn the concept of Neuro Fuzzy Modelling
CO4	To understand Genetic algorithm
CO5	Introduction to MATLAB and various commands

Detailed Syllabus

MODULE-I

Artificial Neural Networks: Basic concepts - Single layer perception - Multilayer Perception - Supervised and Unsupervised learning – Back propagation networks - Kohnen's self organizing networks - Hopfield network.
Fuzzy Systems: Fuzzy sets, Fuzzy Relations and Fuzzy reasoning, Fuzzy functions - Decomposition – Fuzzy automata and languages - Fuzzy control methods - Fuzzy decision making.

MODULE-II

Neuro-Fuzzy Modeling: Adaptive networks based Fuzzy interface systems - Classification and Regression Trees –Data clustering algorithms - Rule based structure identification - Neuro-Fuzzy controls –Simulated annealing – Evolutionary computation.
Genetic Algorithms: Survival of the Fittest - Fitness Computations - Cross over - Mutation - Reproduction –Rankmethod - Rank space method.

MODULE-III

Application of Soft Computing: Optimiation of traveling salesman problem using Genetic Algorithm, Genetic algorithm basedInternet Search Techniques, Soft computing based hybrid fuzzy controller, IntoductiontoMATLAB Environment for Soft computing Techniques.

Text Books:

1. Sivanandam, Deepa, " Principles of Soft Computing", Wiley
2. Jang J.S.R, Sun C.T. and Mizutani E, "Neuro-Fuzzy and Soft computing", PrenticeHall
3. Timothy J. Ross, "Fuzzy Logic with Engineering Applications", McGraw Hill

Reference Books:

1. LaureneFausett, "Fundamentals of Neural Networks", Prentice Hall
2. D.E. Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning",Addison Wesley
3. Wang, “Fuzzy Logic”, Springer

Course Outcomes: After the completion of the course the student will be able to:

CO1	Learn about soft computing techniques and their applications.
CO2	Analyze various neural network architectures.
CO3	Define the fuzzy systems.
CO4	Understand the genetic algorithm concepts and their applications.
CO5	Identify and select a suitable Soft Computing technology to solve the problem; construct a solution and implement a Soft Computing solution. .

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BCS-055	DISCRETE STRUCTURES	L T P 3 0 0	3 Credits

Pre-requisites: None

Course Objectives:

CO1	To develop logical thinking and its application to computer science (to emphasize the importance of proving statements correctly.
CO2	To Have substantial experience to comprehend formal logical arguments.
CO3	To express mathematical properties formally via the formal language of propositional logic and predicate logic.
CO4	To understand basic mathematical objects such as sets, functions, and relations and will also be able to verify simple mathematical properties that these objects possess.
CO5	The subject enhances one's ability to reason and ability to present a coherent and mathematically accurate argument.

DETAILED SYLLABUS

MODULE-I

Set Theory: Introduction, Combination of sets, Multisets, Ordered pairs. Proofs of some general identities on sets. **Relations:** Definition, Operations on relations, Properties of relations, Composite Relations, Equality of relations, Recursive definition of relation, Order of relations.
Functions: Definition, Classification of functions, Operations on functions, Recursively defined functions. Natural Numbers: Introduction, Mathematical Induction, Proof Methods, Proof by contradiction. **Algebraic Structures:** Definition, Groups, Subgroups and order, Cyclic Groups, Lagrange's theorem, Normal Subgroups, Permutation and Symmetric groups, Group Homeomorphisms, Definition and elementary properties of Rings and Fields.

MODULE-II

Partial order sets: Definition, Partial order sets, Combination of partial order sets, Hasse diagram. **Lattices:** Definition, Properties of lattices – Bounded, Complemented, Modular and Complete lattice. **Boolean algebra:** Introduction, Axioms and Theorems of Boolean algebra, Algebraic manipulation of Boolean expressions. Simplification of Boolean Functions, Karnaugh maps, Logic gates, Digital circuits and Boolean algebra.
Propositional Logic: Proposition, well formed formula, Truth tables, Tautology, Satisfiability, Contradiction, Algebra of proposition, Theory of Inference.
Predicate Logic: First order predicate, well formed formula of predicate, quantifiers, Inference theory of predicate logic.

MODULE-III

Trees : Definition, Binary tree, Binary tree traversal, Binary search tree.
Graphs: Definition and terminology, Representation of graphs, Multigraphs, Bipartite graphs, Planar graphs, Isomorphism and Homeomorphism of graphs, Euler and Hamiltonian paths, Graph coloring, Recurrence Relation, Method of solving recurrences.

Text Book*:*

1. Koshy, Discrete Structures, Elsevier Pub. 2008

Reference Books:

1. Kenneth H. Rosen, Discrete Mathematics and Its Applications, 6/e, McGraw-Hill, 2006.
2. B. Kolman, R.C. Busby, and S.C. Ross, Discrete Mathematical Structures, 5/e, Prentice Hall, 2004.
3. E.R. Scheinerman, Mathematics: A Discrete Introduction, Brooks/Cole, 2000.
4. R.P. Grimaldi, Discrete and Combinatorial Mathematics, 5/e, Addison Wesley, 2004.
5. J.P. Tremblay& R. Manohar, "Discrete Mathematical Structure with Applications to Computer Science" Mc.Graw Hill, 1975

Course Outcomes: After the completion of the course the student will be able to:

CO1	Be able to construct simple mathematical proofs and possess the ability to verify them.
CO2	Have substantial experience to comprehend formal logical arguments.
CO3	Be skillful in expressing mathematical properties formally via the formal language of propositional logic and predicate logic.
CO4	Be able to specify and manipulate basic mathematical objects such as sets, functions, and relations and will also be able to verify simple mathematical properties that these objects possess.
CO5	Gain experience in using various techniques of mathematical induction (weak, strong and structural induction) to prove simple mathematical properties of a variety of discrete structures.

BCS-552	DBMS Lab	L T P 0 0 4	2 credits

List of Programs to be Implemented in Lab

1. Data Definition, Table Creation, Constraints,
2. Insert, Select Commands, Update & Delete Commands.
3. Nested Queries & Join Queries
4. Views
5.High level programming language extensions (Control structures, Procedures and Functions).
6. Front end tools
7. Forms
8.Triggers
9.Menu Design
10.Reports.
11.Database Design and implementation (Mini Project).

