

# NOTE

- 1. The scheme and detailed contents for 2002 and 2003 batches are same except BC-301 Mathematics-II (Computer Oriented ) and BC-403 Computer system Architecture has been interchanged between 3<sup>rd</sup> and 4<sup>th</sup> semester.**
- 2. The scheme and detailed contents for 2003 and 2004 batches are same but one theory paper namely BC-105 Communication Skill is changed as practical only.**

**BCA COURSE STRUCTURE**

Batch : 2004

<b>SEMESTER – I</b>		<b>L</b>	<b>T</b>	<b>P</b>	<b>Int</b>	<b>Ext</b>	<b>Total</b>
BC-101 (N2)	Information Technology	3	1	0	40	60	100
BC-102 (N2)	Mathematics (Bridge Course)	3	1	0	40	60	100
BC-103 (N2)	Basic Accounting	3	1	0	40	60	100
BC-104 (N2)	Programming in C	3	1	0	40	60	100
BC-105 (N2)	Communication Skills (Practical Only)	0	0	2	40	60	100
BC-106 (N2)	Software Lab-I (BC-101 & 103)	0	0	2	40	60	100
BC-107 (N2)	Software Lab-II (BC-104)	0	0	2	40	60	100
							<b>700</b>

**SEMESTER - II**

BC-201 (N2)	Principles of Management	3	1	0	40	60	100
BC-202 (N2)	System Analysis & Design	3	1	0	40	60	100
BC-203 (N2)	Mathematics -I (Discrete)	3	1	0	40	60	100
BC-204 (N2)	Data Structures	3	1	0	40	60	100
BC-205 (N2)	Digital Ckt. & Logic Design	3	1	0	40	60	100
BC-206 (N2)	Hardware lab-I(BC-205)	0	0	2	40	60	100
BC-207 (N2)	Software Lab-III(BC-204)	0	0	2	40	60	100
							<b>700</b>

**SEMESTER - III**

BC-403 (N2)	Computer System Architecture	3	1	0	40	60	100
BC-302 (N2)	Management Information System	3	1	0	40	60	100
BC-303 (N2)	Software Engineering	3	1	0	40	60	100
BC-304 (N2)	Object oriented Programming Using C <sup>++</sup>	3	1	0	40	60	100
BC-305 (N2)	Introduction To Microprocessor	3	1	0	40	60	100
BC-306 (N2)	Software Lab IV (BC-304)	0	0	2	40	60	100
BC-307 (N2)	Hardware Lab II (BC-305)	0	0	2	40	60	100
							<b>700</b>

**SEMESTER - IV**

BC-401 (N2)	Computer Networks	3	1	0	40	60	100
BC-402 (N2)	Data Base Management System	3	1	0	40	60	100
BC-301 (N2)	Mathematics – II (Computer Oriented)	3	1	0	40	60	100
BC-404 (N2)	Operating System	3	1	0	40	60	100
BC-405 (N2)	Workshop On Visual Basic	-	-	4	100	00	100
BC-406 (N2)	Software Lab V (BC-402)	0	0	2	40	60	100
BC-407 (N2)	Software Lab VI (BC-404)	0	0	2	40	60	100
	UNIX / LINUX						
							<b>700</b>

**SEMESTER - V**

BC-501 (N2)	Introduction To Internet & Java	3	1	0	40	60	100
BC-502 (N2)	System Software	3	1	0	40	60	100
BC-503 (N2)	Computer Graphics	3	1	0	40	60	100
BC-504 (N2)	Operation Research	3	1	0	40	60	100
BC-505 (N2)	Software Lab VII (Major Project – I)	0	0	4	40	60	100
BC-506 (N2)	Software Lab VIII (BC-501)	0	0	2	40	60	100
BC-507 (N2)	Software Lab IX (BC-503)	0	0	2	40	60	100
							<b>700</b>

**SEMESTER - VI**

BC-601 (N2)	Artificial Intelligence	3	1	0	40	60	100
BC-602 (N2)	Handling Operating Systems	3	1	0	40	60	100
BC-603 (N2)	Software Lab – X (Major Project-II)	0	0	4	40	60	100
BC-604 (N2)	Software Lab – XI (Web Designing)	0	0	4	40	60	100
BC-605 (N2)	Software Lab – XII (BC-602)	0	0	2	40	60	100
BC-606 (N2)	Seminar (BC-603)	0	0	0	100	0	100
BC-607 (N2)	Comprehensive Viva-Voce	0	0	0	0	100	100
							<b>700</b>

**BCA COURSE STRUCTURE**

Batch : 2003

<b>SEMESTER – I</b>		<b>L</b>	<b>T</b>	<b>P</b>	<b>Int</b>	<b>Ext</b>	<b>Total</b>
BC-101 (N2)	Information Technology	3	1	0	40	60	100
BC-102 (N2)	Mathematics (Bridge Course)	3	1	0	40	60	100
BC-103 (N2)	Basic Accounting	3	1	0	40	60	100
BC-104 (N2)	Programming in C	3	1	0	40	60	100
BC-105 (N2)	Communication Skills	0	0	2	40	60	100
BC-106 (N2)	Software Lab-I (BC-101 & 103)	0	0	2	40	60	100
BC-107 (N2)	Software Lab-II (BC-104)	0	0	2	40	60	100
							<b>700</b>

**SEMESTER - II**

BC-201 (N2)	Principles of Management	3	1	0	40	60	100
BC-202 (N2)	System Analysis & Design	3	1	0	40	60	100
BC-203 (N2)	Mathematics -I (Discrete)	3	1	0	40	60	100
BC-204 (N2)	Data Structures	3	1	0	40	60	100
BC-205 (N2)	Digital Ckt. & Logic Design	3	1	0	40	60	100
BC-206 (N2)	Hardware lab-I(BC-205)	0	0	2	40	60	100
BC-207 (N2)	Software Lab-III(BC-204)	0	0	2	40	60	100
							<b>700</b>

**SEMESTER - III**

BC-403 (N2)	Computer System Architecture	3	1	0	40	60	100
BC-302 (N2)	Management Information System	3	1	0	40	60	100
BC-303 (N2)	Software Engineering	3	1	0	40	60	100
BC-304 (N2)	Object oriented Programming Using C <sup>++</sup>	3	1	0	40	60	100
BC-305 (N2)	Introduction To Microprocessor	3	1	0	40	60	100
BC-306 (N2)	Software Lab IV (BC-304)	0	0	2	40	60	100
BC-307 (N2)	Hardware Lab II (BC-305)	0	0	2	40	60	100
							<b>700</b>

**SEMESTER - IV**

BC-401 (N2)	Computer Networks	3	1	0	40	60	100
BC-402 (N2)	Data Base Management System	3	1	0	40	60	100
BC-301 (N2)	Mathematics – II (Computer Oriented)	3	1	0	40	60	100
BC-404 (N2)	Operating System	3	1	0	40	60	100
BC-405 (N2)	Workshop On Visual Basic	-	-	4	100	00	100
BC-406 (N2)	Software Lab V (BC-402)	0	0	2	40	60	100
BC-407 (N2)	Software Lab VI (BC-404)	0	0	2	40	60	100
	UNIX / LINUX						
							<b>700</b>

