

ARYAVART INTERNATIONAL UNIVERSITY
Tilthai, Dharmanagar, North Tripura

ARYAVART INTERNATIONAL UNIVERSITY

Tilthai, Dharmanagar, North Tripura-799250

Syllabus for BCA

Semester 3

Theory										
S. No.	Course Code	Topic	L	T	P	Credit	Theory Marks	Internal Marks	Practical Marks	Total Marks
1	BCA301	Operating System Concepts	4	1	0	5	70	30	0	100
2	BCA302	Data Structure Using C	4	1	0	5	70	30	0	100
3	BCA303	Computer Networks	4	1	0	5	70	30	0	100
4	BM301	Accounting & Financial Management	2	0	0	2	70	30	0	100
5	BCA304	Basics of UNIX Operating System	4	1	0	5	70	30	0	100
6	BCA391	Data Structures Using C Lab	0	0	5	5	0	30	70	100
7	BCA392	Introduction to Unix/ Linux Laboratory	0	0	5	5	0	30	70	100
Total						32	350	210	140	700

तमसो मा ज्योतिर्गमय

Detailed Syllabus

OPERATING SYSTEM CONCEPTS

Code: BCA301

Max Marks: 70

Course Objectives: The course objectives for Operating System Concepts include understanding process and memory management, storage and I/O systems, and concurrency and synchronization. Students will learn about resource allocation, security, and distributed systems, with a focus on performance evaluation and optimization. Practical applications and case studies provide hands-on experience with different operating systems, such as Windows and Unix/Linux, to build a solid foundation in OS design and implementation.

UNIT I: (14 Hours)

Introduction: Definition of Operating System, Computer-System Organization, Computer System Architecture, Operating-System Structure, Operating System Structures: Operating- System Services, System Calls, Types of System Calls.

Process: Process Concept, Process Scheduling, Operations on Processes, Inter process Communication, Threads: Overview, Multi core Programming, Multithreading Models, Threading Issues. CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms

UNIT II: (8 Hours)

Process Synchronization: Background, The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic Problems of Synchronization, Monitors.

Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

UNIT III: (10 Hours)

Main Memory: Background, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table.

Virtual Memory: Background, Demand Paging, Page Replacement, Allocation of Frames, Thrashing, Memory-Mapped Files, Mass-Storage Structure, Overview of Mass- Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, Disk Formatting, RAID Structure

UNIT IV: (12 Hours)

File-System Interface: File Concept, Access Methods, Directory and Disk Structure, Protection.

File-System Implementation: File-System Structure, File-System Implementation, Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance.

I/O Systems: Overview, Application I/O Interface, Kernel I/O Subsystem, Transforming I/O Requests to Hardware Operations.

UNIT V: (04 Hours)

Protection: Goals of Protection, Principles of Protection, Domain of Protection Access Matrix, Implementation of the Access Matrix, Access Control, Revocation of Access Rights, Capability Based Systems.

Security: The Security Problem, Program Threats, System and Network Threats, Cryptography as a Security Tool, User Authentication.

ARYAVART INTERNATIONAL UNIVERSITY
Tilthai, Dharmanagar, North Tripura

Text Book:

1. A.Tanenbaum, "Modern Operation Systems", Third Edition, Pearson Education, 2008.

Reference Books:

1. William Stallings, "Operating Systems", Fifth Edition, Pearson Education, 2005.
2. Ida M.Flynn, "Understanding Operating Systems", Sixth Edition, Cengage, 2011.
3. D.M.Dhamdhere, "Operating systems a concept based approach", Second Edition, McGraw-Hill, 2007
4. Abraham Silberschatz, Peter Galvin, Greg Gagne, "Operating System Concepts", Ninth Edition, John Wiley and sons publication, 2013.

DATA STRUCTURE USING C

Code: BCA302

Max Marks: 70

Course Objectives: The course aims to familiarize students with fundamental data structures such as arrays, linked lists, stacks, queues, trees, and graphs, utilizing the C programming language. Students will learn to implement these data structures efficiently, analyze their time and space complexities, and apply them to solve real-world problems. Through programming assignments and projects, students will develop proficiency in C programming and algorithmic thinking essential for software development and computer science applications.

UNIT -I (02 Hours)

Introduction to Data Structure and its Characteristics: Array Representation of single and multidimensional arrays; Sprase arrays – lower and upper triangular matrices and Tridiagonal matrices with Vector Representation also.