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BCS-553	JAVA Programming Lab	L T P 0 0 4	2 credits

List of Programs to be Implemented in C language

1. WAP to show the concept of various principle of OOP's such as
a. Inheritance
b. Polymorphism
c.Encapulation
d. Abstraction
2. WAP to create a calculator using class & inheritance?
3. WAP to print the matrix?
4. WAP to print the addition of two matrixes?
5. WAP to print the multiplication of two matrixes?
6. WAP to print the default value of instance variable?
7. WAP to demonstrate the scope of variables?
8. WAP to show the concept of up casting & down casting?(implicit & explicit typecasting)?
9. WAP to overload the constructor?**(Compile time polymorphism)**
10. WAP to calculate the sine series, i.e. create a user defined method of sine series?
11. WAP to overload the method? **(Compile time polymorphism)**
12. WAP to override the method (sine series method)?**(Runtime polymorphism)**
13. WAP to show the dynamic method dispatch?**(Make all possible combination)**
14. Demonstrate the calling of constructor?
15. WAP to Demonstrate concept of Automatic type conversion apply to overloading?
16. WAP to calculate the factorial using static methods?
17. WAP to use command line arguments?
18. WAP to show the use of ***this*** keyword of java?
19. WAP to show the two use of ***super*** keyword of java?
20. WAP to show the ways to call the static method in java?
21. WAP to demonstrate to handle the exception?
22. WAP to create user defined exception?
23. WAP to read its own java source file & write that file in another java file?
24. WAP to create multiple Threads & show how inter Thread communication is performed?
25. WAP to demonstrate the life cycle of an applet?
26. Draw following shapes on an applet :
a) Circle
b) Rectangle
c) Square
Make sure that all shapes must have different colours.
27. WAP to create calculator GUI in java with proper event handling?
28. Create a notepad in java?**(Menu driven)**

BCS-601	COMPUTER NETWORK	L T P 3 0 0	3 Credits

Pre-requisites: None

Course Objectives:

CO1	Study the basic taxonomy and terminology of the computer networking and enumerate the layers of OSI model and TCP/IP model.
CO2	Acquire knowledge of Application layer and Presentation layer paradigms and protocols.
CO3	Study Session layer design issues, Transport layer services, and protocols.
CO4	Gain core knowledge of Network layer routing protocols and IP addressing.
CO5	Study data link layer concepts, design issues, and protocols.

MODULE-I

Introduction Concepts: Goals and Applications of Networks, Network architecture, The OSI reference model, TCP/IP model ,services, Network Topology Design - Delay Analysis, Back Bone Design, Local Access Network Design, Physical Layer Transmission Media, Switching methods.Data Link Layer - Elementary Data Link Protocols, Sliding Window protocols, Error Handling.

MODULE-II

Medium Access sub layer - Channel Allocations, Medium Access protocols, Ethernet, Wireless LANS.Network Layer: Network Layer - Point - to Pont Networks, routing, Congestion control, IP packet, IP address, IPv6.Transport Layer: Transport Layer – Design issues, connection management.

MODULE-III

Session Layer- Design issues, remote procedure call. Presentation Layer-Design issues, Data compression techniques, cryptography – Symmetric-Key and Asymmetric –Key, Security services.Application Layer: DNS, File Transfer Access, Electronic mail, SNMP.

Text Books:

1. Forouzen, "Data Communication and Networking", TMH
2. A.S. Tanenbaum, Computer Networks, Pearson Education

Reference Books:

1. W. Stallings, Data and Computer Communication, Macmillan Press
2. AnuranjanMisra, “Computer Networks”, Acme Learning
3. G. Shanmugarathinam, ”Essential of TCP/ IP”, Firewall Media

Course Outcomes: After the completion of the course the student will be able to:

CO1	Describe the functions of each layer in OSI and TCP/IP model.
CO2	Explain the functions of Application layer and Presentation layer paradigms and Protocols.
CO3	Describe the Session layer design issues and Transport layer services.
CO4	Classify the routing protocols and analyze how to assign the IP addresses for the given network.
CO5	Describe the functions of data link layer and explain the protocols.

BCS-602	Compiler Design	L T P 3 1 0	3 Credits

Pre-requisites: Basic knowledge of theory of computation and compilers.
Course Objectives: To provide a thorough understanding of the internals of Compiler Design

CO1	To discuss the techniques of scanning , parsing & semantic elaboration well enough to build or modify front end.
CO2	To expose the critical issues in modern compilers & provide them with the background to tackle those problems
CO3	Provide an understanding of the fundamental principles in compiler design
CO4	Learn the process of translating a modern high-level language to executable code required for compiler construction
CO5	Provide the skills needed for building compilers for various situations that one may encounter in a career in Computer Science.

Detailed Syllabus

MODULE-I

Introduction to Compiler: Phases and passes, Bootstrapping, Finite state machines and regular expressions and their applications to lexical analysis, implementation of lexical analyzers, lexical-analyzer generator, LEX-compiler. Lexical Phase errors: detection &recovery. Formal grammars and their application to syntax analysis, BNF notation, ambiguity. The syntactic specification of programming languages: Context free grammars, derivation and parse trees, capabilities of CFG.Basic Parsing Techniques: Parsers, Shift reduce parsing, operator precedence parsing, top down parsing, predictive parsers.

MODULE-II

Automatic Construction of efficient Parsers: LR parsers, the canonical Collection of LR (0) items, constructing SLR parsing tables, constructing Canonical LR parsing tables, Constructing LALR parsing tables, using ambiguous grammars, an automatic parser generator, implementation of LR parsing tables. Syntactic phase errors – detection & recovery. Syntax-directed Translation: Syntax-directed Translation schemes, Implementation of Syntax directed Translators, Intermediate code, postfix notation, Parse trees & syntax trees, three address code, quadruple & triples, translation of assignment statements, Boolean expressions, statements that alter the flow of control, postfix translation, translation with a top down parser. More about translation: Array references in arithmetic expressions, procedures call, declarations and case statements. Semantic errors – detection & recovery.

MODULE-III

Symbol Tables: Data structure for symbols tables, representing scope information. RunTime Administration: Implementation of simple stack allocation scheme, storage allocation in block structured language. Code Generation: Design Issues, the Target Language. Addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, Code

Generator.Code optimization: Machine-Independent Optimizations, Loop optimization, DAG representation of basic blocks, value numbers and algebraic laws, Global Data-Flow analysis

Text Books:

1. Aho, Sethi& Ullman, "Compilers: Principles, Techniques and Tools", Pearson Education.

Reference Books:

2. Raghvan, " Principles of Compiler Design", TMH
3. Kenneth Louden," Compiler Construction", Cengage Learning.
4. Charles Fischer and Ricard LeBlanc, "Crafting a Compiler with C", Pearson Education

Course Outcomes: After the completion of the course the student will be able to:

CO1	Understand the basic concepts and application of Compiler Design
CO2	Apply their basic knowledge Data Structure to design Symbol Table, Lexical Analyzer
CO3	Understand and Implement a Parser -Top Down and Bottom Up Design
CO4	Understand strength of Grammar and Programming Language
CO5	Understand the concept of Code generation

BCS-061	SOFTWARE TESTING	L T P 3 0 0	3 Credits

Pre-requisites: None

Course Objectives:

CO1	To discuss software testing background.
CO2	To introduce software testing techniques.
CO3	To explain different types of testing to understand realistic problem.
CO4	To develop analyzing techniques through automation testing tool.
CO5	To create awareness about the process part as per as software testing is concern.