**SEMESTER - V**

BC-501 (N2)	Introduction to Internet & Java	3	1	0	40	60	100
BC-502 (N2)	System Software	3	1	0	40	60	100
BC-503 (N2)	Computer Graphics	3	1	0	40	60	100
BC-504 (N2)	Operation Research	3	1	0	40	60	100
BC-505 (N2)	Software Lab VII (Major Project – I)	0	0	4	40	60	100
BC-506 (N2)	Software Lab VIII (BC-501)	0	0	2	40	60	100
BC-507 (N2)	Software Lab IX (BC-503)	0	0	2	40	60	100
							<b>700</b>

**SEMESTER - VI**

BC-601 (N2)	Artificial Intelligence	3	1	0	40	60	100
BC-602 (N2)	Handling Operating Systems	3	1	0	40	60	100
BC-603 (N2)	Software Lab – X (Major Project-II)	0	0	4	40	60	100
BC-604 (N2)	Software Lab – XI (Web Designing)	0	0	4	40	60	100
BC-605 (N2)	Software Lab – XII (BC-602)	0	0	2	40	60	100
BC-606 (N2)	Seminar (BC-603)	0	0	0	100	0	100
BC-607 (N2)	Comprehensive Viva-Voce	0	0	0	0	100	100
							<b>700</b>

**BCA COURSE STRUCTURE**

Batch : 2002

<b>SEMESTER – I</b>		<b>L</b>	<b>T</b>	<b>P</b>	<b>Int</b>	<b>Ext</b>	<b>Total</b>
BC-101 (N2)	Information Technology	3	1	0	40	60	100
BC-102 (N2)	Mathematics (Bridge Course)	3	1	0	40	60	100
BC-103 (N2)	Basic Accounting	3	1	0	40	60	100
BC-104 (N2)	Programming in C	3	1	0	40	60	100
BC-105 (N2)	Communication Skills	0	0	2	40	60	100
BC-106 (N2)	Software Lab-I (BC-101 & 103)	0	0	2	40	60	100
BC-107 (N2)	Software Lab-II (BC-104)	0	0	2	40	60	100
							<b>700</b>

**SEMESTER - II**

BC-201 (N2)	Principles of Management	3	1	0	40	60	100
BC-202 (N2)	System Analysis & Design	3	1	0	40	60	100
BC-203 (N2)	Mathematics -I (Discrete)	3	1	0	40	60	100
BC-204 (N2)	Data Structures	3	1	0	40	60	100
BC-205 (N2)	Digital Ckt. & Logic Design	3	1	0	40	60	100
BC-206 (N2)	Hardware lab-I(BC-205)	0	0	2	40	60	100
BC-207 (N2)	Software Lab-III(BC-204)	0	0	2	40	60	100
							<b>700</b>

**SEMESTER - III**

BC-301 (N2)	Mathematics – II (Computer Oriented)	3	1	0	40	60	100
BC-302 (N2)	Management Information System	3	1	0	40	60	100
BC-303 (N2)	Software Engineering	3	1	0	40	60	100
BC-304 (N2)	Object oriented Programming Using C <sup>++</sup>	3	1	0	40	60	100
BC-305 (N2)	Introduction To Microprocessor	3	1	0	40	60	100
BC-306 (N2)	Software Lab IV (BC-304)	0	0	2	40	60	100
BC-307 (N2)	Hardware Lab II (BC-305)	0	0	2	40	60	100
							<b>700</b>

**SEMESTER - IV**

BC-401 (N2)	Computer Networks	3	1	0	40	60	100
BC-402 (N2)	Data Base Management System	3	1	0	40	60	100
BC-403 (N2)	Computer System Architecture	3	1	0	40	60	100
BC-404 (N2)	Operating System	3	1	0	40	60	100
BC-405 (N2)	Workshop On Visual Basic	-	-	4	100	00	100
BC-406 (N2)	Software Lab V (BC-402)	0	0	2	40	60	100
BC-407 (N2)	Software Lab VI (BC-404)	0	0	2	40	60	100
	UNIX / LINUX						
							<b>700</b>

**SEMESTER - V**

BC-501 (N2)	Introduction To Internet & Java	3	1	0	40	60	100
BC-502 (N2)	System Software	3	1	0	40	60	100
BC-503 (N2)	Computer Graphics	3	1	0	40	60	100
BC-504 (N2)	Operation Research	3	1	0	40	60	100
BC-505 (N2)	Software Lab VII (Major Project – I)	0	0	4	40	60	100
BC-506 (N2)	Software Lab VIII (BC-501)	0	0	2	40	60	100
BC-507 (N2)	Software Lab IX (BC-503)	0	0	2	40	60	100
							<b>700</b>

**SEMESTER - VI**

BC-601 (N2)	Artificial Intelligence	3	1	0	40	60	100
BC-602 (N2)	Handling Operating Systems	3	1	0	40	60	100
BC-603 (N2)	Software Lab – X (Major Project-II)	0	0	4	40	60	100
BC-604 (N2)	Software Lab – XI (Web Designing)	0	0	4	40	60	100
BC-605 (N2)	Software Lab – XII (BC-602)	0	0	2	40	60	100
BC-606 (N2)	Seminar (BC-603)	0	0	0	100	0	100
BC-607 (N2)	Comprehensive Viva-Voce	0	0	0	0	100	100
							<b>700</b>

**Introduction to Information Technology****BC-101(N2)****Max. Marks 100****Internal Assessment 40****External Assessment 60****Instruction for paper setter**

The question paper will consist of two sections A and B. Sections B will have Six questions and will carry 10 marks each. Section A will have 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 20 marks in all.

**Instructions for Candidates**

Candidates are required to attempt four questions from section B and the entire section A. Use of non-programmable scientific calculator is allowed

Use of non-programmable scientific calculator is allowed

Computer Fundamentals: Number Systems, History of Computers, Block diagram of computer & detailed significance of each part.

Study of I/O devices : Keyboard, Hard disk, Floppy disk, CD-ROM, DVD, Plotters, Scanners, mouse, Printers: Dot matrix, Laser, Thermal Inkjet, VDU.

Primary & secondary memories.

Introduction to Operating Systems & its functions

Definition of Simple batch processing, multiprogramming, multiprocessing, real-time, time-sharing systems, Concept of Spooling,

Typical DOS commands, making simple batch files.

Application of Computers in various fields : Defense, Industry, Management, Sports, Commerce, Internet.

Computer and communication: Single user, Multi-user, Workstations, and Overview of LAN, WAN:  
Overview of modem, E-Mail, Fax  
Internet facilities through WWW

**REFERENCES**

- |                           |                           |               |
|---------------------------|---------------------------|---------------|
| 1.Larry long & Nancy long | Computers                 | Prentice Hall |
| 2.V.Rajaraman             | Fundamentals Of Computers | Prentice Hall |
| 3.P.K.Sinha               | Computer Fundamentals     |               |
| 4.Basandra                | Computer Today            |               |
| 5.Leon & Leon             | Internet For Everyone     |               |

**MATHEMATICS (BRIDGE COURSE)****BC-102(N2)****Max. Marks: 100**  
**Internal Assessment: 40**  
**External Assessment: 60****Instruction for paper setter**

The question paper will consist of two sections A and B. Sections B will have Six questions and will carry 10 marks each. Section A will have 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 20 marks in all.

**Instructions for Candidates**

Candidates are required to attempt four questions from section B and the entire section A. Use of non-programmable scientific calculator is allowed

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Set relations and functions: elements of a set, methods of describing a set, types of set, Venn diagram, operations on sets, union, intersection and difference of set, Duality, partitioning of a set, trigonometric functions.