UNIT -II (12 Hours)

Stacks and Queues: Introduction and primitive operations on stack; Stack application; Infix, postfix, prefix expressions; Evaluation of postfix expression; Conversion between prefix, infix and postfix, introduction and primitive operation on queues, D- queues and priority queues.

UNIT-III (07 Hours)

Lists: Introduction to linked lists; Sequential and linked lists, operations such as traversal, insertion, deletion searching, Two way lists and Use of headers

UNIT-IV (07 Hours)

Trees: Introduction and terminology; Traversal of binary trees; Recursive algorithms for tree operations such as traversal, insertion, deletion; Binary Search Tree

B-Trees: Introduction, The invention of B-Tree; Statement of the problem; Indexing with binary search trees; a better approach to tree indexes; B-Trees; working up from the bottom; Example for creating a B-Tree

UNIT-V (10 Hours)

Sorting Techniques: Insertion sort, selection sort, merge sort, heap sort, searching Techniques: linear search, binary search and hashing

ARYAVART INTERNATIONAL UNIVERSITY
Tilthai, Dharmanagar, North Tripura

Text Book:

1. Kamthane: Introduction to Data Structures in C. Pearson Education 2005

Reference Books:

1. Weiss, Data Structures and Algorithm Analysis in C, II Edition, Pearson Education.
2. Lipschutz: Schaum's outline series Data structures Tata McGraw-Hill
3. Robert Kruse Data Structures and program designing using 'C'
4. Trembley and Sorenson Data Structures
5. E.Balaguruswamy Programming in ANSI C.
6. Bandyopadhyay, Data Structures Using C Pearson Education
7. Tenenbaum, Data Structures Using C. Pearson Education

DATA COMMUNICATION AND COMPUTER NETWORKING

Code: BCA303

Max Marks: 70

Course Objectives: The course aims to equip students with a comprehensive understanding of data communication and computer networking principles, including protocols, architectures, and security measures. Through hands-on exercises and theoretical learning, students will gain practical skills in network design, configuration, and troubleshooting, preparing them for roles in designing, implementing, and managing modern networks.

UNIT -I

(9 Hours)

Introduction: Data Communication: components – Networks: distributed processing, network criteria – Protocols and Standards.

Basic Concepts: Line Configuration – Topology: Mesh, Star, Tree, Bus, Ring – Transmission Mode – Categories of Networks: LAN, MAN, WAN– Internetworks. The OSI Model: The Model – Functions of the Layers.

UNIT -II

(12 Hours)

Transmission of Digital Data: Digital data transmission: Parallel, Serial – DTE-DCE interface: EIA 232 interface: mechanical, electrical and Functional Specification, Null modem – MODEMS.

Transmission media: Guided media: twisted pair cable, coaxial cable and fiber optic cable: propagation modes – Unguided media: propagation of radio waves, terrestrial microwave, satellite communication, cellular telephony – Transmission impairment: attenuation, distortion, noise – performance: throughput, propagation speed, propagation time.

UNIT-III

(12 Hours)

Data Link Control: Line Discipline: ENQ/ ACK, Poll/Select - Flow Control: Stop- and- wait, Sliding Window – Error Control: Stop and wait ARQ, Sliding Window ARQ: Go-back-n and Selective reject.

Local Area Networks: Ethernet: 10BASE5, 10BASE2, 10BASE-T, IBASE5, Other Ethernet networks –Token Bus – Token Ring - FDDI.

ARYAVART INTERNATIONAL UNIVERSITY
Tilthai, Dharmanagar, North Tripura

UNIT-IV

(15 Hours)

Switching: Circuit Switching: Space division switching, Time division switches – Packet Switching: datagram approach, Virtual Circuit approach – Message Switching.

Integrated Services Digital Network: B, D, and H channels, User Interfaces, Functional Grouping-The ISDN Layers – Broadband ISDN.

UNIT-V

(12 Hours)

Transport Layer: Duties of the Transport Layer: End-to end delivery, Addressing, Reliable delivery, Flow control, Multiplexing – Connection – The OSI Transport Protocol: transport classes, TPDU, Connection- oriented and connectionless services.