Detailed Syllabus

MODULE I

Introduction

Faults, Errors, and Failures, Basics of software testing, Testing objectives, Principles of testing, Requirements, behavior and correctness, Testing and debugging, Test metrics and measurements, Verification, Validation and Testing, Types of testing, Software Quality and Reliability, Software defect tracking.

White Box and Black Box Testing

White box testing, static testing, Structural testing: Unit/Code functional testing, Code coverage testing, Code complexity testing, Black Box testing, Requirements based testing, Boundary value analysis, Equivalence partitioning, state/graph based testing, Model based testing and model checking, Differences between white box and Black box testing.

MODULE II

Integration, System, and Acceptance Testing

Top down and Bottom up integration, Bi-directional integration, System integration, Scenario Testing, Defect Bash, Functional versus Non-functional testing, Design/Architecture verification, Deployment testing, Beta testing, Scalability testing, Reliability testing, Stress testing, Acceptance testing: Acceptance criteria, test cases selection and execution,

MODULE III

Test Selection & Minimization for Regression Testing

Regression testing, Regression test process, Initial Smoke or Sanity test, Selection of regression tests, Execution Trace, Dynamic Slicing, Test Minimization, Ad hoc ,Testing: Pair testing, Exploratory testing, Iterative testing, Defect seeding.

Test Management and Automation

Test Planning, Management, Execution and Reporting, Software Test Automation: Scope of automation, Design & Architecture for automation, Generic requirements for test tool framework.

Text Books:

1. S. Desikan and G. Ramesh, "Software Testing: Principles and Practices", Pearson Education.
2. Aditya P. Mathur, "Fundamentals of Software Testing", Pearson Education.
3. Naik and Tripathy, "Software Testing and Quality Assurance", Wiley
4. K. K. Aggarwal and Yogesh Singh, "Software Engineering", New Age International Publication.

Course Outcomes: After the completion of the course the student will be able to:

CO1	Formulate problem by following Software Testing Life Cycle.
CO2	Design Manual Test cases for Software Project.
CO3	Identify the realistic problem for different category of software.
CO4	Use automation testing tool students will be able test the software.
CO5	Follow the process related activity and testing techniques to work as team member

BCS-062	GRAPH THEORY	L T P 3 0 0	3 Credits

Pre-requisites: None

Course Objectives:

CO1	Learn the fundamental concepts in graph theory in view of its applications in modern science.
CO2	Learn to understand and create mathematical proofs, including an appreciation of its significance in C S.
CO3	Use the concepts of Graph theory in subsequent courses in the design and analysis of algorithms, computability theory, software engineering and computer systems.
CO4	Apply concepts of the theory of probability in study of random phenomena, analyzing and interpreting data that involves uncertainties.
CO5	Learn the fundamental concepts in graph theory in view of its applications in modern science.

Detailed Syllabus

MODULE I

Graphs, Sub graphs, some basic properties, various example of graphs & their sub graphs, walks, path & circuits, connected graphs, disconnected graphs and component, euler graphs, various operation on graphs, Hamiltonian paths and circuits, the traveling sales man problem.

MODULE II

Trees and fundamental circuits, distance diameters, radius and pendent vertices, rooted and binary trees, on counting trees, spanning trees, fundamental circuits, finding all spanning trees of a graph and a weighted graph, algorithms of primes, Kruskal and Dijkstra Algorithms. Cuts sets and cut vertices, some properties, all cut sets in a graph, fundamental circuits and cut sets , connectivity and separability, network flows Planer graphs, combinatorial and geometric dual: Kuratowski graphs, detection of planarity, geometric dual, Discussion on criterion of planarity, thickness and crossings.

MODULE III

Vector space of a graph and vectors, basis vector, cut set vector, circuit vector, circuit and cut set subspaces, Matrix representation of graph – Basic concepts; Incidence matrix, Circuit matrix, Path matrix, Cut-set matrix and Adjacency matrix. Coloring, covering and partitioning of a graph, chromatic number, chromatic partitioning, chromatic polynomials, matching, covering, four color problem Discussion of Graph theoretic algorithm wherever required.

Text Books:

1. Deo, N, Graph theory with applications to Engineering and Computer Science, PHI
2. Gary Chartrand and Ping Zhang, Introduction to Graph Theory, TMH
3. Robin J. Wilson, Introduction to Graph Theory, Pearson Education
4. Harary, F, Graph Theory, Narosa
5. Bondy and Murthy: Graph theory and application. Addison Wesley.
6. V. Balakrishnan, Schaum's Outline of Graph Theory, TMH
7. Geir Agnarsson, Graph Theory: Modeling, Applications and Algorithms, Pearson Education

Course Outcomes: After the completion of the course the student will be able to:

CO1	Able to define the basic concepts of graphs, directed graphs, and weighted graphs.
CO2	Able to define the properties of bipartite graphs, particularly in trees.
CO3	Able to understand the concept of colourings and theory.
CO4	Able to understand the concept of Trees and fundamental circuits
CO5	Able to understand the concept of Kruskal and Dijkstra Algorithms

BCS-063	SYSTEM PROGRAMMING	L T P 3 0 0	3 Credits

Pre-requisites: None
Course Objectives:

CO1	Develop complex applications using asynchronous programming techniques.
CO2	Understand the basic operating system concepts.
CO3	Understand the basics of networking technologies and have good understanding of communication networking concepts and protocols.
CO4	Display proficiency in the use of programming languages like C.
CO5	Understand the fundamentals of concurrent programming.

Detailed Syllabus

MODULE-I

Evolution of Components Systems Programming, Assemblers, Loaders, Linkers, Macros, Compilers. software tools, Text editors, Interpreters and program generators, Debug Monitors, Programming environment.

Compiler: Brief overview of compilation process, Incremental compiler, Assembler: Problem statement, single phase and two phase assembler, symbol table; Loader schemes, compile and go Loader, general loader schemes, absolute loader, Subroutine linkage, Reallocating loader, Direct linkage Loader, Binders, Linking loader, overlays.

