ARYAVART INTERNATIONAL UNIVERSITY

Tilthai, Dharmanagar, North Tripura-799250

Syllabus for B Sc (Hardware and Networking)

Semester 1

Theory									
Course Code	**Topic**	**L**	**T**	**P**	**Credit**	**Theory Marks**	**Internal Marks**	**Practical Marks**	**Total Marks**
24CS101	Fundamentals of IT	4	0	0	4	70	30	0	100
24CS102	C Programming	4	0	0	4	70	30	0	100
24MT101	Discrete Mathematical Structure	4	0	0	4	70	30	0	100
24EN102	Business Communication	3	1	0	4	70	30	0	100
24CM101	Accounting and Financial Management	4	0	0	4	70	30	0	100
Practical									
24CS191	IT Lab	0	0	2	2	0	30	70	100
24CS192	C Programming Lab	0	0	2	2	0	30	70	100
	Total				**24**	**350**	**210**	**140**	**700**

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Detailed Syllabus

FUNDAMENTALS OF IT

Code: 24CS101
Max Marks: 70

Course Objectives: This course aims in introducing skills relating to IT basics, computer applications, programming, interactive Medias, Internet basics etc.

UNIT I **(12 Hrs)**

Fundamentals of Computers: Definition and Characteristics of Computer System. Computer Generation from First Generation to Fifth Generation. Classifications of Computers: Micro, Mini, Mainframe and super computers.
Computer Hardware: Major Components of a digital computer, Block Diagram of a computer, Input-output devices, Description of Computer Input Units, Output Units, CPU.
Computer Memory: Memory Hierarchy, Primary Memory – RAM and its types, ROM and its types, Secondary Memory, Cache memory. Secondary Storage Devices - Hard Disk, Compact Disk, DVD, Flash memory.

UNIT II **(12 Hrs)**

Interaction with Computers: Computer Software: System software: Assemblers, Compilers, Interpreters, linkers, loaders.
Application Software: Introduction to MS Office (MS-Word, MS Power point, MS-Excel).
Operating Systems: Elementary Operating System concepts, Different types of Operating Systems.
DOS: Booting sequence; Concepts of File and Directory, Types of DOS commands.
Computer Languages: Introduction to Low-Level Languages and High-Level Languages.

UNIT III **(12 Hrs)**

Computer Number System: Positional and Non-positional number systems, Binary, Decimal, Octal and Hexadecimal Number Systems and their inter-conversion.
Binary Arithmetic: Addition, subtraction, multiplication and division. Use of complement method to represent negative binary numbers, 1's complement, 2's complement, subtraction using 1's complement and 2's complement. Introduction to Binary Coded Decimal (BCD), ASCII Codes, EBCDIC codes.

UNIT IV **(10 Hrs)**

Computer Network & Internet: Basic elements of a communication system, Data transmission modes, Data Transmission speed, Data transmission media, Digital and Analogue Transmission, Network topologies, Network Types (LAN, WAN and MAN), Basics of Internet and Intranet.
Internet: Terminologies related to Internet: Protocol, Domain name, Internet Connections, IP address, URL, World Wide Web. Introduction to Client-Server Model, Search Engine, Voice over Internet Protocol (VOIP), Repeater, Bridge, Hub, Switch, Router, Gateway, Firewall, Bluetooth technology.
Advanced Trends in IT Applications: Brief Introduction to Cloud Computing, Internet of Things, Data Analytics, AI and Machine Learning.

Text Book:

1. P. K. Sinha & Priti Sinha, "Computer Fundamentals", BPB Publications, 1992.
2. Anita Goel "Computer Fundamentals", Pearson.

Reference Books:

1. B. Ram, "Computer fundamentals Architecture and Organization", New Age Intl.
2. Alex Leon & Mathews Leon, "Introduction to Computers", Vikas Publishing.
3. Norton Peter, "Introduction to Computers", 4th Ed., TMH, 2001.
4. Vikas Gupta, "Comdex Computer Kit", Wiley Dreamtech, Delhi, 2004.

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Tilthai, Dharmanagar, North Tripura

C PROGRAMMING

Code: 24CS102
Max Marks: 70

Course Objectives: The course is designed to provide complete knowledge of C language. Students will be able to develop logics which will help them to create programs, applications in C. Also by learning the basic programming constructs they can easily switch over to any other language in future.