Binomial theorem and principle of mathematics induction

Introduction to matrix, properties of matrix; evaluation of determinant, minor and cofactors and properties of determinant

Statistics: introduction to statistics, collection, and tabulation of data, mean, median and mode.

**Reference:**

Refresher Course On Mathematics Vol: 2--- Manjit Singh  
ABC Of Mathematics J.P Mahendru

***Note: This course is compulsory for all the students.***

**BC-103(N2)**

**Basic Accounting**

**Max. Marks: 100**

**Internal Assessment: 40**

**External Assessment: 60**

**Instruction for paper setter**

The question paper will consist of two sections A and B. Sections B will have Six questions and will carry 10 marks each. Section A will have 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 20 marks in all.

**Instructions for Candidates**

Candidates are required to attempt four questions from section B and the entire section A. Use of non-programmable scientific calculator is allowed

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Basic Accounting: Introduction, importance and scope, concepts and conventions-  
Generally accepted accounting principles-double entry framework  
Basic concepts of Journals, ledgers, purchase book, sales book, cashbook.

Preparation of financial statements: Profit and loss account and balance sheet.

Nature, scope, advantage and limitations of management accounting.

Sources of raising of capital in corporate undertaking –simple treatment to issue of shares, forfeiture of shares and re – issue of forfeited shares.

Application of computers in accounting.

**REFERENCE:**

- |                          |   |
|--------------------------|---|
| 1. Bhattacharya & Deaden | Accounting for management (Vikas 1986)    |
| 2. R.L Gupta & V.K Gupta | Financial Accounting (Part I and Part II) |
| 3. S.N. Maheshwari       | Fundamental Accountancy                   |
| 4. Antony & Reece        | Accounting Principal                      |
| 5. Jawahar Lal           | Managerial Accounting                     |

**Programming in 'C'****BC-104(N2)****Max. Marks: 100  
Internal Assessment: 40  
External Assessment: 60****Instruction for paper setter**

The question paper will consist of two sections A and B. Sections B will have Six questions and will carry 10 marks each. Section A will have 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 20 marks in all.

**Instructions for Candidates**

Candidates are required to attempt four questions from section B and the entire section A. Use of non-programmable scientific calculator is allowed

**Fundamentals:** Character set, Identifiers & Keywords, Data Types, constants, set, constants, variables, expressions, statement, symbolic constants.

**Operations and expressions:** Arithmetic operators, unary operators, relational and logical operators, assignment and conditional operators, and library functions.

**Data input and output:** Preliminaries, single character input, single character output, entering input data, more about the scanf function, writing output data, more about printf function, the gets and puts function, interactive programming.

**Control statements:** Preliminaries, while, do-while and for statements. Nested loops, if else, switch, break continue statement.

**Functions:** Brief overview, defining accessing function, passing perimeters to function, specifying argument data types, function prototype and recursion.

**Program structure:** Storage classes, automatic, external, and static variables, more about library functions.

**Array:** defining and processing an array, passing pointers to a function, pointer and one dimensional arrays, operations on pointers, passing functions multidimensional arrays of pointers, passing functions to the other functions, more about pointer declarations.

**Structure And Unions:** Defining and processing a structure, user defined data types, structure and Pointers, passing structure to function, self-referential structures, unions.

**Data files:** Opening, closing, creating, and processing and unformatted data field.

**C-programming applications:** Sorting (Bubble sort, Selection sort), Searching (Binary search, Linear Search).

**REFERENCE:**

- |                         |  |                    |
|-------------------------|--|--------------------|
| 1. E.Balaguruswamy      | Programming in ansi 'C'                | (Tata McGraw Hill) |
| 2. Byron Gottorfried    | Schaum's outline of programming with C | (Tata McGraw Hill) |
| 3. Kerighan & Richie    | The C programming language             | (PHI Publication)  |
| 4. Lafore R             | Object Oriented Programming            | (Galgotia)         |
| 5. Aaron M. Tannen Baum | Data structures using C                | (PHI publication)  |

<b>BC-106(N2)</b>	<b>Practical S/W Lab I</b>	<b>Max. Marks 100</b>	
		<b>Internal Practical</b>	<b>40</b>
		<b>External Practical</b>	<b>60</b>

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Based on BC 101 & BC 103

Familiarizing with PC and WINDOWS commands, file creation, editing and directory creation. Mastery of DOS commands. Learning to use MS Office: MS WORD, MS EXCEL & MS PowerPoint.

Familiarizing with any accounting package.

**Practical Software Lab –II**

**BC-107(N2)**

**Max. Marks 100**  
**Internal Assessment 40**  
**External Assessment 60**

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Paper BC-104

Note: Program should be fully documented with simple I/O data. Flow charts should be developed wherever necessary.

Write program in 'C' language

- 1.Using input and output statements
- 2.Using control statements
- 3.Using functions
- 4.Using arrays
- 5.Using structure
- 6.Using files
- 7.To sort an array using different methods
- 8.To search an element from array

**PRINCIPLES OF MANAGEMENT****BC- 201(N2)****Max. Marks 100****Internal Assessment: 40****External Assessment: 60****Instruction for paper setter**

The question paper will consist of two sections A and B. Sections B will have Six questions and will carry 10 marks each. Section A will have 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 20 marks in all.

**Instructions for Candidates**

Candidates are required to attempt four questions from section B and the entire section A. Use of non-programmable scientific calculator is allowed

Forms of business organizations and ownership: Sole proprietorship, Partnership, Joint stock company, Public & Private undertakings, Government companies.

Management: Meaning & definition of management, nature, scope and its various functions.

Planning : nature and purpose, types, steps in planning ,decision making : Strategic , tactical and operational decision, decision making process, rationality in decision making.

Organizing : nature, importance, the organizing process, organizational objectives, formal and informal organization, organization chart, span of management : factors determining effective span,  
Departmentation : definition, departmentation by function, by territory, product/service customer group ;  
management by objectives (MBO), Delegation, Decentralization v/s centralization.

Staffing : definition, manpower management, factors affecting staffing, Recruitment and selection ,  
Performance appraisal .

Motivation: theories of Motivation; hierarchy of needs theory, theory of X and theory of Y.

Leadership : styles, theories of leadership : trait approach and situational approach, managerial grid.

Controlling : meaning & nature , steps in controlling , essentials of effective control systems.

**REFERENCES:**

- |                      |   |
|----------------------|---|
| 1. Koontz            | Essentials of management                            |
| 2. L.M.Prasad        | Principles & Practices of Management                |
| 3. Y. K. Bhushan     | Management  |
| 4. Prof. Parag Diwan | An Executive's Encyclopedia of Management Practices |

**System Analysis and Design****BC-202(N2)****Max. Marks: 100****Internal Assessment: 40****External Assessment: 60****Instruction for paper setter**

The question paper will consist of two sections A and B. Sections B will have Six questions and will carry 10 marks each. Section A will have 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 20 marks in all.

**Instructions for Candidates**

Candidates are required to attempt four questions from section B and the entire section A. Use of non-programmable scientific calculator is allowed

System Concepts: Definition, characteristics, elements & types of system.

System development life cycle: Recognition of need: Feasibility study, system analysis-introduction, information collection, interviews, questionnaires, observation, record searching and document analysis, analysis tools, data flow diagram, data dictionary, decision tree, structured English and decision table.

System Design: The process and stages of systems design, input/output and file design; System Implementation: System implementation, system testing, implementation process and implementation methods; system maintenance.