MODULE-II

Macro language and macro-processor, macro instructions, features of macro facility, macro instruction arguments, conditional macro expansion, macro calls with macro instruction defining macros.

Theoretical Concept of Unix Operating System: Basic features of operating system, File structure: CPU scheduling; Memory management: swapping, demand paging; file system: block and fragments, inodes, directory structure; User to user communication.

MODULE-III

Getting Started with Unix: User names and groups, logging in; Format of Unix commands; Changing your password; Characters with special meaning; Unix documentation; Files and directories; Current directory, looking at the directory contents, absolute and relative pathnames, some Unix directories and files; Looking at the file contents; File permissions; basic operation on files; changing permission modes; Standard files, standard output; Standard input, standard error; filters and pipelines; Processes; finding out about processes; Stopping background process; Unix editor vi. Test Manipulation: Inspecting files; File statistics; Searching for patterns; Comparing files; Operating on files; Printing files; Rearranging files; Sorting files; Splitting files; Translating characters; AWK utility. Shell Programming: Programming in the Borne and C-Shell; Wild cards; Simple shell programs; Shell variables; Shell programming constructs; interactive shell scripts; Advanced features.

Text Books:

1. Systems Programming by Donovan, TMH.
2. The unix programming environment by Brain Kernighen & Rob Pike, 1984, PHI & Rob Pike.
3. Design of the Unix operating system by Maurich Bach, 1986, PHI.
4. Introduction to UNIX and LINUX by John Muster, 2003, TMH.

Reference Books:

1. Advanced Unix programmer's Guide by Stephen Prato, BPB
2. Unix- Concept and applications by Sumitabha Das, 2002, TMH

Course Outcomes: After the completion of the course the student will be able to:

CO1	To understand the basics of system programs like editors, compiler, assembler, linker, loader, interpreter and debugger
CO2	Describe the various concepts of assemblers and microprocessors.
CO3	To understand the various phases of compiler and compare its working with assembler.
CO4	To understand how linker and loader create an executable program from an object module created by assembler and compiler
CO5	To know various editors and debugging techniques.

BCS-064	PHP	L T P 3 0 0	3 Credits

Pre-requisites: None

Course Objectives:

CO1	To understand the general concepts of PHP scripting language for the development of Internet websites.
CO2	To understand the basic functions of MySQL database program.
CO3	To learn the relationship between the client side and the server side scripts.
CO4	To implement GET and POST methods
CO5	To develop a final project using the learned techniques.

Detailed Syllabus

MODULE-I

Introduction to PHP- intro to different kinds of languages, intro to PHP for web development, History and future scope, Advantages of PHP over JSP, tools for working in PHP like WAMP, First script in PHP, Environment setup, Language Basics: Syntax overview, Defining variables and types, constant, deleting a variable, Data type- data type and their types, type casting, garbage value, Operator and types.

MODULE-II

Decisions and loops- Making decisions, doing repetitive task with looping Arrays- creating index based and associative array, accessing element, looping with indexed based array, , type, built in functions, multi-dimensional array Strings- creating and accessing, searching and replacing, formatting, library function, Functions- Define, Types, function call, parameters, call by value and call by reference, built in functions, recursive function.

MODULE-III

Web Component: Identifying browser & platform, display image randomly, form, import HTML tags, super global variable, GET and POST methods, File Inclusion, Files and I/O- understanding file and directories, opening and closing a file, coping, renaming and deleting a file, working with directories, file uploading and downloading, Cookie- define and their types, anatomy, setting, creating, accessing, deleting, Session: definition, creating and destroying a session, login/logout, uses.

Text Books:-

- Jason Lengstorf," PHP for Absolute beginners", Apress
- Robin Nixon," Learning PHP, MySQL & Java Script: with JQuery, CSS and HTML 5", O'RELLY.

Reference Book:-

- Matt Doyle," Beginning PHP 5.3",Wrox Publication.

Course Outcomes: After the completion of the course the student will be able to:

CO1	Use a PHP editing program.
CO2	Develop functional PHP script
CO3	Understand the use of PHP with HTML.
CO4	Understand the ability to post and publish a PHP website.
CO5	Develop Database connectivity using MySQL

BCS-065	Linux Administration	L T P 3 0 0	3 Credits

Pre-requisites: None

Course Objectives:

CO1	Install **Linux** from a network install server, setup network install servers, and perform automated installs.
CO2	Manage system and services startup and shutdown.
CO3	Select and use system **administration** tools when appropriate.
CO4	Configure and manage printers.
CO5	Use packaging tools to create, install, and de-install packages.

Detailed Syllabus

MODULE-I

System performance-Security-Service Access Control-Network Resource Access Control in Redhat Linux- Goals, Security Domains, System Faults and Analysis methods, Benefits of maintaining system state, Networking-data storage and processing resource concerns, Log file analysis, Understanding service management, Service configuration resource, Implement access control, Selinux overview, SELinux management, IP and IP routing, Compare IPV4 and IPV6, NAT.

MODULE-II

Organizing network system, NFS, SAMBA, Web services in Redhat Linux Host name resolution, Verification of DNS server operation, BIND DNS configuration, DHCP overview and configuration, Describe FTP service, Network file sharing, Samba service, client tool with each service, features of Apache HTTP server, Configure important Apache parameters, pre-directory configuration, CGI use with Apache, identify key modules, introduction to proxy web services.

MODULE-III

Mail services, Securing data, account management with Redhat Linux Understanding email operation, Basic configuration of mail server, Configuring proc mail- dovecot, Debug email services, Fundamentals of encryption protocols, encryption with Redhat linux, configure encryption services for common networking protocols, basic of authentication.