UNIT I **(08 Hrs)**

Computer Programming: Basic Programming concepts, Modular programming and structured programming, Problem solving using Computers, Concept of flowcharts and algorithms.
Overview of C: Introduction, Importance of C, Sample C Programs, Basic structure of C programs, Programming style, executing a C Program.
Constants, Variables and Data types: C Tokens, keywords, and identifiers, constants, variables, datatypes, declaration of variables, assigning values to variables, defining symbolic constants.
Operators and Expressions: Arithmetic operators, Relational operators, Logical operators, Assignment operators, increment and decrement operators, conditional operator, bitwise operators, type conversion in expressions, operator precedence and associability.
Mathematical functions.

UNIT II **(12 Hrs)**

Input and Output statements, reading a character, writing a character, formatted input, formatted output statements.
Decision-making, Branching and Looping : Decision making with IF statement, simple IF statement, The IF-ELSE statement, nesting of IF .. ELSE statements, The ELSE -IF ladder, the switch statement, The operator, The GOTO statement, The WHILE statement, The DO statement, The FOR statement, Jumps in loops.

UNIT III **(10 Hrs)**

Arrays: one dimensional array, Two-dimensional arrays, Initializing arrays, Programs based on arrays such as sorting, Fibonacci sequence, Matrix operations, etc.
Handling of Characters and Strings: Declaring and initializing string variables, Reading string from terminal, writing string to screen, Arithmetic operations on characters, Putting strings together. Comparison of two strings, Character and string handling functions.

UNIT IV **(08 Hrs)**

User defined functions: Need for user-defined functions, A multi-functional program, The form of 'C' function, Return values and their types, Calling a function, Category of functions: No arguments and no return values, Arguments but no return values, Arguments with return values, Nesting of functions, Recursion, Functions with arrays as parameters.

UNIT V **(05 Hrs)**

Structure and Union: Structure definition, Giving values to members, Structure initialization; Comparison of structure variables, Array of structures, Array within structure, Union.
Pointers: Understanding pointers, Accessing the address of variables, Declaring and initializing pointers, Accessing a variable through its pointer.

Text Book:

1. Kamthane, “Programming with ANSI and Turbo C”. Pearson Education 2003.

Reference Books:

1. E. Balaguruswamy. “Programming in ANSI C". Tata McGraw-Hill (1998).
2. Yeshvant Kanetkar: "Let us C”.
3. V. Rajaraman. “Programming in C”. PHI (EEE) (2000).
4. Rajesh Hongal. “Computer Concepts & C language”.
5. Brain Kernighan & Dennis M. Ritchie. “ANSI C Programming” (PHI).

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DISCRETE MATHEMATICAL STRUCTURE

Code: 24MT101
Max Marks: 70

Course Objectives: The main objectives of the course are to introduce concepts of mathematical logic for analyzing propositions and proving theorems. Use sets for solving applied problems, and use the properties of set operations algebraically. Work with relations and investigate their properties.

UNIT I **(13 Hrs)**

SETS: Sets, Subsets, Equal Sets, Universal Sets, Finite and Infinite Sets, Operations on Sets: Union, Intersection difference and Complements of Sets, Algebra of sets, Cartesian product, Simple applications.
RELATION AND FUNCTIONS: Properties of Relations, Equivalence Relation, Partial Order Relation, And Composition of relations and Representation of relations using digraph and Matrix, Function: Domain and Range, onto, into and One to One Functions, Composite and Inverse Functions, Hashing functions, Recursive function.
PROPOSITIONAL LOGIC: Introduction, Proposition, First order logic, Basic logical operations, Truth tables, Tautologies, Contradictions, Algebra of Propositions, Logical implications, Logical equivalence, Predicates, Universal and existential quantifiers.

UNIT II **(10 Hrs)**

PARTIAL ORDER RELATIONS AND LATTICES: Partial Order Sets, Totally ordered set, Representation of POSETS using Hasse diagram, Chains, Maximal and Minimal elements, Greatest lower bound, least upper bound, Lattices and Algebraic Structure, Principle of Duality, Elementary Properties of Lattices, Atoms. Sub lattices, Bounded lattice, Distributed & Complemented Lattices, Isomorphic lattices. Boolean lattice.