Upper OSI Layers: Session Layer: Session and Transport Interaction, Synchronization points, Session Protocol data Unit – Presentation Layer- Functions: Translation, Encryption/ Decryption, Authentication, Compression – Application Layer: MHS, FTAM, VT, DS, CMIP

Text Book:

1. Stallings, Data and Computer Communications, 7/e, Pearson Education, 2003

Reference Books

1. Behrouz A. Forouzan. Data Communications and Networking. Tata McGraw-Hill Edition, Fourth Edition.
2. Andrew s. Tanenbaum .Computer Networks. Pearson Education .Fourth Edition.
3. Alberto Leon- Garcia and Indra Widjaja. Communication Networks- Fundamental Concepts and key Architectures. Tata Mcgraw-Hill. Second Edition.

ACCOUNTING AND FINANCIAL MANAGEMENT

Code: BM301

Max Marks: 70

Course Objectives: The course objectives for Accounting and Financial Management are to provide students with a comprehensive understanding of financial accounting principles, financial statement analysis, and managerial accounting techniques. Students will learn to prepare and interpret financial statements, develop budgeting and forecasting skills, and understand cost management and performance evaluation. Additionally, the course covers financial decision-making, investment analysis, and the impact of financial policies on business strategy and operations.

UNIT -I

(18 Hours)

Introduction: Principles – Concepts & Conventions – Double entry system of accounting – Journal – Ledger. Preparation of trial balance. Subsidiary Books with special reference to simple cash book and three column cash book.

UNIT -II

(12 Hours)

Final accounts of sole trader: adjusting entries, including reserve for bad debts, reserve for discount on debtors and creditors, preparation of final accounts.

UNIT-III

(08 Hours)

Introduction: Meaning, scope, Functions of finance manager. Unit Costing: Preparation of cost sheet

ARYAVART INTERNATIONAL UNIVERSITY
Tilthai, Dharmanagar, North Tripura

UNIT-IV

(12 Hours)

Ratio analysis: Meaning of ratio – Advantages – disadvantages – types of ratio – usefulness – liquidity ratios – profitability ratios, efficiency ratios, solvency ratios. (Theoretical concepts) Funds Flow Statement: Meaning – concepts of funds flow. Cash flow statement :Meaning ,need – simple problems on cash flow statement

UNIT V

(10 Hours)

Marginal Costing: Meaning – Definition – Concepts in marginal costing – marginal equations – P / V ratio – B.E.P – Margin of safety – Sales to earn a desired profit – problems on above Budgetary control: Meaning – Definition – Preparation of flexible budget and cash budget

Text Book:

1. T.S Grewal - “Introduction to accounting”, S. Chand & Company Limited

Reference Books:

1. M.C Shukla, T.S. Grewal, S.C. Gupta - “Advanced Accounts”, S. Chand & Company Limited, 2006
2. S.N Maheshwari - “ An introduction to Accountancy”, Vikas Publishing House Pvt Limited, 2009
3. S.P Basu & M. Das: “Practice in Accountancy”
4. Rajasekaran V. – ”Financial Accounting”, Pearson Education India, 2011

BASICS OF UNIX OPERATING SYSTEM

Code: BCA304

Max Marks: 70

Course Objectives: The course aims to introduce students to the fundamental concepts of the UNIX operating system. Students will learn about the UNIX architecture, basic commands, file system structure, and shell scripting. The course also covers essential system administration tasks, providing a solid foundation for further studies in UNIX and Linux environments.

UNIT -I

(10 Hours)

Working with UNIX-like Systems: Brief history of UNIX and LINUX, strengths and weaknesses of UNIX-like operating systems Basic concepts in UNIX-like systems: the kernel, shells, multiuser multitasking operation, remote access, file system, processes, environment and environment variables, the command line, online manual Using the vi editor – modes of operation and switching between them, text navigation, editing text, saving and quitting, using buffers (cut-copy-paste), pattern searching and replacement, undoing and repeating commands Basic commands related to handling files and the file system

UNIT -II

(10 Hours)

The Bourne Again Shell (bash) Prompts, the command line, quoting and escaping, internal and external commands, the path, shell variables, basic command line processing Using the echo command A quick introduction to basic filters – cat and cut The building blocks approach Input/output redirection Command substitution

UNIT-III

(10 Hours)

Introduction to Shell Scripting Shell scripts Fundamental shell programming constructs – conditional execution, loops, input and output, turning debugging on and off, etc.