Text Books:-

1. Linux Bible By: Christopher Negus- Wiley Publishing, Inc, 2010
2. Redhat Linux Networking and System Admin BY: Terry Collings and Kurt Wall-M&T Books, 2009

Reference Book:-

1. UNIX and Linux System Administration Handbook (4th Edition), Evi Nemeth, Garth Snyder, Trent R.Hein, Ben Whaley, Prentice Hall; 4th edition(July 24, 2010)
2. Linux Administration A Beginners Guide 6/E, Wale Soyinka, McGraw-Hill Osborne Media; 6th edition (February 21, 2012)

Course Outcomes: After the completion of the course the student will be able to:

CO1	Ability to remember and understand factual knowledge relevant to system administration tools and technologies
CO2	Ability to apply the procedures presented in a "how to" document or tutorial to perform a system administration task successfully
CO3	Ability to use available technical references & resources to find responses to specific system administration questions. This skill entails being able to assert the validity & reliability of such sources
CO4	Ability to write how-to documents, white papers, tutorials guiding other system administrators or users step-by-step through system administration tasks
CO5	Ability to review alternative system administration technologies or solutions based on requirements in order to make recommendation on the most suited

BCS-066	SOFTWARE PROJECT MANAGEMENT	L T P 3 0 0	3 Credits

Pre-requisites: None

Course Objectives:

CO1	To develop awareness regarding the theoretical and methodological issues related to software project management.
CO2	To develop software projects based on current technologies.
CO3	To make them understand the concepts of Project Management for planning to execution of projects.
CO4	To make them understand the feasibility analysis in Project Management and network analysis tools for cost and time estimation.
CO5	To enable them to comprehend the fundamentals of Contract Administration, Costing and Budgeting.

Detailed Syllabus

MODULE I

Introduction and Software Project Planning

Fundamentals of Software Project Management (SPM), Need Identification, Vision and Scope document, Project Management Cycle, SPM Objectives, Management Spectrum, SPM Framework, Software Project Planning, Planning Objectives, Project Plan, Types of project plan, Structure of a Software Project Management Plan, Software project estimation, Estimation methods, Estimation models, Decision process.

Project Organization and Scheduling

Project Elements, Work Breakdown Structure (WBS), Types of WBS, Functions, Activities and Tasks, Project Life Cycle and Product Life Cycle, Ways to Organize Personnel, Project schedule, Scheduling Objectives, Building the project schedule, Scheduling terminology and techniques, Network Diagrams: PERT, CPM, Bar Charts: Milestone Charts, Gantt Charts.

MODULE II

Project Monitoring and Control

Dimensions of Project Monitoring & Control, Earned Value Analysis, Earned Value Indicators: Budgeted Cost for Work Scheduled (BCWS), Cost Variance (CV), Schedule Variance (SV), Cost Performance Index (CPI), Schedule Performance Index (SPI), Interpretation of Earned Value Indicators, Error Tracking, Software Reviews, Types of Review: Inspections, Desk checks, Walkthroughs, Code Reviews, Pair Programming.

Software Quality Assurance and Testing

Testing Objectives, Testing Principles, Test Plans, Test Cases, Types of Testing, Levels of Testing, Test Strategies, Program Correctness, Program Verification & validation, Testing Automation & Testing Tools, Concept of Software Quality, Software Quality Attributes, Software Quality Metrics and Indicators, The SEI Capability Maturity Model CMM), SQA Activities, Formal SQA Approaches: Proof of correctness, Statistical quality assurance, Cleanroom process.

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MODULE III

Project Management and Project Management Tools

Software Configuration Management: Software Configuration Items and tasks, Baselines, Plan for Change, Change Control, Change Requests Management, Version Control, Risk Management: Risks and risk types, Risk Breakdown Structure (RBS), Risk Management Process: Risk identification, Risk analysis, Risk planning, Risk monitoring, Cost Benefit Analysis, Software Project Management Tools: CASE Tools, Planning and Scheduling Tools, MS-Project.

Text Books:

1. M. Cotterell, Software Project Management, Tata McGraw-Hill Publication.
2. Royce, Software Project Management, Pearson Education
4. Kieron Conway, Software Project Management, Dreamtech Press
5. S. A. Kelkar, Software Project Management, PHI Publication.

Course Outcomes: After the completion of the course the student will be able to:

CO1	Understand the process of Software Project Management.
CO2	Conduct project planning activities that accurately forecast project costs.
CO3	Handle tools like MS Project & SVN
CO4	Understand the skills required for managing projects, project teams, and stakeholders
CO5	Understand the process of Software Project Management.

BCS-067	PATTERN RECOGNITION	L T P 3 0 0	3 Credits

Course Objectives:

CO1	Understand the concept of a pattern and the basic approach to the development of pattern recognition and machine intelligence algorithms
CO2	Understand the basic methods of feature extraction, feature evaluation, and data mining
CO3	Understand and apply both supervised and unsupervised clasification methods to detect and characterize patterns in real-world data
CO4	Develop prototype pattern recognition algorithms that can be used to study algorithm behavior and performance against real-world multivariate data
CO5	To introduce the fundamental algorithms for pattern recognition

MODULE-I

Basics of pattern recognition, Learning Types: Supervised & Unsupervised, Pattern recognition approaches, Decision Boundary, Feature Vector, Mathematical foundations – Probability Theory (Bayes Theorem), Expectation, Mean and Covariance, Normal distribution, multivariate normal densities. Bayesian Decision Theory, Classifiers, discriminant functions, Normal density (Univariate & Multivariate). Distance Based Classifiers**:** Euclidean Distance, Manhattan Distance and Mahalanobis Distance, Adaptive Decision Boundary.

MODULE-II

Principle Component Analysis, Linear discriminant analysis, Hidden Markov Model – Evaluation (Forward Algorithm), Decoding (HMM Decoding Algorithm), Learning (Forward-Backward Algorithm). Artificial Neural Networks: Biological Neuron, Artificial Neuron, Activation Function, Perceptron, Fixed Increment Perceptron Learning algorithm.

MODULE-III

K-Nearest Neighbour Estimation, Nearest Neighbour Rule, Fuzzy classification - Membership functions, interference in fuzzy logic, fuzzy if - then rules.Unsupervised Learning & Clustering: Criterion functions for clustering, Clustering Techniques: Iterative square - error partition clustering – K means, Fuzzy K - Means agglomerative hierarchical clustering, Cluster validation.

Text Books:

1. Richard O. Duda, Peter E. Hart and David G. Stork, "Pattern Classification", 2nd Edition, John Wiley, 2006.
2. Earl Gose, Richard Johnsonbaugh and Steve Jost, "Pattern Recognition and Image Analysis", PHI.
3. Sergios Theodoridis, Konstantinos Koutroumbas, "Pattern Recognition", 2nd Edition, Elsevier Academic Press.
4. S. Rajsekaran & G.A. Vijayalakshmi Pai, "Neural Networks,Fuzzy Logic and Genetic Algorithm Synthesis and Applications" Prentice Hall of India.
5. C. M. Bishop, "Pattern Recognition and Machine Learning", Springer, 2009.

Course Outcomes: After the completion of the course the student will be able to:

CO1	Understand the process of Software Project Management.
CO2	Conduct project planning activities that accurately forecast project costs.
CO3	Handle tools like MS Project & SVN
CO4	Understand the skills required for managing projects, project teams, and stakeholders
CO5	Understand the process of Software Project Management.

