

GUJARAT UNIVERSITY-S.Y.BCA SYLLABUS (REVISED)
Effective from June,2006

TEACHING AND EXAMINATION SCHEME

SUB NO	SUBJECT	TEACHING		EXAMINATIONS				
		HRS PER WEEK		INTERNAL		EXTERNAL 3 HRS		TOTAL
		THEORY	PRACT	SESSIONAL	TERM WORK	THEORY	PRACT	
	Passing Marks			7	4	25	18	
BCA201	Computer Organization and Advanced Micro-processors	3	-	20	10	70	-	100
BCA202	Data & File Structure	3	2	20	10	70	50	150
BCA203	Mathematical foundation of Computer Science	3	-	20	10	70	-	100
BCA204	System Analysis and Design	3	-	20	10	70	-	100
BCA205	Advanced Visual & Windows Programming.	3	2	20	10	70	50	150
BCA206	Operating System & Unix	3	1	20	10	70	50	150
BCA207	Object Oriented Programming with C++	3	2	20	10	70	50	150
BCA208	Scientific & Statistical Computing	3	1	20	10	70	50	150
TOTAL		24	8	160	80	560	250	1050

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**BCA201 COMPUTER ORGANIZATION AND ADVANCED
MICRO-PROCESSORS**

TEACHING		EXAMINATIONS				
HRS PER WEEK		INTERNAL		EXTERNAL 3HRS		
THEORY	PRACT	SESSIONAL	TERM WORK	THEORY	PRACT	TOTAL
3	-	20	10	70	-	100

PART I

Modern Computer Organization

(10%)

Introduction , Man and computing, User and computer, Computer Organization , Main Memory, CPU operation , Interrupt Concept, Bus Concept, Computer Types, Booting sequence.

CPU Architecture and Instruction Set

(15%)

Introduction, CISC vs. RISC,
Instruction set Design (excluding flowcharts), Addressing Modes, Data representation, Binary data

Computer Arithmetic

(20%)

Introduction
Gates :-AND, OR, NOT, NAND, NOR, XOR
Flip-Flops :- D, JK
Decoder, Encoder, Multiplexer, Demultiplexer

} Block diagram
& Truth table

Fixed point arithmetic:-Sign Extension, Integer Addition:-Unsigned addition (excluding Adders), Signed two's complement addition.
Integer Subtraction (excluding Circuits)
Integer Multiplication :-Multiplication of unsigned and signed numbers (excluding diagrams), 2's complement Multiplication
Integer division :- Division of unsigned integers, Floating Point Arithmetic

Processor design and Data Path

(5%)

Processor design Process, Main Memory Interface

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Main Memory Design (10%)

Introduction, Memory Parameters, Classification of Memory, Main Memory Allocation

Memory Management techniques (10%)

Introduction , Memory hierarchy, Main memory drawbacks, Instruction prefetch (excluding sum), Cache Memory:-Principle of cache ,Hit and Miss, Direct mapping, Associative Mapping ,Set-Associative mapping ,Cache replacement, Cache write policy, Multi-level cache, Associative Memory.

PART II

Introduction to Microprocessors (10%)

Evolution ,single-chip microcomputer, embedded microprocessors, micro-programming, RISC and CISC processors, scalar and super scalar processors, Von-neumann architecture.

16-bit Intel Microprocessor (15%)

intel-8086,pin description minimum and maximum modes, operating modes, register organization, BIU and EU, interrupts, addressing modes

Other Microprocessors (5%)

Pentium, Pentium Pro ,Alpha ,Cyrix, MIPS ,SUN's SPARC,AMD
Note: Only Features of all the processors to be discussed
(excluding : Block diagrams , Pin configuration and tables)

PART I

Textbook: COMPUTER ARCHITECTURE AND ORGANIZATION

Author: B Govindarajalu

PART II

Textbook: Advanced Microprocessor and Interfacing (30%)

Author: Badri Ram



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BCA202 DATA AND FILE STRUCTURE

TEACHING		EXAMINATIONS				
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3	2	20	10	70	50	150

INTRODUCTION

Data Structure and its classification (Primitive, non-primitive : linear, non-linear)

ARRAYS

Array Concept (One Dimension, Two Dimension), Memory representation of Single Dimension Array & Two Dimension Array (Row Major , Column Major), Operations for One Dimension Array (Insertion, Deletion, Traversal), Sparse Matrix, Memory Representation of Sparse Matrix (Vector Notation), Representation of Polynomial.