ARYAVART INTERNATIONAL UNIVERSITY
Tilthai, Dharmanagar, North Tripura

UNIT-IV

(10 Hours)

Shell Scripting using Filters Definition of a filter Basic filters like the grep family, expr, sed, etc. Processing the output of commands like ls, ps, who, etc. Processing data in text files (fixed-width format and delimited format)

Text Book:

1. Das S. : Your UNIX – The Ultimate Guide, Tata McGraw-Hill, 2001.

Reference Books:

1. Kernighan B. W. and Pike R. : The Unix Programming Environment, Prentice-Hall of India, 1994.
2. Prata S. : Advanced Unix – A Programmer's Guide, BPB Publications, 1986

Theory Paper

Total: 100 Marks

Time: 3 hours

External: 70 Marks

Internal: 30 Marks

External : 70 Marks

10 Question (MCQ): 1 marks each (1x10 = 10)

5 Question (Fill in the blanks): 1 marks each (1x5 = 5)

5 Question (Short 30-40 Words): 3 marks each (3x5 = 15)

Answer any 4 out of 6 (Long 50-75 Words): 4 marks each (4x4 = 16)

Answer any 2 out of 4 (Long 75-100 Words): 7 marks each (7x2 = 14)

Answer any 1 out of 2 (Very Long 150-200 Words): 10 marks each (10x1 = 10)

Internal : 30 Marks

Internal Exam: 15 Marks

(There will be two internal exams, each carrying 30 marks. The final mark will be determined by selecting the highest score from these two exams.)

Assignment : 8 Marks

Attendance : 4 Marks

G.P. (General Proficiency) : 5 Marks

ARYAVART INTERNATIONAL UNIVERSITY
Tilthai, Dharmanagar, North Tripura

Data Structure Using C Lab

Practical: 100 Marks

External: 70 Marks

Internal: 30 Marks

External (Two programs) : 70 Marks

Program Writing: 10 marks each (10x2 = 20)

Algorithm & Flowchart : 10 marks each (10x2 = 20)

Program execution: 10 marks each (10x2 = 20)

Viva: 10 marks

Internal : 30 Marks

Program Writing: 5 marks

Algorithm & Flowchart : 5 marks

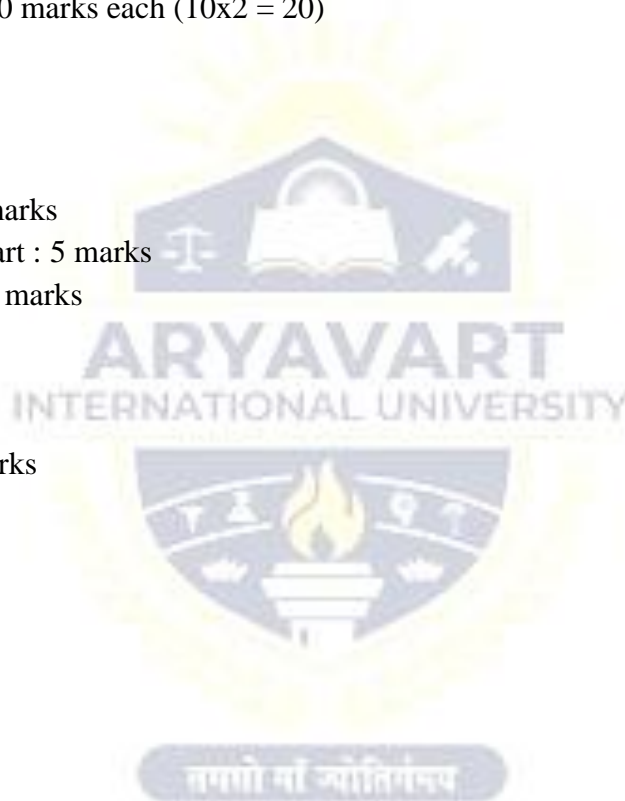
Program execution: 5 marks

Viva: 5 marks

Record: 5 marks

Attendance : 2 marks

Lab Discipline : 3 marks



ARYAVART INTERNATIONAL UNIVERSITY
Tilthai, Dharmanagar, North Tripura

Introduction to Unix/Linux Lab

Practical: 100 Marks

External: 70 Marks

Internal: 30 Marks

External (Two programs) : 70 Marks

Program Writing: 10 marks each (10x2 = 20)

Schema: 5 marks each (10x2 = 20)

Program execution: 15 marks each (15x2 = 30)

Viva: 10 marks

Internal : 30 Marks

Record: 10 Marks

Practical Assessments/Lab Work : 10 Marks

Attendance : 5 Marks

G.P. : 5 Marks