BCS-068	PARALLEL ALGORITHMS	L T P 3 1 0	4 Credits

Pre-requisites: None

Course Objectives:

CO1	Understand the concept of a pattern and the basic approach to the development of pattern recognition and machine intelligence algorithms
CO2	Understand the basic methods of feature extraction, feature evaluation, and data mining
CO3	Understand and apply both supervised and unsupervised clasification methods to detect and characterize patterns in real-world data
CO4	Develop prototype pattern recognition algorithms that can be used to study algorithm behavior and performance against real-world multivariate data
CO5	To introduce the fundamental algorithms for pattern recognition

MODULE I

Sequential model, need of alternative model, parallel computational models such as PRAM, LMCC, Hypercube, Cube Connected Cycle, Butterfly, Perfect Shuffle Computers, Tree model, Pyramid model, Fully Connected model, PRAM-CREW, EREW models, simulation of one model from another one. Performance Measures of Parallel Algorithms, speed-up and efficiency of PA, Cost- optimality,
An example of illustrate Cost- optimal algorithms- such as summation, Min/Max on various models.

MODULE II

Parallel Sorting Networks, Parallel Merging Algorithms on CREW/EREW/MCC, Parallel Sorting Networks on CREW/EREW/MCC/, linear array Parallel Searching Algorithm, Kth element, Kth element in X+Y on PRAM, Parallel Matrix
Transportation and Multiplication Algorithm on PRAM, MCC, Vector-Matrix Multiplication, Solution of Linear Equation, Root finding.

MODULE III

Graph Algorithms - Connected Graphs, search and traversal, Combinatorial Algorithms- Permutation, Combinations, Derrangements.

Text Books:

1. M.J. Quinn, “Designing Efficient Algorithms for Parallel Computer”, McGrawHill.
2. S.G. Akl, “Design and Analysis of Parallel Algorithms”
3. S.G. Akl, ”Parallel Sorting Algorithm” by Academic Press

Course Outcomes: After the completion of the course the student will be able to:

CO1	Search, collect, classify and critically interpret relevant information to design a simple pattern recognition systems
CO2	Implement an advanced pattern recognition algorithm
CO3	Evaluate the result from a simple pattern recognition system
CO4	Describe and explain the difference between supervised and unsupervised learning
CO5	Become aware of the theoretical issues involved in pattern recognition system design such as the curse of dimensionality.

BCS-069	INTERNET TECHNOLOGY	L T P 3 0 0	3 Credits

Pre-requisites: None

Course Objectives:

CO1	To learn HTML tags and JavaScript Language programming concepts and techniques.
CO2	To develop the ability to logically plan and develop web pages.
CO3	To learn to write, test, and debug web pages using HTML and JavaScript.
CO4	To learn to write, test, and debug web pages using servlet
CO5	To learn to write, test, and debug web pages using JSP.

MODULE-I

Introduction and Web Development Strategies: History of Web, World Wide Web Consortium (W3C), Protocols governing Web, Creating Websites for individual and Corporate World, Cyber Laws, Web Applications, Writing Web Projects, Identification of Objects, Target Users, Web Team.
HTML & DHTML: Introduction, Standard Structure, Basic html tags such as list, table, images, frames, forms. Cascading Style Sheet (CSS).**XML:** Introduction & use, DTD, XML Schema.**Object Model:** Document Object Model (DOM), Simple API for XML (SAX).Introduction to Java Script, Object in JavaScript, Introduction to AJAX.

MODULE-II

Server Side Programming: Introduction to web Server, Configuring the Tomcat Web Container.
The Servlet Technology: Introduction to Servelets, Lifecycle, The javax.servlet Package, Obtaining Configuration Information, Preserving the ServletConfig , The Servlet Context , Sharing Information Among Servlets, Requests and Responses , The GenericServlet Wrapper Class , The HttpServlet Class, The HttpServletRequest Interface , HttpServletResponse , Sending an Error Code , Sending Special Characters , Buffering the Response , Populating HTML Elements , Request Dispatching , Creating Thread-Safe Servlets.
The JSP Technology: What's Wrong with Servlets? , Running Your First JSP , How JSP Works , The JSP Servlet Generated Code , The JSP API , The Generated Servlet Revisited , Implicit Objects.
Directives, Scripting Elements, Standard Action Elements, Comments, Converting into XML Syntax.
Session Management: What Is Session Management? , URL Rewriting , Hidden Fields , Cookies , Session Objects , Knowing Which Technique to Use.

MODULE-III

Database Connectivity: Database Programming using JDBC, Studying Javax.sql.*package, accessing a database from a JSP page, Application-specific Database Action, Developing Java Beans in a JSP page, introduction to Struts framework.

Text Books:

1. "Java for the Web with Servlets, JSP, and EJB: A Developer's Guide to J2EE Solutions", Budi Kurniawan , New Riders Publishing.
2. Burdman, "Collaborative Web Development" Addison Wesley.

Reference Books:

1. Chris Bates, "Web Programing Building Internet Applications", 2nd Edition, WILEY, Dreamtech
2. Joel Sklar , "Principal of web Design" Vikash and Thomas Learning
3. Horstmann, "CoreJava", Addison Wesley.
4. Herbert Schieldt, "The Complete Reference:Java", TMH.

Course Outcomes: After the completion of the course the student will be able to:

CO1	Explain the concepts of internetworking techniques with their characteristics.
CO2	Illustrate the requirement for WWW format and techniques.
CO3	Define the email functioning and basics of HTML,XML and DHTML.
CO4	Recognize the functioning of servers and privacy, security related mechanism.
CO5	Differentiate between different Web Extensions and Web Services.

BCS-069	Introduction to Internet of Things (IoT)	L T P 3 0 0	3 Credits

Pre-requisites: None

Course Objectives:

CO1	To learn about basic of IoT
CO2	Understand domain specific applications
CO3	Identify various protocols for IoT
CO4	To learn various M2M and IoT architectures
CO5	Understand various challenges of IoT

Module 1

Introduction to IoT: Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models & APIs, Elements of an IoT ecosystem.
IoT APPLICATIONS - Home automation, Future Factory Concepts, Smart Objects, and Smart Applications. Study of existing IoT platforms /middleware.

Module 2

IoT Protocols: Protocol Standardization for IoT, M2M and WSN Protocols – SCADA and RFID Protocols, Issues with IoT Standardization, Protocols- IEEE802.15.4–BACNet Protocol– Modbus – KNX – Zigbee– Network layer – APS layer – Security
IoT Reference Architecture- Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views. Real-World Design Constraints- Introduction, Technical Design constraints-hardware is popular again, Data representation and visualization, Interaction and remote control.