**REFERENCE:**

1. Awad Elias N.      System analysis and design (Galgotia)
2. Sen James A.      Analysis and design of information system (Tata McGraw)

BC-203(N2)

**Mathematics-I (Discrete Maths)**

**Max Marks: 100**  
**Internal Assessment: 40**  
**External Assessment 60**

**Instruction for paper setter**

The question paper will consist of three sections A, B and C. Sections A and B will have four questions each from the section A and B of the syllabus and will carry 10 marks each. Section C will have 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 20 marks in all.

**Instructions for Candidates**

Candidates are required to attempt two questions each from section A and B and the entire section C. Use of non-programmable scientific calculator is allowed

**Section A**

Set theory. Relations and functions: Set notations and description, subsets, basic set operations. Venn diagrams, laws of set theory, partition of sets, min sets, duality principle, basic definitions of relations and functions, graphics of relations, properties of relations; injective, surjective and bijective functions, composition.

Combinations: Rule of products, permutations, combinations.

Algebra of Logic: Propositions and logic operations, truth tables and propositions generated by set, equivalence and implication laws of logic, mathematical system, and propositions over a universe, mathematical induction, quantifiers.

**Section B**

Recursion and recurrence: The many faces of recursion, recurrence, relations, and some common recurrence relations, generating functions.

Graph theory: Various types of graphics, simple and multigraphs, directed and undirected graphs, Eulerian and Hamiltonian graph, graph connectivity, traversals, graph optimizations, Graph coloring, trees, spanning trees, rooted trees, binary trees.

**REFERENCE**

- |                               |  |
|-------------------------------|--|
| 1. Doerr A& Kenneth L.        | Applied Discrete Structure of computer Science (Galgotia)                          |
| 2. Swami M.N.S & Thisiraman E | Graphics Networks And Algorithms<br>(John Wiley & Sons)                            |
| 3. Tremblay J.P and Manohar R | Discrete Mathematical structure with application to computer science.(McGraw Hill) |

BC- 204(N2)

**Data Structures****Max Marks 100****Internal Assessment 40****External Assessment 60****Instruction for paper setter**

The question paper will consist of two sections A and B. Sections B will have Six questions and will carry 10 marks each. Section A will have 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 20 marks in all.

**Instructions for Candidates**

Candidates are required to attempt four questions from section B and the entire section A. Use of non-programmable scientific calculator is allowed

**Introduction to Data Structure:** Basic concept of data, Problem analysis , algorithm complexity, Big O notation and time space trade off.

**Stacks & Queues :** Basics of stacks and queues, Recursion, Polish notation, circular Queues, priority Queues.

**Linked Lists :** Single linked list, circular linked list, doubly linked list and dynamic storage management, generalized list, Garbage Collection.

**Trees :** Definition & Concepts, Basic trees, Binary tree representations, threaded storage representation, binary tree traversals, and application of trees.

**Searching and sorting :** use of various data structures for searching and sorting, linear and binary search, insertion sort, selection sort, merge sort, bubble sort, quick sort, Heap sort.

**References:**

1. Schaum Series

2. Niclaus Wirth

1. Tanenbaum

4. Trembley &amp; Soreson

Data Structure

Algorithm + Data Structures &amp; Programs

Data Structures.

An Introduction to Data Structures Applications

BC-205(N2)

**Digital Circuits & Logic Design****Max. Marks: 100****Internal Assessment: 40****External Assessment 60****Instruction for paper setter**

The question paper will consist of two sections A and B. Section B will have Six questions and will carry 10 marks each. Section A will have 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 20 marks in all.

**Instructions for Candidates**

Candidates are required to attempt four questions from section B and the entire section A. Use of non-programmable scientific calculator is allowed

Introduction : Overview of number system and codes. Elements and functions of digital Logic gates, Gate propagation delay time, logic gates applications.

Boolean algebra: Boolean operations, SOP and POS forms, and simplification using karnaugh maps, Realization of expressions using goals.

Combinational logical circuits: design of Binary Adder-Serial, Parallel, Carry look ahead type. Full subtractor, code converters, MUX and DEMUX, encoders and encoders.

Sequential logic circuits: Flip flop: R-S, J-K, Master slave J-K, D and T flip-flops using nand gates.

Counters: Design of asynchronous and synchronous, updown and programmable counters.

Registers: shift registers, various types and their applications.

Detection and correction codes, detecting and correcting an error.

**REFERENCE:**

- |                         |   |
|-------------------------|---|
| 1. D. Morris Mano       | Digital Circuits of logic design (PHI)        |
| 2.T.C. Bartee           | Digital and electronic circuits (McGraw Hill) |
| 3. Malvino              | Digital computer electronics                  |
| 4. Floyd                | Digital fundamentals                          |
| 5. R.P. Jain            | Modern digital electronics                    |
| 6. Tauls and Schillings | Digital integrated electronics                |

**Practical Hardware Lab - I****BC-206(N2)****Max. Marks: 100****Internal Assessment: 40****External Assessment: 60**

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Paper BC 205

Note: A subset of following experiments has to perform.

1. To study the functions of basic logic gates and verify the truth table of AND, OR, NOT, X-OR, NAND, NOR.
2. To study applications of AND, OR, NAND, X-OR gates for gating digital signals.
3. To develop the different Arithmetic Circuits:
  - (a) Half-Adder and Subtractor
  - (b) Full-Adder and Subtractor
4. To study the BCD to Binary and Binary to BCD Code converter.
5. Study of Decoder Circuits:
  - (a) BCD-to-Decimal Decoder
  - (b) BCD-to-7-Segment Decoder
6. Study of Encoder Circuits:
  - (a) BCD-to-Decimal Encoder
  - (b) Octal-to-Binary Encoder
7. To study the flip flop circuit using Gates:
  - (a) R-S Flip Flop
  - (b) J-K Flip Flop
  - (c) Master Slave J-K Flip Flop
  - (d) D-Flip Flop
8. To study the R-S, J-K and D Flip Flop Using IC's.
9. Study of Shift Register.
10. Study of Ring Counter.
11. Study of Asynchronous and Synchronous Counters.

**Practical Software Lab -- III**

**BC- 207(N2)**

**Max Marks 100**  
**Internal Assessment 40**  
**External Assessment 60**

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Paper BC 204

Note: Program should be fully documented with sample I/O data Flow charts should be developed wherever necessary.

Write program in C

1. To insert and delete a node in a linked list
2. To add two polynomials using linked list
3. To insert and delete a node in a circular linked list.
4. To implement a stack using arrays and linked list.
5. To implement a queue using arrays and linked list.
6. To invert a linked list.
7. To merge two arrays.
8. To solve polish expression using stacks.
9. For tower of hanoi problem using recursion.
10. To insert and delete node in binary search tree
11. To find traversals of expressions using binary tree
12. To search an element using binary tree.

**Computer System Architecture****BC-403(N2)****Max. Marks: 100****Internal Assessment: 40****External Assessment: 60****Instructions for paper setter**

The question paper will consist of two sections A and B. Sections B will have Six questions and will carry 10 marks each. Section A will have 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 20 marks in all.

**Instructions for Candidates**

Candidates are required to attempt four questions from section B and the entire section A. Use of non-programmable scientific calculator is allowed

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Computer Organization & Design: Instruction codes, op-codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory reference instructions, CPU: Stack Organization, Instruction format, Addressing Formats.

Control Unit Architecture, I/O Architecture: Transfer of Information among I/O devices, CPU, Memory and I/O ports.