UNIT III **(11 Hrs)**

COMBINATORICS: Introduction, Basic Counting Principles, Permutations, Permutations of things not all different, Circular Permutations, Combinations, Restricted Permutations and Combinations, Derangement, Pascal's Triangle, Binomial Theorem (only for natural Numbers).
RECURRENCE RELATIONS: Introduction, Order of Recurrence Relations, Degree of Recurrence Relations, Linear Homogeneous Recurrence Relations, Non-Homogeneous Recurrence Relations, Solution of linear homogeneous and non-non-homogeneous recurrence relations.

UNIT IV **(10 Hrs)**

GRAPHS: Introduction, Degree of a vertex of a graph, Handshaking Theorem, Types of Graphs, Sub graph, Matrix representation of a graph: adjacent and incidence matrices, Isomorphic graphs, Path and circuit (Floyd's and Warshall algorithms), Connected graph, Hamiltonian graph, Euler graph, Graph colouring (Vertex, Edges and Map).

Text Book:

1. Rosen, K. H., "Discrete Mathematics and its Applications", McGraw Hill Education, 8th edition 2021.
2. Kolman, Busby and Ross, "Discrete Mathematical Structures", Pearson, 10th edition 2015.
3. Babu Ram, "Discrete Mathematics", Pearson Education, 1st edition 2010.

Reference Books:

1. D. S. Malik, M. K. Sen, "Discrete Mathematics" Cengage Learning, 2012.
2. RB2. S. K. Sarkar. "A Text Book of Discrete Mathematics" S. Chand Publications, 9th edition 2019.
3. RB3. Singh J. P. "Discrete Mathematics for Undergraduates". ANE Books, 1st edition, 2013.
4. RB4. Tremblay J. P. and Manohar, R., "Discrete Mathematical Structures with Applications to Computer Science". Tata McGraw Hill.

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Tilthai, Dharmanagar, North Tripura

BUSINESS COMMUNICATION

Code: 24EN102
Max Marks: 70

Course Objectives: This course is designed to give students a comprehensive view of communication, its scope and importance in business and the role of communication in establishing a favourable outside the firm environment, as well as an effective internal communications program. The Business Communications course will prepare future entrepreneurs to create effective business communications, present business briefings, produce understandable business documents and examine the impact of the communications process on the business operation.

UNIT I **(10 Hrs)**

Concepts and Fundamentals: Introduction to Technical Communication, Need and importance of communication, Channel, Distinction between general and technical communication, Nature and features of technical communication, Seven Cs of communication, Types of Technical communication, Style in technical communication, Technical communication skills, Language as a tool of Communication, History of development of Technical Communication, Computer Aided Technical Communication

UNIT II **(12 Hrs)**

Oral Communication: Principles of effective oral communication, Introduction of Self and others, Greetings, Handling Telephone Calls Interviews: Meaning & Purpose, Art of interviewing, Types of interview, Interview styles, Essential, Techniques of interviewing, Guidelines for Interviewer, Guidelines for interviewee. Meetings: Definition, Kind of meetings, Agenda, Minutes of the Meeting, Advantages and disadvantages of meetings/ committees, Planning and organization of meetings. Project Presentations: Advantages & Disadvantages, Executive Summary, Charts, Distribution of time (presentation, questions & answers, summing up), Visual presentation, Guidelines for using visual aids, Electronic media (power-point presentation). The technique of conducting Group Discussion and JAM session.

UNIT III **(12 Hrs)**

Written Communication: Overview of Technical Writing: Definition and Nature of Technical Writing, Basic Principles of Technical Writing, Styles in Technical Writing.
Note – Making, Notice, E-mail Writing.
Writing Letters: Business letters, Persuasive letters- Sales letters and complaint letters, Office memorandum, Good news and bad news letters.
Report Writing: Definition & importance; categories of reports, Elements of a formal report, style and formatting in report.
Special Technical Documents Writing: Project synopsis and report writing, Scientific Article and Research Paper writing, Dissertation writing: Features, Preparation and Elements.
Proposal Writing: Purpose, Types, characteristics and structure.
Job Application: Types of application, Form & Content of an application, Drafting the application, Preparation of resume.