(10%)

SEARCHING AND SORTING

(15%)

Sequential Search, Binary Search, Comparison in terms of efficiency, Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort, Comparison in terms of their efficiency

STACKS AND QUEUES

(20%)

Properties of Stacks, Stack Representation using Array, Stack operations (Push, Pop, Peep, Change), Applications Of Stack (Recursion, Expression: Infix, Postfix and Prefix with their conversions)
 Properties of Queues, Circular Queue, Priority Queue, Double ended queue, Queue representation using Array, Queue Operations(Insert , Delete),Applications of queue.

LINKED LISTS

(15%)

Singly linked lists, Doubly Linked List , Circular Linked List, Header Linked List, Operations of linked list (Insertion , Deletion , Traversal, Split, Join), Application of linked list. Representation of Polynomial, Implementation of Stack and Queue.

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TREES

(20%)

Definition, Binary Trees and its properties, Binary Search Tree, Representation of Tree using Array and Linked List, Operations on Binary trees (Creation , Traversal : Preorder, Post order, Inorder, converse Preorder, Converse Inorder, Converse Postorder, Search, Deletion), Applications of Binary trees, Threaded Binary tree, Heap Tree, B-trees, AVL trees, Expression tree, Forests (Introduction), Conversion of Forest into Binary Tree , Heap Sort.

GRAPHS

(20%)

Introduction to Graphs, Weighted Graphs, Representation of Graph: Adjacency Matrix, Adjacency List, DFS, BFS algorithms, Minimum Spanning Trees: Prim's Algorithm, Greedy Method, Application :Traveling Salesman problem. PERT and CPM

TEXT BOOK :

- Classical Data Structure, D. Samanta, PHI

REFERENCE:

- Data Management and File Structure, Mary ,E .S. Loomis, PHI
- Data Structures Using C, M. Radhakrishnan & V. Srinivasan
- Data Structures And Algorithm Analysis In C, Mark Allen Weiss
- Data Structures Using C & C++, Tananbaum, PHI.
- Data Structures And Algorithms, Trembley & Sorensson, TMH
- Data Structures, Lipschuists, Schaum's Series,Mcgraw Hill
- Data Structure & Program Design In C : Robert Kruse, C.L.Tondo , Bruse Leung , PHI

PRACTICALS BASED ON SYLLABUS USING C & C++ ONLY.
TERMWORK SHOULD BE BASED ON THE SYLLABUS



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**BCA203 MATHEMATICAL FOUNDATION OF COMPUTER
 SCIENCE**

TEACHING		EXAMINATIONS				
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3	-	20	10	70	-	100

CONNECTIVES (10%)

Introduction, Objectives, Statements, Connectives, Negation, Conjunction, Disjunction, Conditional and Bi-conditional, Equivalence of Formulae and Well Formed Formulae, Two State Devices, Gate and Module, Two Level Networks, NOR and NAND gates.

NORMAL FORMS AND THE THEORY OF INFERENCES (10%)

Introduction Disjunctive normal forms, Conjunctive normal forms, Principal Disjunctive forms, Principal Conjunctive forms. Valid inferences using truth table and direct method of proof, Rules of inference (Rule P, T and CP), implications, Equivalence, Consistency of Premises and indirect method of proof

RELATIONS AND ORDERING (15%)

Introduction, Relations, Relation in a set, Binary relation in a set, Domain and range of a relation, Total no. of distinct relation from a set A to B, graph of relations, Relations and sets of Ordered pairs, Types of relations in a set, Properties of relations in a set, Equivalence Relation, More example on relations, Equivalence classes or Equivalence sets, Partitions, Partial Order Relations, Hasse diagram, Upper and Lower Bounds, Minimal, Maximal element, Binary Operations, Closure Operation.

POSETS AND LATTICES (10%)

Introduction, Posets, Lattices as Posets, Lattices as algebraic systems, Sublattices, Complete Lattices, Bounds of Lattices, Modular and distributive lattices, Complemented Lattice, Chains.