Memory System, Storage technologies, Memory hierarchy, Memory mapping, Main memory and Auxiliary memory, Associative and Cache memory

Introductory study of 8-bit Microprocessor

**References:**

- |              |  |     |
|--------------|--|-----|
| 1. M.M. Mano | Computer System Architecture           | PHI |
| 2. J.P.Hayes | Computer Organization and Architecture | TMH |
| 3. R.P.Jain  | Modern Digital Electronics             | TMH |
| 4. Stallings | Computer System Architecture           | PHI |

**MANAGEMENT INFORMATION SYSTEM****BC-302(N2)****Max. Marks 100****Internal Assessment 40****External Assessment: 60****Instructions for paper setter**

The question paper will consist of two sections A and B. Sections B will have Six questions and will carry 10 marks each. Section A will have 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 20 marks in all.

**Instructions for Candidates**

Candidates are required to attempt four questions from section B and the entire section A. Use of non-programmable scientific calculator is allowed

---

Introduction to Systems and Basic Systems Concepts, Types of Systems, The Systems Approach, Information Systems: Definition & Characteristics, Types of Information, Role of Information in Decision - Making, Sub - Systems of an Information system: EDP and MIS, management levels, EDP/MIS/DSS.

An overview of Management Information System: Definition & Characteristics, Components of MIS, Frame Work for Understanding MIS: Robert Anthony's Hierarchy of Management Activity, Information requirements & Levels of Management, Simon's Model of decision- Making, Structured Vs Un-structured decisions, Formal Vs. Informal systems.

Developing Information Systems: Analysis & Design of Information Systems: Implementation & Evaluation, Pitfalls in MIS Development.

Functional MIS: A Study of Marketing, Personnel, Financial and Production MIS.

**References:**

1. J. Kanter, "Management /information Systems", PHI.
2. Gordon B. Davis & M.H. Olson, "Management Information Systems : Conceptual Foundation, structure & Development".
3. Robert G. Murdick & Joel E. Ross & James R. Claggett, "Information Systems for Modern Management" PHI.
4. Lucas, "Analysis, Design & Implementation of Information System.

**Software Engineering****BC- 303(N2)****Max. Marks: 100  
Internal Assessment: 40  
External Assessment: 60****Instructions for paper setter**

The question paper will consist of two sections A and B. Sections B will have Six questions and will carry 10 marks each. Section A will have 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 20 marks in all.

**Instructions for Candidates**

Candidates are required to attempt four questions from section B and the entire section A. Use of non-programmable scientific calculator is allowed

---

Software: Characteristics, Components, Applications, Software Process Models: Waterfall, Spiral, Prototyping, Fourth Generation Techniques, Concepts of Project Management, Role of Metrics & Measurements.

S/W Project Planning: Objectives, Decomposition techniques: S/W Sizing, Problem-based estimation, Process based estimation, Cost Estimation Models: COCOMO Model, The S/W Equation, System Analysis: Principles of Structured Analysis, Requirement analysis, DFD, Entity Relationship diagram, Data dictionary.

S/W Design: Objectives, Principles, Concepts, Design methodologies: Data design, Architectural design, procedural design, Object -oriented concepts

Testing fundamentals: Objectives, principles, testability, Test cases: White box & Black box testing, Testing strategies: verification & validation, unit test, integration testing, validation testing, system testing

**References:**

1. Roger. S. Pressman, "Software Engineering - A Practitioner's Approach", Third Edition, McGraw Hill, 1992
2. R.E. Fairley, "Software Engineering Concepts", McGraw-Hill, 1985.
3. Jalota, "An Integrated Approach to Software Engineering", (Narosa Publishing House, 1992)

**Object Oriented Programming using C++**

BC- 304(N2)

**Max Marks: 100**  
**Internal Assessment: 40**  
**External Assessment: 60**

**Instructions for paper setter**

The question paper will consist of two sections A and B. Section B will have Six questions and will carry 10 marks each. Section A will have 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 20 marks in all.

**Instructions for Candidates**

Candidates are required to attempt four questions from section B and the entire section A. Use of non-programmable scientific calculator is allowed

---

Introduction: Object oriented programming, characteristics of object orientated languages, classes, C++ basics: Program Statements, Variables and constants, Loops and Decisions.

Functions: Defining a function, function arguments & passing by value, arrays & pointers, function & strings, functions & structures.

Classes & Objects: Defining class, class constructors and destructors, operator overloading.

Class Inheritance: Derived class & base class; Virtual, Friends and Static functions; Multiple inheritance, Polymorphism.

Input/output files: Streams, buffers & iostreams, header files, redirection, file input and output.

**References:**

- |                    |  |
|--------------------|--|
| 1. Stephen Prata   | The Walte Group's c++ primer plus Galgotia publications                          |
| 2. Robert Lafore   | The Walte Group's object oriented programming in Turbo C++ Galgotia publications |
| 3. E Balaguruswamy | Object oriented programming with C++ Tata McGraw Hill                            |

**INTRODUCTION TO MICROPROCESSOR****BC- 305(N2)****Max Marks: 100  
Internal Assessment: 40  
External Assessment: 60****Instructions for paper setter**

The question paper will consist of two sections A and B. Sections B will have Six questions and will carry 10 marks each. Section A will have 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 20 marks in all.

**Instructions for Candidates**

Candidates are required to attempt four questions from section B and the entire section A. Use of non-programmable scientific calculator is allowed

---

Introduction to Microprocessor, its historical background and its applications.

**INTEL 8085**

Introduction, Microprocessor Architecture and its operations, 8085 MPU and its architecture, 8085 instruction cycle, 8085 Instructions :Data Transfer instructions, Arithmetic instructions, logical instructions, Branch instructions, RISC v/s CISC processors.

**INTEL 8086**

Introduction, 8086 Architecture, real and Protected mode memory Addressing, Memory Paging Addressing Modes.

Various types of instructions: Data movement, Arithmetic and logic; and program control. Type of instructions, Pin diagram of 8086, clock generator (8284A)

**INTERRUPTS:**

Introduction, 8257 Interrupt controller, basic DMA operation and 8237 DMA Controller, Arithmetic coprocessor, 80X87 Architecture.

**REFERENCES:**

1. B. Brey                      The intel micro processors 8086/8086, 80186/80188, 80286, 80386, 80486 pentium pro processor Architecture, programming and interfacing 4th Edition.
2. B. Ram                      Fundamentals of microprocessors and HI microcomputers Dhanpat Rai Publication.
3. Ramesh S. Gaonkar      Microprocessor Architecture ,Programming and Applications with 8085, 4<sup>th</sup> edition , Penram International Publishing (India)

**Practical S/W Lab-IV**

**BC-306(N2)**

**Max. Marks 100**  
**Internal Assessment 40**  
**External Assessment 60**

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Paper BC-304

Note: Program should be fully documented with simple I/O data. Flow charts should be developed wherever necessary.

Write program in 'C++' language

- 1.Using input and output statements
- 2.Using control statements.
- 3.Using functions.
- 4.Using array
- 5.Using Classes and implementation of Constructor and Destructor.
- 6.Using files.
- 7.Using OOP's Concepts (Inheritance, Polymorphism, Encapsulation, Friend and Static Functions)

**Practical Hardware Lab - II****BC-307(N2)****Max. Marks100  
Internal Assessment 40  
External Assessment 60**

Paper BC 305

Using 8085 and 8086 microprocessor kits do the following programs:

**8085**

1. To examine and modify the contents of a register and memory location.
2. To add two hexadecimal nos.
3. To subtract two hexadecimal nos.
4. To add two hexadecimal nos. The result should not be greater than 199.
5. To add two sixteen bit nos.
6. To subtract two sixteen bit nos.
7. For addition of 8 bit no series neglecting the carry generated.
8. To separate hexadecimal number into two digits(Breaking the byte into two nibbles).