UNIT IV **(10 Hrs)**

Soft Skills: Business Etiquettes – Professional Personality, Workplace Protocols, Cubicle. Non-Verbal Communication: Kinesics and Proxemics, Paralanguage.
Interpersonal Skills.
Language Skills: Improving command in English, improving vocabulary, Choice of words, Common problems with verbs, Adjectives, adverbs, Pronouns, Tenses, Conjunctions, Punctuations, Prefix, Suffix, Idiomatic use of prepositions. Sentences and paragraph construction, Improve spellings, Common errors and misappropriation, Building advanced Vocabulary (Synonyms, Antonyms), Introduction to Business English.

Text Book:

1. Kavita Tyagi and Padma Misra , "Advanced Technical Communication", PHI, 2011
2. P. D. Chaturvedi and Mukesh Chaturvedi, "Business Communication– Concepts, Cases and Applications", Pearson, second edition.
3. Rayudu, "C. S. "Communication", Himalaya Publishing House, 1994.
4. Asha Kaul, "Business Communication", PHI, second edition.

Reference Books:

1. Raymond Murphy, "Essential English Grammar- A self-study reference and practice book for elementary students of English", Cambridge University Press, second edition.

2. Manalo, E. & Fermin, V. (2007). "Technical and Report Writing". ECC Graphics. Quezon City.
3. Kavita Tyagi and Padma Misra. "Basic Technical Communication". PHI, 2011.
4. Herta A Murphy, Herbert W Hildebrandt and Jane P Thomas. "Effective Business Communication". McGraw Hill, seventh edition.

ACCOUNTING AND FINANCIAL MANAGEMENT

Code: 24CM101
Max Marks: 70

Course Objectives: The objective of this course is to enable students understand accounting principles, tools and techniques used for taking business decisions. The course aims to impart training and education with an employability outlook. The focus being making students' future-ready i.e. to become entrepreneurs or professional or executives in the industry by equipping students with a holistic view of the business and finance environment and its applications. The thrust of the programme is on personality development of the students through helping to acquire conceptual, analytical, problem-solving capabilities and emotional maturity. The innovative curriculum and proven pedagogy will equip participants with actionable knowledge and skills along with deep insights into leadership and strategy.

UNIT I **(15 Hrs)**
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 Hrs)**
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 Hrs)**
Introduction – Meaning, Scope, Functions of finance manager. Unit Costing: Preparation of cost sheet.

UNIT IV **(12 Hrs)**
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 Hrs)**
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. "Financial Accounting", Ashis Bhattacharya, Prentice-Hall India Publication.
2. Prasanna Chandra, "Financial Management", Tata McGraw Hill Publications.

Reference Books:
1. "Book Keeping and Accountancy" Choudhari, Chopde.
2. "Cost Accounting": Choudhari, Chopde.
3. "Financial Management- Text and Problems". M. Y. Khan, P. K. Jain.
4. "Financial Management- Theory & Practice" Prasanna Chandra Tata McGraw Hill.
5. "Managerial Economics & Financial Analysis". Siddiqui S. A. Siddiqui A. S. New Age.

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Tilthai, Dharmanagar, North Tripura

C PROGRAMMING LAB

Code: 24CS192
Max Marks: 70

(BASED ON 24CS102) C Programming:
Core Practical (Implement minimum 8 out of 10 practical)

1. Write a program to convert temperature from Celsius to Fahrenheit by taking input from the user.
2. Write a program to find the greatest number among 3 numbers given by the user.
3. Write a program to check if a given number is a prime number or not.
4. Write a program to display the following pattern up to N rows, taking the value of N from the user:
   1
   2 3
   4 5 6
   7 8 9 10
5. Write a program to input marks of 50 students using an array and display the average marks of the class.
6. Write a program to search for a number entered by the user in a given array and display the array in ascending order.
7. Write a program to check if a string is palindrome or not.
8. Write a program to add, subtract, multiply and divide two numbers using pointers.
9. Write a program to create a structure for employees containing the following data members: Employee ID, Employee Name, Age, Address, Department and Salary. Input data for 10 employees and display the details of the employee from the employee ID given by the user.
10. Write a program to create two files with names Even File and Odd File. Input 20 numbers from the user and save even numbers in Even File and odd numbers in Odd File.