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BOOLEAN ALGEBRA **(10%)**

Introduction, Definition and important properties, Subboolean Algebra, Atoms, Anti atoms Irreducible, Stone's representation theorem(without proof), Boolean Expression and their equivalence, Min terms and max terms, Values of Boolean expressions and Boolean Functions.

MATRICES **(20%)**

Algebraic operations (Multiplication) computations of inverse, Rank of Matrix, Solution of Simultaneous Linear equations, Cramer's Rule, Gauss elimination Method, Matrix Inversion Method.

GRAPH THEORY **(25%)**

Introduction to graph, abstract definition of Graph, Isomorphism, Matrix representation of Graphs, Path, Reachability, Connectedness, Node base, Trees, Definitions of basic terms related to trees and Binary trees.

TEXT BOOKS:

- Discrete Mathematics, Schaum's Series.

REFERENCE BOOKS:

- Discrete Mathematical Structure (Third Edition), Bernard Kolman, Robert C. Busby, Sharon Roass :, Prentice Hall Of India Pvt. Ltd.
- Discrete Mathematics And Its Applications, Tata Mcgraw Hill (5th Edition)
, Kenneth .H. Rosen
- Business Mathematics, Dr .D.C.Sancheti And V.K.Kapoor
- Discrete Mathematical Structures With Applications To Computer Science, J. P. Tremblay And R. Manohor, Mcgraw Hill, New Delhi.

NO PRACTICALS

TERMWORK SHOULD BE BASED ON THE SYLLABUS



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BCA 204 SYSTEM ANALYSIS AND DESIGN

TEACHING		EXAMINATIONS				
HRS PER WEEK		INTERNAL		EXTERNAL 3HRS		
THEORY	PRACT	SESSIONAL	TERM WORK	THEORY	PRACT	TOTAL
3	-	20	10	70	-	100

PART-I----- (25%)

INTRODUCTION TO SYSTEMS ANALYSIS AND DESIGN

Business Process Modeling, Information System Components, Business Information Systems, Types of Business Information Systems, Organizational Structure, System Development Techniques and Tools, Overview of Systems Development Methodologies, The Systems Development Life Cycle, Information Technology Department, The Systems Analyst Position

PRELIMINARY INVESTIGATION

The importance of Strategic Planning, A framework for Systems Development, Information Systems Projects, Evaluation of System Requests, Preliminary Investigation Overview, Steps in Preliminary Investigation

REQUIREMENTS MODELING

Systems Analysis Phase Overview, Systems Development Methods, Modeling Tools and Techniques, System Requirements Checklist, Scalability and total Cost of Ownership, Fact Finding, Interviews, Other Fact Finding Techniques, Documentation, Preview of Data; Process and Object Modeling

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PART II----- (30%)

DATA AND PROCESS MODELING

Data Flow Diagrams, Data Dictionary, Process Description Tools, Logical Vs. Physical Models

OBJECT MODELING

Object-oriented Terms and Concepts, Relationships among Objects and Classes, Object Modeling with the Unified Modeling Language

TRANSITION TO SYSTEMS DESIGN

Evaluating Software Alternatives, Steps in Evaluating and Purchasing Software Packages, Completion of Systems Analysis, Transition to System Design, Prototyping, Overview of System Design, Designing and Using Codes

PART III----- (15%)

USER INTERFACE, INPUT AND OUTPUT DESIGN

User Interface Design, Input Design, Output Design Issues, Printed Output

DATA DESIGN

Data Design Concepts, Data Design Terminology, Data Relationships, Normalization, Steps in Database Design, Database Models, Data Storage, Data Control

PART IV----- (30%)

APPLICATION ARCHITECTURE

Design Checklist, Planning the Architecture, Client/Server Architecture, Impact of the Internet, Processing Methods, Network Models, Modeling Application Architecture, System Management and Support, Systems Design Completion

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APPLICATION DEVELOPMENT

Quality Assurance, Overview of Application Development, Structured Application Development, Other Application Development Tools, Coding, Object-oriented Application Development, Testing the Application, Documentation, Management Approval

INSTALLATION AND EVALUATION

Operational and Test Environment, Training, Data Conversion, System Changeover, Post Implementation Task, Final Report to Management

SYSTEMS OPERATION AND SUPPORT

Overview of Systems Support and Maintenance, User Support Activities, Maintenance Activities, Managing Systems Operation and Support, Managing System Performance, System Obsolescence

TEXT BOOK:

- Systems Analysis And Design, 4th Edition, By Shelly / Cashman / Rosenblatt (Thomson)

REFERENCE :

- Systems Analysis And Design, 3rd Edition, By Elias Awad (Galgotia Publications)

NO PRACTICALS.