**8086**

- 1.To add two binary nos each 8 bit long.
- 2 To add two binary nos each 8 bit long.
- 3.To find the maximum no in a given string (16 bytes long ) and store it in a particular location.
- 4.To find the minimum no in a given string (16 bytes long ) and store it in a particular location.
- 5.To sort a string of a no of bytes in descending order.
- 6.To multiply an ASCII string of eight numbers by single ASCII digit.
- 7.To calculate the no. of bytes in a string starting from a particular location up to an Identifier (data byte) placed in AL register. Store the actual count in a particular memory Location.
8. To multiply two nos.

**Computer Networks****BC-401N2)****Max. Marks 100****Internal Assessment 40****External Assessment: 60****Instructions for paper setter**

The question paper will consist of two sections A and B. Sections B will have Six questions and will carry 10 marks each. Section A will have 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 20 marks in all.

**Instructions for Candidates**

Candidates are required to attempt four questions from section B and the entire section A. Use of non-programmable scientific calculator is allowed

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Data communications concepts: Digital and analog parallel and serial synchronous and asynchronous, simplex, half duplex, full duplex, multiplexing.

Communication channels: Wired transmissions: Telephone lines, leased lines, switch line, coaxial cables-base band, broadband, optical fiber transmission.

Wireless transmission: Microwave transmission, infrared transmission, laser transmission, radio transmission, and satellite transmission.

Communication switching techniques; Circuit switching, message switching, packet switching.

Network reference models; Network topologies, OSI references model, TCP/IP reference model, comparison of OSI and TCI reference model.

Data link layer design issue: Services provided to the network layer, framing, error control, flow control HDLC, SDLC, data link layer in the internet (SLIP, PPP).

MAC sub layer: CSMA/CD, IEEE standards, FDM, TDM, CDMA.

The Network Layer: Design Issues, Routing Algorithms: Optimality principled, shortest path routing, Concept of Internet Working.

**REFERENCE:**

- |    |                    |                                  |       |
|----|--------------------|----------------------------------|-------|
| 1. | Tanne Baun, Andrew | Computer Networks                | (PHI) |
| 2. | S.K. Bansandra     | Computer Today (Galgotia)        |       |
| 3. | Black, Ulysee      | Data Communication System        | (PHI) |
| 4. | Stalling           | Data and Computer Communications | (PHI) |

**Data Base Management System****BC-402(N2)****Max. Marks 100****Internal Assessment 40****External Assessment: 60****Instructions for paper setter**

The question paper will consist of two sections A and B. Sections B will have Six questions and will carry 10 marks each. Section A will have 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 20 marks in all.

**Instructions for Candidates**

Candidates are required to attempt four questions from section B and the entire section A. Use of non-programmable scientific calculator is allowed

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An overview of the DBMS: Concept of database system, Database Administrator and his responsibilities. Physical and Logical data independence. Three level Architecture of database system: the external level, conceptual level and the internal level.

Introduction to Data Models: Entity Relationship Model, Hierarchical, Network and Relational Model. Comparison of Network, Hierarchical and Relational Model.

Relational data model: Relational database, relational algebra and calculus, SQL dependencies, functional, multi-valued and join, normalization.

Database protection: Recovery, concurrency, security, integrity and control.

Distribute database: Structure of distributed database, design of distributed databases.

**REFERENCE:**

1. C.J. Date, "An Introduction to Data Base Systems", Narosa Publications.
2. Henry F. Korth, "Database System Concepts", McGraw Hill.
3. Naveen Prakash, "Introduction to Database Management", TMH
4. Bipin C. Desai, "An Introduction to Database System", Galgotia Publications.
5. Ullman, "Principles of Database Systems", Galgotia Publications.

**Mathematicss - II (Computer Oriented Methods)****BC-301 (N2)****Max Marks: 100  
Internal Assessment: 40  
External Assessment: 60****Instruction for paper setter**

The question paper will consist of three sections A, B and C. Sections A and B will have four questions each from the section A and B of the syllabus and will carry 10 marks each. Section C will have 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 20 marks in all.

**Instructions for Candidates**

Candidates are required to attempt two questions each from section A and B and the entire section C. Use of non-programmable scientific calculator is allowed

**SECTION A**

**Matrix Algebra:** Introduction of a matrix, its different kinds, matrix addition and scalar multiplication, Multiplication of matrices, Square matrix, Rank of a matrix, Transpose, Adjoint and Inverse of a matrix

Solving simultaneous equations using Gauss elimination method, Gauss Jordan Method and matrix inversion method

Statistics : Measures of central tendency. Preparing frequency distribution table, arithmetic mean, geometric mean, harmonic mean, median and mode. Measures of dispersion: Range, mean deviation, standard deviation, co-efficient of variation, moments, Skewness and Kurtosis

**SECTION B**

**Differential Calculus:** Introduction, Differentiation, Derivative of a Function of One Variable, Power Function, Sum and Product of Two Functions, Function of a Function, Differentiation by method of substitution, Maxima and Minima

**Integral Calculus:** Indefinite Integral, Integration by substitution, integration by parts,, Integration by partial fractions, definite integral.

Numerical integration : Trapezoidal method, simpson's 1/3 rule, simpson's 3/8 rule.

**REFERENCES:**

Rajaraman    Computer Oriented numerical methods  
B.S.Grewal    Numerical methods to Engg.  
D.C.Sancheti    Business Mathematics

**OPERATING SYSTEMS****BC-404(N2)****Max marks 100  
Internal assessment 40  
External Assessment: 60****Instructions for paper setter**

The question paper will consist of two sections A and B. Sections B will have Six questions and will carry 10 marks each. Section A will have 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 20 marks in all.

**Instructions for Candidates**

Candidates are required to attempt four questions from section B and the entire section A. Use of non-programmable scientific calculator is allowed

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Introduction to Operating System, its need and Operating System services; Operating System classification - single user, multi-user, simple batch processing, Multiprogramming, Multitasking, Parallel system, Distributed system, Real time system.

Process Management : Process Concept, Process scheduling, Overview of Inter-Process communication, CPU Scheduling : Basic concepts, Scheduling Criteria, Scheduling Algorithms.

Memory Management: Logical Versus Physical address space, Swapping Partition, paging and segmentation, concepts of Virtual Memory.

File Management: File concept, access methods, Directory Structure, file protection. Allocation methods: Contiguous, linked and index allocation.

Deadlocks: Deadlock Characteristics, Prevention, Avoidance, Detection and Recovery, critical section, synchronization hardware, semaphores, combined approach to deadlock handling.

Security: Authentication, Program Threats, System Threats, and Encryption.

**REFERENCES:**

- |    |                     |  |
|----|---------------------|--|
| 1. | Silberschatz Galvin | Operating system concepts                            |
| 2. | D.M. Dhamdhare      | System programming and operating system              |
| 3. | Milan Milenkovic    | Operating system                                     |
| 4. | Deital H.M.         | An introduction to operating system (Addison Wesley) |
| 5. | P.Brinch Hansen     | Operating system principles (PHI)                    |
| 6. | Stalling, W         | Operating system (PHI)                               |

**Workshop On Visual Basic**

**BC-405(N2)**

**Max. Marks 100**  
**Internal Assessment 100**

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Develop an Application using Visual Basic

1. Bank transactions management
2. Hotel Management
3. Gas agency management
4. Office automation
5. Railway reservation
6. Computerisation course registration
7. Hostel management
8. Hospital management
9. Inventory management
10. Competitive examination database
11. Air line reservation
12. Transport management
13. College admission
14. Library management

Note: Any Relational Database System can be used as back end.