Application Based Practical (Implement minimum 5 out of 10 practical)

11. Write a menu driven program to construct a calculator for following arithmetic operations: addition, subtraction, multiplication, division, average and percentage.
12. Write a menu driven program to perform the following operations:
    (i) Print Armstrong numbers up to N,
    (ii) Display prime numbers between 1 to N,
    (iii) Reverse of an integer
13. Write a program to convert a hexadecimal number into a binary number.
14. Write a program to calculate factorial of a number and display Fibonacci series up to N terms using recursive functions.
15. Write a program to perform
    (i) matrix addition,
    (ii) matrix multiplication, and
    (iii) Matrix transpose on 2D arrays.
16. Write a program to make use of arrays with structures in the following ways:
    (i) Use array as a structure data member
    (ii) Create array of structure variables
17. Write a program to compare the contents of two files by taking names of the files through command line arguments.
18. WAP to perform I/O and make use of file positioning functions on Binary files. (using fseek, ftell, rewind functions)
19. Write a menu driven program to implement the following string operations:
    (i) Calculate length of a string
    (ii) Concatenate at the end of a given
    (iii) Copy one string to another
    (iv) Compare contents of two strings
    (v) Copy nth character string to another
20. Write a program to read time in string format and extract hours, minutes and second also check time validity

Note:

1. **In total 15 practical to be implemented. 2 additional practical may be given by the course instructor.**

2. **This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.**

IT LAB

Code: 24CS191
Max Marks: 70

(BASED ON 24CS101) Fundamentals of IT:
Core Practical (Implement minimum 10 out of 15 practical)

1. To explore the System settings - Personalisation, System, Devices, Apps, Network & Internet.
2. To practice basic DOS commands like cd, md, dir, erase cls, copy, date etc.
3. To explore Windows Explorer functionalities like create, rename, move, delete folder and files etc.
4. To practice the use of basic formatting features - Format Painter, Indentation, Line spacing, background colour, find, replace, dictate commands.
5. To practice the use of Bullets, numbering, multilevel lists and use of Table Feature- Insert table with rows and columns, draw tables, excel spreadsheet and quick tables etc.
6. To practice the use of Insert Features – add picture, Chart, SmartArt, WordArt, Equation, Symbols, Header and Footer, Page Numbering etc. and the use of Design Features – Watermark, Page color, Page Border, Themes implementation etc.
7. To practice the use of Layout Features – Margins, Orientation, Size, Columns, Indent, Spacing etc.
8. To practice the use of Mail Merge Feature to generate Envelops and Labels.
9. To practice the use of Excel basic formatting features – Wrap Text, Insert and Delete (Cells, Sheet, Row or Column), Format – Cell Height, Cell Width, Hide, Un Hide Cell, Protection, Freeze and Unfreeze panes, Macros etc.
10. To practice the use of Insert Features- Pivot Table, Pivot Chart, Picture, Chart and its formatting and Design and the use of Page Layout Features- Margins, Orientation, Page Break , Background, Height and Width of Cells.
11. To practice the use of Formula Features – user defined function, pre-defined functions – Logical, Date, Time, Maths and the use of Data Manipulation Features – Sort, Filter, Advanced Filters, Whatif analysis.
12. To practice the creation of Blank presentation and Selecting Themes and the use of the basic design features – Adding New Slides, Reuse slides, Slides layout etc.
13. To practice the use of Insert Features – add pictures, screenshots, shapes, wordart, audio, video, date-time etc. and use of Design Features- Changing the theme of presentation, format background and design ideas.
14. To practice the use of Transition features to be applied on Slides content, setting sound, duration etc. and the use of Animation Features to be applied on presentation of Slide, set animation timings and rehearse etc.
15. To practice the use of Slide Show Features – Custom Slide Show, Rehearse Timing etc.