TERM WORK SHOULD BE BASED ON SYLLABUS ONLY.



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BCA205 ADVANCED VISUAL AND WINDOWS PROGRAMMING

TEACHING		EXAMINATIONS				
HRS PER WEEK		INTERNAL		EXTERNAL 3HRS		
THEORY	PRACT	SESSIONAL	TERM WORK	THEORY	PRACT	TOTAL
3	2	20	10	70	50	150

Introduction to VB.NET (10%)

Over view of a .NET Framework: Versioning and Deployment, Memory Management, Cross-Language Integration, Metadata, IL Disassembler
 The IDE Components like IDE Menu, Toolbox, Solution Explorer, Property Window, Output Window, Command Window, Task List Window.

Namespace and the Imports Keyword, the AssemblyInfo.vb file.

Basics of VB.NET (10%)

Variables (declaration, types, conversion), Constants, Arrays, Variables as Objects, Operators, Flow Control Statements, Modular coding (Subroutines, Functions), Arguments, etc. Appearance of Forms, Loading and Showing Forms, Designing Menus, Building Dynamic Forms at Runtime, MDI Application.

Windows Controls (20%)

TextBox Control, ListBox Control, CheckedListBox, ComboBox Controls, ScrollBar and TrackBar Control, Common Dialog Control, Color Dialog Control, Font Dialog Control, Open and Save As Dialog Control, Print Dialog Box, RichTextBox Control, ListView, TreeView Control, and all other Toolbox's Controls.

OO Features (10%)

Building Class, Encapsulation and Abstraction, Inheritance, Polymorphism

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Basic Framework Classes **(15%)**

Sorting and searching in array, ArrayList Collection, HashTable, SortedList Class, Serialization Class, Char Class, String Class, StringBuilder Class, DateTime Class, Time Span Class, Directory Class, File Class, DirectoryInfo Class, FileInfo Class, Path Class, Accessing files using - FileStream, StreamWriter, StreamReader, BinaryWriter and BinaryReader.

Error Handling and Debugging **(5%)**

Types of Errors, Exceptions and Structured Exception Handling, Debugging

Database Application using ADO.NET **(20%)**

Architecture of ADO.NET, Creating a DataSet, Data Binding, DataAdapter Object, Command Object and DataReader object.

Building Components **(10%)**

Designing, Hosting, and Activating Components, Calling unmanaged DLLs.

TextBook:

- Mastering Visual Basic .NET by E. Petroustos, BPB.

Reference Books:

- Visual Basic .NET Programming by Peter Aitken's. Dreamtech Press
- Building Distributed Applications with Visual Basic .NET by Dam Fox. Techmedia
- VB.NET Programming Developer's Guide by Cameron Wakefield, Henk Evert Sounder, Wei Meng Lee. Dreamtech Press.



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BCA 206 OPERATING SYSTEM AND UNIX

TEACHING		EXAMINATIONS				
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THEORY	PRACT	SESSIONAL	TERM WORK	THEORY	PRACT	TOTAL
3	1	20	10	70	50	150

BCA 206 OPERATING SYSTEM & LINUX/ UNIX

PART:I----- (70%)

INTRODUCTION (5%)

Operating System Software, Types of Operating Systems.