Module 3

Challenges in IoT: Design challenges, Development challenges, Security challenges, other challenges.
Tools: Introduction to Python and Introduction to different IoT tools.

Textbook:

- Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, “From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”, 1st Edition, Academic Press, 2014.

Reference Books:

- Vijay Madisetti and Arshdeep Bahga, “Internet of Things (A Hands-on-Approach)”, 1stEdition, VPT, 2014.
- Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, 1st Edition, Apress Publications, 2013
- Waltenegus Dargie,Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice"

Course Outcomes: After the completion of the course the student will be able to:

CO1	Understand fundamental concepts of Internet of Things (IoT)
CO2	Learn basic programming for implementation
CO3	Identify various devices, sensors and applications
CO4	Analyze various M2M and IoT architectures
CO5	Evaluate design issues in IoT applications

BOE-601	Total Quality Management	L T P 3 0 0	3 Credits

Pre-requisites: None

Course Objectives:

CO1	Aware about the total quality management concept.
CO2	Control Quality in the critical activities of an organization by bringing together resources, equipment, people and procedures.
CO3	Learn to construction and analysis of R charts
CO4	Learn to construction and analysis of C charts.
CO5	To calculate reliability, building reliability in the product

Detailed Syllabus

MODULE 1

Quality Concepts:
Evolution of Quality Control, concept change, TQM Modern concept, Quality concept in design, Review of design, Evolution of proto type.

Control on Purchased Product
Procurement of various products, evaluation of supplies, capacity verification, Development of sources, procurement procedure.

Manufacturing Quality
Methods and techniques for manufacture, inspection and control of product, quality in sales and services, guarantee, analysis of claims.

MODUEL II

Quality Management
Organization structure and design, quality function, decentralization, designing and fitting, organization for different type products and company, economics of quality value and contribution, quality cost, optimizing quality cost, seduction program.

Control Charts
Theory of control charts, measurement range, construction and analysis of R charts, process capability study, use of control charts.

Attributes of Control Chart
Defects, construction and analysis of charts, improvement by control chart, variable sample size, construction and analysis of C charts.

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MODUEL III

Defects diagnosis and prevention defect study, identification and analysis of defects, correcting measure, factors affecting reliability, MTTF, calculation of reliability, building reliability in the product, evaluation of reliability, interpretation of test results, reliability control, maintainability, zero defects, quality circle. **,**ISO-9000 and its concept of Quality Management, SO 9000 series, Taguchi method, JIT in some details. **7**

Text Books:

1. Lt. Gen. H. Lal, "Total Quality Management", Eastern Limited, 1990.

2. Greg Bounds, "Beyond Total Quality Management", McGraw Hill, 1994.

3. Menon, H.G, "TQM in New Product manufacturing", McGraw Hill 1992.

Course Outcomes: After the completion of the course the student will be able to:

CO1	To realize the importance of significance of quality
CO2	Manage quality improvement teams
CO3	Identify requirements of quality improvement programs
CO4	To have exposure to challenges in Quality Improvement Programs
CO5	To have a good understanding of the concept of Quality

BOE-602	Human Computer Interaction	L T P 3 0 0	3 Credits

Pre-requisites: None

Course Objectives:

CO1	To Understand WIMP
CO2	To learn about Internet technology
CO3	To learn about interactive design
CO4	To understand design concept
CO5	Understand the criteria for acceptability

Detailed Syllabus

MODULE-I

User centered design of system & interfaces, anatomy and rational of WIMP (Window, Icon, Menus & Pointing Devices) interfaces.
Dialogue design, Presentation design, user documentation, evaluation/usability testing of user interface.

MODULE II

Ergonomics and Cognitive issues, hypertext and the World Wide Web.
User centered design, human factors in user-centered design, development & evaluation, Interactive design –rapid prototyping.

MODULE III

Designing for usability –effectiveness, learnability, flexibility, attitude and usability goals, criteria for acceptability.

Text Books:-

1. **Ben Shneiderman, Catherine Plaisant, Maxine Cohen, Steven Jacobs**" Human Computer Interaction".

Reference Book:-

1. Sudifte AG, "Human Computer Interface Design", 2nd ed. Macmillan, 1995
2. Sheiderman B Designing the user interface, "Strategies for Effective Human Computer Interaction", 2nd ed. Addison Wesley, 1992

Course Outcomes: After the completion of the course the student will be able to:

CO1	Describe what interaction design is and how it relates to human computer interaction and other fields.
CO2	Describe the social mechanisms that are used by people to communicate and collaborate
CO3	Describe how technologies can be designed to change people's attitudes and behaviour
CO4	Discuss the difference between qualitative and quantitative data and analysis
CO5	Consider which interface is best for a given application or activity

BOE-603	ENREPRENEURSHIP DEVELOPMENT	L T P 3 0 0	3 Credits

Course Objectives:

CO1	To understand basic concepts in the area of entrepreneurship.
CO2	To understand the role and importance of entrepreneurship for economic development.
CO3	To developing personal creativity and entrepreneurial initiative.
CO4	To adopt the key steps in the elaboration of business idea.
CO5	To understand the stages of the entrepreneurial process and the resources needed for the successful development of entrepreneurial ventures.

MODULE I

Entrepreneurship- Definition, Growth of small scale industries in developing countries and their positions vis-a-vis large industries; role of small scale industries in the national economy; characteristics and types of small scale industries; demand based and resources based ancillaries and sub-control types. Government policy for small scale industry; stages in starting a small scale industry.

Project identification- assessment of viability, formulation, evaluation, financing, field-study and collection of information, preparation of project report, demand analysis, material

balance and output methods, benefit cost analysis, discounted cash flow, internal rate of return and net present value methods.

MODULE II

Accountancy- Preparation of balance sheets and assessment of economic viability, decision making, expected costs, planning and production control, quality control, marketing, industrial relations, sales and purchases, advertisement, wages and incentive, inventory control, preparation of financial reports, accounts and stores studies.

MODULE III

Project Planning and control:
The financial functions, cost of capital approach in project planning and control. Economic evaluation, risk analysis, capital expenditures, policies and practices in public enterprises. profit planning and programming, planning cash flow, capital expenditure and operations. control of financial flows, control and communication.
Laws concerning entrepreneur viz, partnership laws, business ownership, sales and income taxes and workman compensation act.
Role of various national and state agencies which render assistance to small scale industries.