Application Based Practical (Implement minimum 5 out of 8 practical)

16. Create a Folder by your name in your system; store all the work done in this semester inside that folder.
17. Create your Resume using basic formatting features like: table, bullets, wordart etc.
18. Design an Invitation to Birthday Party using mail merge features sends the invitation to 10 friends.
19. Write an Article for Magazine with 3 columns and hyperlink.
20. Create your own mark sheet using basic formatting features.
21. Create a list of marks of 10 students create charts and pivot table.
22. Prepare a Sales summary and use features like sort, filter etc. to manipulate the data.
23. Create a Power Point Presentation on any topic of your choice using animation and transition features.

Note:

1. **In total 15 practical to be implemented. 2 additional practical may be given by the course instructor.**
2. **This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.**

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Theory Paper

Total: 100 Marks
External: 70 Marks
Internal: 30 Marks

External: 70 Marks
10 Question (MCQ): 1 marks each (1x10 = 10)
Answer any 6 out of 8 (Very Short 20-30 Words): 2 marks each (2x6 = 12)
Answer any 6 out of 8 (Short 50-70 Words): 3 marks each (3x6 = 18)
Answer any 6 out of 8 (Long 100-120 Words): 5 marks each (5x6 = 30)

Internal: 30 Marks
Two Internal Assessment Examinations will be conducted, each carrying 50 marks. The higher of the two scores will be considered for the final assessment.

Lab

Practical: 100 Marks
External: 70 Marks
Internal: 30 Marks

External (Two programs): 70 Marks
- **Program Writing**: 10 + 10 Marks
- **Algorithm& Flowchart**: 5 + 5 Marks
- **Program Execution**: 15 + 15 Marks
- **Viva**: 10 Marks

Internal Assessment (30 Marks)
Internal Assessment Examinations will be conducted, carrying 50 marks
- **Record**: 5 Marks
- **Attendance**: 5 Marks
- **Program Writing**: 15 Marks
- **Program Execution**: 15 Marks
- **Viva**: 10 Marks

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Tilthai, Dharmanagar, North Tripura-799250

Syllabus for B Sc (Hardware and Networking)

Semester 2

Theory									
Course Code	**Topic**	**L**	**T**	**P**	**Credit**	**Theory Marks**	**Internal Marks**	**Practical Marks**	**Total Marks**
24CS201	Data Structure And Algorithm Using 'C'	4	0	0	4	70	30	0	100
24CS204	PC Assembly & Troubleshooting	4	0	0	4	70	30	0	100
24CS205	Electronics Instruments and Measurements	4	0	0	4	70	30	0	100
24CS206	Computer Storage Devices	4	0	0	4	70	30	0	100
24GN301	Personality Development Skills	2	0	0	2	70	30	0	100
Practical									
24CS294	PC Assembly & Troubleshooting Lab	0	0	2	2	0	30	70	100
24CS295	Electronics Instruments and Measurements Lab	0	0	2	2	0	30	70	100
	Total				**22**	**350**	**210**	**140**	**700**

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Tilthai, Dharmanagar, North Tripura

Detailed Syllabus

DATA STRUCTURE AND ALGORITHM USING C

Code: 24CS201
Max Marks: 70

Course Objective: The "Data Structure" course aims to equip students with a deep understanding of organizing, managing, and storing data efficiently. It covers fundamental concepts such as arrays, linked lists, stacks, queues, trees, and graphs, focusing on their implementation and applications. Students will also learn to analyze and optimize algorithms for better performance.

UNIT I **(14 Hrs)**
Linear Data Structures- Static: Introduction to Algorithms- Attributes, Design Techniques, Time Space Trade Off, Data Structures, Classification and Operations of Data Structures.
Arrays: Single Dimension, Two-Dimension and Introduction to Multi Dimensions, Memory Representation, Address Calculation, Sparse Matrices- Types, Representation.
Searching and Sorting: Linear and Binary Search, Selection Sort, Bubble Sort, Insertion Sort, Merge Sort, Elementary Comparison of Searching and Sorting Algorithms.
Hashing: Hash Table, Hash Functions and Collision Resolution.

UNIT II **(10 Hrs)**
Linear Data Structures- Dynamic
Introduction: Dynamic Memory Allocation, Dynamic Memory versus Static Memory Allocation.
Linked List Types: Singly Linked List, Doubly Linked List, Header Linked List, Circular Linked List.
Operations: Creation, Insertion, Deletion, Modification, Searching, Sorting, Reversing, and Merging.