PROCESS MANAGEMENT & PROCESS SYNCHRONIZATION (20%)

Process Scheduling Policies, Process Scheduler, Scheduling Algorithms (FCFS, SJN, Priority, SRT, RR), Parallel Processing, Process Synchronization, Test and set, WAIT and SIGNAL, Semaphores, Process Cooperation, Producer and Consumers, Readers and Writers

DEADLOCK (8%)

Deadlocks, Conditions for deadlock, Deadlock Modeling, Strategies for handling deadlocks, Starvation (The Dining Philosopher Problem)

MEMORY MANAGEMENT (15%)

Single-User Contiguous Scheme, Fixed partition, Dynamic Partition, Allocation and Deallocation Methods, Relocatable Dynamic Partition, Paged Memory Allocation, Demand paging, Page replacement Algorithms (FIFO, LRU), Paging, Segmentation, Virtual Memory

FILE MANAGEMENT (10%)

File manager, Interacting with file manager, File Organization, Physical storage allocation, Data Compression, Access Methods, Access Controls

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DEVICE MANAGEMENT **(10%)**

System Devices, Direct access storage devices, Component of the I/O subsystem, Communication among devices, Management of I/O requests, Device Handler seek strategies.

Introduction and Comparison of Network and Distributed Operating systems **(2%)**

PART- II----- (30%)

LINUX/ UNIX Operating System

INTRODUCTION

The UNIX Operating system, LINUX and GNU, The UNIX Architecture, Features of UNIX.

UNDERSTANDING THE UNIX COMMAND

Locating commands, Internal and external commands, Command structure, Flexibility of Command usage.

GENERAL –PURPOSE UTILITIES

man, cal, date, echo, printf, bc, script, passwd, who, uname, tty

THE FILE SYSTEM OF UNIX

The parent-child relationship, Absolute and relative pathnames, The HOME variable, file attributes, compressing and Archiving files
ls, pwd, mkdir ,cd, rmdir,cat,cp,rm,mv,more, ,file,wc, od, cmp, comm.,
diff, gzip, gunzip, tar, zip and unzip, chmod ,ln, unmask, find

THE SHELL

Working with Bourne shell and Bash shell
Wild-card, Redirection, pipes and tee
(Any editor can be used to write shell script)

COMMUNICATION

finger, talk, mesg, email basics, mailx, pine

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FILTERS

pr, head, tail, cut ,paste grep, egrep, sort, uniq, tr,

SHELL PROGRAMMING

Shell scripts, read, Command line arguments, exit, exit status command, logical operators, Condition execution, evaluation of expression, case, expr computation and String handling, looping, set, shift, Document (<<), trap, debugging,

TEXT BOOKS:

- Understanding Operating Systems Ida M. Flynn/Ann Mciver Mchoes , Thomson Learning (Chapters to be covered are: 1,2,3,4,5,6,7,8 and 10)
- UNIX Concepts and Applications, Sumitabha Das 3rd Edition TMH (Chapters to be covered are: 1,2,3,4,5,6, 9,12,14,and 16
Some of the commands, given in the list to be covered from ch: 7,9,13,15)

REFERENCE:

- Operating System Concepts, Silberschatz & Galvin, Addison Wesley
- The Unix Programming Environment, Brian Kernighan & Pike, PHI
- Student Guide to Unix, Harley Hahn, MGH
- A User Guide to Unix System, Rebecca Thomas & Yeats, TMH

NOTE:

Practicals on Unix/Linux Operating System (Part-II)
Term Work should be based on the entire syllabus



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BCA207 OBJECT-ORIENTED PROGRAMMING WITH C++

TEACHING		EXAMINATIONS				
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3	2	20	10	70	50	150

INTRODUCTION TO OBJECT ORIENTED PROGRAMMING (10%)

Object Oriented programming systems, Comparison of C++ with C, Console Input output in C++, Variables in C++, Reference variables in C++, function prototyping, function overloading, default values for formal arguments of functions, inline functions.

CLASSES AND OBJECTS (15%)

Introduction to classes and objects, member functions and member data, Access specification, objects and functions, objects and arrays, namespaces, nested classes static members, 'this' pointer.

DYNAMIC MEMORY MANAGEMENT

Introduction, dynamic memory allocation, dynamic memory deallocation, the set_new_handler() function.

CONSTRUCTORS AND DESTRUCTORS

Constructors: Zero argument constructor, parameterized constructor, copy constructor, Destructors, the philosophy of OOPs.

(15%)

INHERITANCE (15%)

Introduction to Inheritance, base class and derived class pointers, function overloading, base class initialization, the protected-access specifier, deriving by different access specifier, different kinds of inheritance, order of invocation of constructors and destructors

VIRTUAL FUNCTIONS AND DYNAMIC POLYMORPHISM (10%)

The need for virtual function, Virtual functions, the mechanism of virtual functions, pure virtual functions, virtual destructors and virtual constructors.