**Practical S/W Lab - V**

**BC-406(N2)**

**Max. Marks 100**  
**Internal Assessment 40**  
**External Assessment 60**

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This laboratory course will mainly comprise of exercise on what is learnt under the paper: **BC-402 (DBMS)**.

Maximum Marks For Continuous Assessment: 40

Maximum Marks For University Examination: 60

Note: The break up of marks for the practical will be as under

Lab Record	15 marks
Viva Voce	15 marks
Program development And execution	30 marks

**Practical S/W Lab - VI**

**BC-404(N2)**

**Max. Marks 100**  
**Internal Assessment 40**  
**External Assessment 60**

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**Paper BC 405**

Practical to Learn Unix/Linux commands.

Note: The break up of marks for the practical will be as under

Lab Record	15 marks
Viva Voce	15 marks
Command Execution	30 marks

**Internet Applications and Java****BC-501(N2)****Max. Marks 100  
Internal Assessment 40  
External Assessment: 60****Instructions for paper setter**

The question paper will consist of two sections A and B. Sections B will have Six questions and will carry 10 marks each. Section A will have 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 20 marks in all.

**Instructions for Candidates**

Candidates are required to attempt four questions from section B and the entire section A. Use of non-programmable scientific calculator is allowed

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Introduction: Internet Architecture board, understanding the internet.

Concept: Working, Surfing and security on the internet.

Internet protocols Internet addressing, internet routing protocols internet message protocol, internet group management protocols, internet mail protocol.

Internet applications: E-mail, multi cost backbone, net news.

Web: World Wide Web advantages of web, web terminology, web access using web browser, locating information on the web.

Introduction to Java: Applets, application & JDK, different b/w Java & C++, working with Java objects: Encapsulation, inheritance & polymorphism, constructors. Garbage collection & finalisers, data types, modifies & expressions, array & flow control statements. Exception handling threads, event handling, network programming & Java virtual machines, Java & databases.

**REFERENCES:**

- |    |                   |                                 |                    |
|----|-------------------|---------------------------------|--------------------|
| 1. | Andews Staunebaum | Computer Networks               | (Tata McGraw Hill) |
| 2. | Harley Haun       | The Internet Complete Reference | (PHI)              |
|    |                   | Mastering Java                  | (BPB Publications) |

## System Software

**BC-502(N2)**

**Max marks 100**  
**Internal Assessment 40**  
**External Assessment: 60**

### **Instructions for paper setter**

The question paper will consist of two sections A and B. Sections B will have Six questions and will carry 10 marks each. Section A will have 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 20 marks in all.

### **Instructions for Candidates**

Candidates are required to attempt four questions from section B and the entire section A. Use of non-programmable scientific calculator is allowed

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Introduction to software processors; elements of assembly language programming; assembly scheme, single pass and two pass assembler; general design procedure of a two pass assembler.

Macros and Macro processor: macro definition, macro expansion, and features of macro facility, design of macro processor.

Overview of compilers - memory allocation, lexical analysis, syntax analysis, Intermediate code generation and optimization - local and global optimization, code generation.

Loaders and linkage editors: Introduction to Loading, linking and relocation, program linking, linkage editors, dynamic linking, bootstrap loader.

Other system software: Operating System, DBMS, Functions and structure of Text Editor.

### **REFERENCES:**

1. Dhamdhare, "Systems Programming and operating systems", TMH, 1996.
2. Donovan, "System Programming". (McGraw-Hill), 1991.

**Computer Graphics****BC-503(N2)****Max marks 100  
Internal Assessment 40  
External Assessment: 60****Instructions for paper setter**

The question paper will consist of two sections A and B. Sections B will have Six questions and will carry 10 marks each. Section A will have 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 20 marks in all.

**Instructions for Candidates**

Candidates are required to attempt four questions from section B and the entire section A. Use of non-programmable scientific calculator is allowed

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Input devices: Keyboard, Touch panel, light pens, Graphic tablets, Joysticks, Trackball, Data glove, Digitizers, Image scanner, Mouse, Voice & Systems.

Hard copy devices: Impact and non impact printers, such as line printer, dot matrix, laser, ink-jet, electrostatic, flatbed and drum plotters.

Video Display Devices Refresh cathode -ray tube, raster scan displays, random scan displays, color CRT-monitors, direct view storage tube, flat-panel displays; 3-D viewing devices, raster scan systems, random scan systems, graphics monitors and workstations.

Scan conversion algorithms for line, circle and ellipse, Bresenham's algorithms, area filling techniques, character generation.

2-dimensional Graphics: Cartesian and Homogeneous co-ordinate system, Geometric transformations (translation, Scaling, Rotation, Reflection, Shearing), Two-dimensional viewing transformation and clipping (line, polygon and text).

3-dimensional Graphics: Geometric transformations (translation, Scaling, Rotation, Reflection, Shearing), Mathematics of Projections (parallel & perspective). 3-D viewing transformations and clipping.

**References:**

1. D. Hearn and M.P. Baker, "Computer Graphics", PHI New Delhi; Second Edition, 1995.
2. J.D. Foley, A.V. Dam, S.K. Feiner, J.F. Hughes, R.L. Phillips. "Introduction to Computer Graphics", Addison-Wesley Publishing company, N.Y.; Second Edition, 1994.
3. R.A. Plastock and G. Kalley, "Computer Graphics", McGraw Hill, 1986.

**OPERATION RESEARCH****BC-504 (N2)****Max Marks: 100**  
**Internal Assessment: 40**  
**External Assessment: 60****Instructions for paper setter**

The question paper will consist of two sections A and B. Sections B will have Six questions and will carry 10 marks each. Section A will have 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 20 marks in all.

**Instructions for Candidates**

Candidates are required to attempt four questions from section B and the entire section A. Use of non-programmable scientific calculator is allowed

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Origin & development of O.R., Nature & Characteristics features of O.R., Models & Modeling in Operation Research. Methodology of O.R., General methods for solving O.R. Models, O.R. & Decision making, Application, Use & Limitations of O.R.

Linear Programming: formulation, Graphical, Big M Method & Simplex Method, Duality in L.P.: Conversion of Primal to Dual only

Transportation Problems: Test for Optimality, Degeneracy in Transportation Problems. Unbalanced Transportation, Assignment Problems, Traveling Salesman Problem.

Decision Making : Decision Making Environment, Decision under uncertainty, Decision under risk, Decision tree Analysis.

Integer Programming and Dynamic Programming: Concept and Advantages only.

**REFERENCES:**

1. Kanti Sawrup, P.K. Gupta and Manmohan, "Operations Research", Sultan Chand & Sons, Seventh Ed.1994.
2. S.D. Sharma, Operations Research", Kedar Nath Ram Nath and Co. Meerut, Tenth Ed. 1992.