Course Outcomes:

CO1	To be able to analyze the business environment in order to identify business opportunities.
CO2	To be able to identify the elements of success of entrepreneurial ventures.
CO3	To be able to consider the legal and financial conditions for starting a business venture.
CO4	To be able to evaluate the effectiveness of different entrepreneurial strategies.
CO5	To be able to specify the basic performance indicators of entrepreneurial activity.

BOE-604	**NON-CONVENTIONAL ENERGY RESOURCES**	**L T P 3 0 0**	**3 Credits**

Course Objectives:

CO1	To understand the various forms of conventional energy resources.
CO2	To learn the present energy scenario and the need for energy conservation.
CO3	To understand the application of wind energy as alternate source of energy.
CO4	To outline division aspects and utilization of renewable energy sources for both domestics and industrial application.
CO5	To analyze the environmental aspects of renewable energy resources.

MODULE 1

Introduction
Various non-conventional energy resources- Introduction, availability, classification, relative merits and demerits.Solar Cells: Theory of solar cells. solar cell materials, solar cell array, solar cell power plant, limitations.
Solar Thermal Energy:
Solar radiation, flat plate collectors and their materials, applications and performance, focussing of collectors and their materials, applications and performance; solar thermal power plants, thermal energy storage for solar heating and cooling, limitations.

MODULE II

Geothermal Energy:

Resources of geothermal energy, thermodynamics of geo-thermal energy conversion-electrical conversion, non-electrical conversion, environmental considerations.

Magneto-hydrodynamics (MHD): Principle of working of MHD Power plant, performance and limitations. Fuel Cells: Principle of working of various types of fuel cells and their working, performance and limitations.

MODULE III

Thermo-electrical and thermionic Conversions: Principle of working, performance and limitations. Wind Energy: Wind power and its sources, site selection, criterion, momentum theory, classification of rotors, concentrations and augments, wind characteristics. performance and limitations of energy conversion systems. Bio-mass:

Availability of bio-mass and its conversion theory. Ocean Thermal Energy Conversion (OTEC): Availability, theory and working principle, performance and limitations.
Wave and Tidal Wave: Principle of working, performance and limitations.
Waste Recycling Plants.

. **Course Outcomes:**

CO1	To understand the need of energy conversion and the various methods of energy storage.
CO2	To explain the field applications of solar energy.
CO3	Identify Winds energy as alternate form of energy and to know how it can be tapped.
CO4	To understand the Geothermal &Tidal energy, its mechanism of production and its applications.
CO5	Illustrate the concepts of Direct Energy Conversion systems & their applications.

Text Books:
1. Raja etal, “Introduction to Non-Conventional Energy Resources” Scitech Publications.
2. John Twideu and Tony Weir, “Renewal Energy Resources” BSP Publications, 2006.
3. M.V.R. Koteswara Rao, “ Energy Resources: Conventional & Non-Conventional “ BSP Publications,2006.
4. D.S. Chauhan,”Non-conventional Energy Resources” New Age International.
5. C.S. Solanki, “Renewal Energy Technologies: A Practical Guide for Beginners” PHI Learning.

BOE-605	OPERATIONAL RESEARCH	L T P 3 0 0	3 Credits

Course Objectives:

CO1	To impart knowledge in concepts and tools of Operations Research.
CO2	To understand mathematical models used in Operations Research.
CO3	To apply these techniques constructively to make effective business decisions.
CO4	Develop mathematical skills to analyze and solve integer programming and network models arising from a wide range of applications.
CO5	Effectively communicate ideas, explain procedures and interpret results and solutions in written and electronic forms to different audiences.

MODULE I

Introduction:
Definition and scope of operations research (OR), OR model, solving the OR model, art of modelling, phases of OR study. Linear Programming:
Two variable Linear Programaming model and Graphical method of solution, Simplex method, Dual Simplex method, special cases of Linear Programming, duality, sensitivity analysis. Transportation Problems: Types of transportation problems, mathematical models , transportation algorithms, Assignment: Allocation and assignment problems and models, processing of job through machines.

MODULE II

Network Techniques: Shortest path model, minimum spanning Tree Problem, Max-Flow problem and Min-cost problem. Project Management:
Phases of project management, guidelines for network construction, CPM and PERT.

MODULE III

Theory of Games: Rectangular games, Minimax theorem, graphical solution of 2 x n or m x 2 games, game with mixed strategies, reduction to linear programming model.
Quality Systems: Elements of Queuing model, generalized poison queuing model, single server models. Inventory Control: Models of inventory, operation of inventory system, quantity discount. Replacement:
Replacement models: Equipments that deteriorate with time, equipments that fail with time.

Text Books:

1. Wayne L. Winston,"Operations Research" Thomson Learning,2003.
2. Hamdy H. Taha, "Operations Research-An Introduction" Pearson Education,2003.
3. R. Panneer Seevam, "Operations Research" PHI Learning, 2008.
4. V.K.Khanna, "Total Quality Management" New Age International, 2008.

Course Outcomes:

CO1	To be able to understand the application of OR and frame a LP Problem with solution
CO2	To be able to use different mathematical models and the solution procedures.
CO3	To understand the usage of game theory and Simulation for Solving Business Problems
CO4	To be able to design new simple models, like: CPM, MSPT to improve decision –making and develop critical thinking and objective analysis of decision problems
CO5	To be able to implement practical cases, by using TORA, WinQSB

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BCS-651	COMPUTER NETWORK LAB	L T P 0 0 4	2 credits

1.Study of different network devices in detail.
2.Study of different types of network cables and practically implement 3.the cross-wired cable and straight through cable using clamping tool.
4.Study of basic network command and Network configuration commands
5.Study of network IP.
6.Implement the concept of VLAN using Network Simulator.
7.Implement the concept of static routing.
8.Implement the concept of dynamic routing (RIP, OSPF, BGP).
9.Packet capture and header analysis by wire-shark (TCP,UDP,IP)
10.Configure a network topology using packet tracer software

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BCS-655	COMPILER LAB	L T P 0 0 4	2 credits

1. Design a Lexical analyzer for the given language. The lexical analyzer should ignore redundant spaces, tabs and new lines. It should also ignore comments. Although the syntax specification states that identifiers can be arbitrarily long, you may restrict the length to some reasonable value.
2. Implement the lexical analyzer using JLex, flex or lex or other lexical analyzer generating stools.
3. Design Predictive parser for the given language.
4. Design LALR bottom up parser for the given language.
5. Convert the BNF rules into Yacc form and write code to generate abstract syntax tree.
6. Write program to generate machine code from the abstract syntax tree
generated by the parser.
7. Implementation of Symbol Table. 8. Generation of Code for a given Intermediate Code.