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STREAM HANDLING

(10%)

Streams, the class hierarchy for handling streams, text and binary input/output, opening and closing files, files as objects of the fstream class, file pointers, random access to files, object input/output through member functions, error handling and manipulators.

**OPERATOR OVERLOADING, TYPE CONVERSION,
NEW STYLE CASTS AND RTTI**

(15%)

Operator overloading, overloading the various operators, type conversion, new style casts, The typeid operator

TEMPLATES

Introduction, function templates, class templates, the standard template library(STL)

EXCEPTION HANDLING

Introduction, C-style handling of error generating code, c++ style solution-the try/throw/catch construct, limitation of exception handling.

(10%)

TEXT BOOK:

- Object Oriented Programming With C++. By Sourav Sahay, OXFORD

REFERENCE BOOK:

- The Complete Reference-Herbert Schildt, Tata McGraw Hill
- Object Oriented Programming with C++, Balaguruswamy, Tata McGraw Hill
- Object Oriented Programming in Turbo C++-Robert Lafore.
- C++ and OO Programming Paradigm-Debashish Jana, PHI



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BCA 208 SCIENTIFIC AND STATISTICAL COMPUTING

TEACHING		EXAMINATIONS				
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3	1	20	10	70	50	150

NORMALISED FLOATTING POINT AND ERRORS (10%)

Different Types of Errors in Numeric Computation, Floating Point Numbers, Normalize Floating point representation, Pitfalls and algebraic operation(without error Propagation)

NUMERICAL SOLUTION OF NON-LINEAR EQUATIONS (20%)

Introduction and applications of non linear equations, methods of finding solution of non linear equations, Bisection method, False Position method, Secant method, Newton-Raphson methods, General Discussion on convergence of these methods (No Mathematical derivations)

INTERPOLATION AND CURVE FITTING (25%)

Introduction and applications of Interpolation, Inverse interpolation, Extrapolation, Finite Differences, Newton's Forward Difference, Backward Difference, Divided Difference Interpolation Formulas(With proof), Lagrange's Interpolation Formula, Lagrange's inverse Interpolation .Method of Least Square, Fitting of Straight Line, Polynomial, Geometric curve And Exponential curve

FREQUENCY DISTRIBUTION (10%)

Introduction and applications of central tendency, Frequency Tables, Graphs, Frequency Curves, Weighted, Arithmetic, Harmonic and Geometric means, Median, Mode, Variance and Standard deviation

PROBABILITY AND MATHEMATICAL EXPECTATION (25%)

Introduction and various related terms of probability, Conditional probability, Baye's Rule, application of baye,s rule Probability distribution related to mathematical expectation.

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CORRELATION AND REGRESSION

(10%)

Introduction, Definitions, Properties, applications of Correlation and regression, Various methods of correlation, regression equations, Probable error.

TEXT BOOKS:

- Computer Oriented Numerical Methods , Salaria, Khanna Publication.
- Statistics And Soluiton By V.K. Kapoor

REFERENCES :

- Computer Oriented Numerical Methods By
- V. Rajaraman, PHI
- Numerical Methods, E.Balagurusamy, TMH
- Numerical analysis And Computational Procedures By S.A.MOLLAH

Practicals based on the syllabus using C or C++ and excel (simple problems).

Termwork should based on the syllabus



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H. L. INSTITUTE OF COMPUTER APPLICATIONS

FY / SY / TY – BCA

CLASS TEST / ON-LINE TEST

- Class test / On line test for each subject will be conducted periodically.
- For each term, there will be minimum 5 tests for each subject.
- Presence is compulsory in each test. If student is absent for the test, he / she will be given zero mark.
- Marks of all class test has due weight age in the internal marks of the respective subject.

TERM WORK

- Students have to submit term work of respective subjects to the faculty member as per schedule.
- Late submission will not be allowed and for that term work, the marks will be given zero.
- Weight age of each term work will be decided by the faculty.
- Clearly write Name, Class, Division and Roll No. on the file.
- Use Spring files and A4 size ruled papers.
- Index page should be filed properly.
- Collect the evaluated term work file from the faculty as per schedule.