**Software Lab – VII (Major Project Phase – I)**

**BC-505(N2)**

**Max. Marks 100**  
**Internal Assessment 40**  
**External Assessment 60**

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Starting of Major Project (Feasibility Study, Requirement Analysis, Design)

Note: The break up of marks for the practical will be as under

Viva Voce	15 marks
System development	45 marks

**Practical S/W Lab –VIII**

**BC-506(N2)**

**Max. Marks 100**  
**Internal Assessment 40**  
**External Assessment 60**

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This paper will comprise of what is learnt under BC – 501 (Java Programming) and

Practical on Internet access to:

- Create E-mail address
- Perform transactions
- Send and receive messages
- Use of search engines

Note: The break up of marks for the practical will be as under

Lab Record	15 marks
Viva Voce	15 marks
Program development And execution	30 marks

**Practical S/W Lab – IX**

**BC-507(N2)**

**Max. Marks 100**  
**Internal Assessment 40**  
**External Assessment 60**

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Paper BC 503

Implement the Following Algorithms using C/C++.

1. Line Drawing Algorithm like DDA, Bresenham.
2. Draw a circle using Bresenham Algorithm.
3. Draw an ellipse using Bresenham Algorithm.
4. To move a character along circle.
5. To rotate a character.
6. To show 2D Clipping and Windowing.

Note: The break up of marks for the practical will be as under

Lab Record	15 marks
Viva Voce	15 marks
Program development	30 marks
And execution	

**Artificial Intelligence****BC-601(N2)****Max. Marks 100  
Internal Assessment 40  
External Assessment: 60****Instructions for paper setter**

The question paper will consist of two sections A and B. Sections B will have Six questions and will carry 10 marks each. Section A will have 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 20 marks in all.

**Instructions for Candidates**

Candidates are required to attempt four questions from section B and the entire section A. Use of non-programmable scientific calculator is allowed

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Introduction to AI: Definitions, AI problems, the underlying assumption, and AI techniques, Level of Model, Criteria for Success.

Problems, Problem Space and Search: defining the problem as a state space search, Production System, Problem Characteristics, Production System Characteristics, issues in design of search programs.

Knowledge Representation Issues: representation and mapping, approaches to knowledge representation, issues in knowledge representation, the frame problem.

Knowledge representation using predicate logic: representing simple facts in logic, representing instance and is a relationships, resolution.

Weak -slot and -filler structures: semantic nets, frames as sets and instances.

Strong slot and filler structures: Conceptual dependency, scripts, CYC.

Natural language processing: syntactic processing, semantic analysis, discourse and pragmatic processing.

**REFERENCES:**

1. E. Rich and K. Knight, "Artificial Intelligence", Tata McGraw Hill.
2. E. Charnaik and D. McDermott, "Introduction to artificial Intelligence", Addison- Wesley Publishing Company

## Handing Operating Systems

**BC-602(N2)**

**Max. Marks 100**  
**Internal Assessment: 40**  
**External Assessment: 60**

### **Instructions for paper setter**

The question paper will consist of two sections A and B. Sections B will have Six questions and will carry 10 marks each. Section A will have 10 short answer type questions, which will cover the entire syllabus uniformly and will carry 20 marks in all.

### **Instructions for Candidates**

Candidates are required to attempt four questions from section B and the entire section A. Use of non-programmable scientific calculator is allowed

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Handing Novel NetWare: Introduction, Installation, configuration, managing resources and users. Granting access rights to users.

Handing Windows NT Server:

Planning: Comparison of Microsoft OS (Windows 95, 98 NT workstation), Workgroups & Domains, choosing disk configuration, choosing Window NT protocols.

Installing & configuration Installing windows NT Server, Windows NT & registry, control panel, configuration protocols & bindings, network adapters, peripherals & devices, hard disk, printing & its client computer.

Managing resources: Managing users & group account, policies & profiles, system policy with system policy editor, disk resources, working with windows NT, the resources, UNC.

Connectivity: Inter operating with NetWare, Configuring remote access service.

### **Reference:**

1. James E. Gaskin                      The complete guide to NetWare 4.11/Internetware (BPB Publication)
2. Joe Cased & Delton                      Windows NT Server 4 (MCSE Training guide) (Techmedia)

**Software Lab – X (Major Project Phase – II)**

**BC-603(N2)**

**Max. Marks 100**  
**Internal Assessment 40**  
**External Assessment 60**

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Continuation of Major Project started in V semester (Code Generation, system testing, Installation and operations & maintenance)

Note: The break up of marks for the practical will be as under

Viva Voce	15 marks
System development	45 marks

**Practical Software Lab – XI (Web Designing)**

**BC-604(N2)**

**Max. Marks 100**  
**Internal Assessment 40**  
**External Assessment 60**

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**Design a Web Page using HTML / DHTML / ASP**

Note: The break up of marks for the practical will be as under

Lab Record	15 marks
Viva Voce	15 marks
Program development And execution	30 marks

**Practical Software Lab - XII**

**BC-605(N2)**

**Max. Marks 100**  
**Internal Assessment 40**  
**External Assessment 60**

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**Paper- BC-602**

**Perform following operations on Novel Netware.**

- ❖ Installation & configuration.
- ❖ Managing resources and users.
- ❖ Granting access rights to users

**Perform following operations on Windows NT Server.**

- ❖ Workgroup & Domain, Choosing Disk Configuration, Choosing Windows NT protocols.
- ❖ Installation Windows NT server, windows NT & registry, control panel, configuring protocols & binding, network adapters, peripherals & devices, hard disk, printing & its client computer.
- ❖ Managing users & group account, policies & profiles, system policy with system policy editor, disk resources, working with Windows NT, file resources, UNC.
- ❖ Connectivity: interoperating with NetWare, configuring remote access services.

**Seminar**

**BC-606(N2)**

**Max. Marks 100  
Internal Assessment 100**

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**Paper- BC-603(N2)**

Seminar based on any Industrial Assignment.

**Note: - The break up is as follows:**

<b>Report:</b>	<b>40 marks</b>
<b>Presentation:</b>	<b>60 marks</b>

**Comprehensive Viva Voce**

**BC-607(N2)**

**Max. Marks 100**  
**External Assessment 100**

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Viva of Full syllabus studied under BCA course.

### Format of Project Report

- Title Cover
- Certificate from organization about your stay (Project Duration) at that place and about submission of work done under external guide at the place of training.
- Certificate from your guide about the submission of work done under his/her guidance, Internal Supervisor.
- Table of Contents, abstract of the project (abstract of actual workdone).
- A brief overview of the organization (regarding function area, location, division in which you are working, turnover)
- Profile of problems assigned.
- Study of existing system, if any.
- System requirements
  - Product Definition
    - Problem Statement
    - Function to be Provided
    - Processing Environment: H/W, S/W.
    - Solution Strategy
    - Acceptance Criteria
  - Feasibility Analysis
  - Project Plan
    - Team Structure
    - Development Schedule
    - Programming Languages And Development Tools
- System Requirement Specifications
  - Developing / Operating / Maintenance Environments
  - External Interface And Data Flows
    - User display and report format, user command summary
    - High level DFD and data dictionary
  - Functional and performance specifications
- Design
  - Detailed DFD's and structure diagrams
  - Data structures, database and file specifications
  - Pseudocode
- Test Plan
  - Functional, Performance, Stress tests etc.
- Implementation / Conversion Plan
- Project Legacy
  - Current status of project
  - Remaining areas of concern
  - Technical and managerial lessons learnt
  - Future recommendations
- Bibliography
- Source Code (if available)

**Note: - The above is meant to serve as a guideline for preparation of your project report. You may add to, modify or omit some of the above-mentioned points depending upon their relevance to your project. You may also consult your internal supervisor for the same.**