UNIT III **(9 Hrs)**
Abstract Data Types:
Stacks: Introduction, Static and Dynamic Implementation, Operations, Applications- Evaluation and Conversion between Polish and Reverse Polish Notations.
Queues: Introduction, Static and Dynamic Implementation, Operations, Types- Linear Queue, Circular Queue, Doubly Ended Queue, Priority Queue.

UNIT IV **(11 Hrs)**
Non Linear Data Structures:
Introduction to Graphs: Notations & Terminologies, Representation of Graphs- Adjacency Matrix, Incidence Matrix and Linked Representation.
Trees: Notations & Terminologies, Memory Representation, Binary Trees Types- Complete, Full, Strict, Expression Binary Tree, Tree Traversals (Recursive), Binary Search Tree and Basic Operations.
Introduction and Creation (Excluding Implementation): AVL Tree, Heap Tree, M- Way Tree, and B Tree.

Text Book:

1. Schaum's Outline Series, "Data Structures", TMH, Special Indian Ed., Seventeenth Reprint, 2014.
2. Y. Langsam, M. J. Augenstein and A. M. Tanenbaum, "Data Structures using C and C++", Pearson Education India, Second Edition, 2015.
3. D. Samanta, "Classic Data Structures", PHI, Second Edition, 2009.

Reference Books:

1. Ashok N Kamthane "Introduction to Data Structures in C", Pearson, Third Edition, 2009.
2. E. Horowitz and S. Sahni, "Fundamentals of Data Structures in C". Universities Press, Second edition, 2008.
3. D. Malhotra and N. Malhotra, "Data Structures and Program Design using C", Laxmi Publications, Indian adapted edition from Mercury Learning and Information-USA, First edition, 2018.
4. Y. Kanetkar "Data Structures through C", BPB Publication, Third Edition, 2019.
5. R. F. Gilberg and B. A. Frouzan. "Data Structures: A Pseudo code Approach with C", Thomson Learning, Second Edition, 2004.
6. A. K. Rath, and A. K. Jagadev, "Data Structures and Program Design Using C", SciTech Publications, Second Edition, 2011.

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PC ASSEMBLY & TROUBLESHOOTING

Code: 24CS204
Max Marks: 70

Course Objectives: The objective of the *PC Assembly and Troubleshooting* course is to provide BCA students with practical knowledge and technical skills in assembling, configuring, maintaining, and troubleshooting personal computers. The course emphasizes understanding computer hardware components, diagnosing issues, and implementing effective solutions, preparing students for real-world IT support and hardware management roles.

UNIT I **(06 Hours)**

Brief history of computer on the basis Hardware: Computer system modules/ components and its operations, need of hardware and software for computer to work, different hardware components within a computer and connected to a computer as peripheral devices, different processors used for personal computers and notebook computers

UNIT II **(06 Hours)**

Perform installation, configuration, and upgrading of microcomputer/ computer: Hardware and software requirement, Assemble/setup microcomputer/ computer systems, accessory boards, types of motherboards, selection of right motherboard, Installation replacement of motherboard, troubleshooting problems with memory

UNIT III **(08 Hours)**

Install/connect associated peripherals: Working of printers and scanners, Installation of printers and scanners, sharing a printer over a local area network, troubleshooting printer and scanner problems, troubleshooting hard drive problems. Drivers: Meaning, role and types.

UNIT IV **(08 Hours)**

Diagnose and troubleshooting of microcomputer/ computer systems hardware & software and other peripheral equipment: Approaches to solve a PC problem, troubleshooting a failed boot before the OS is loaded, different approaches to installing and supporting I/O device, managing faulty components. Booting and its types

Text Book:

1. "PC Hardware: The Complete Reference", McGraw-Hills

Reference Books:

1. "The Indispensable PC Hardware Book" (4th Edition) Hans-Peter Messmer.
2. "PC Hardware: A Beginner's Guide" by Ron Gilster.

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ELECTRONICS INSTRUMENTS AND MEASUREMENTS

Code: 24CS205
Max Marks: 70

Course Objective: To provide students with a fundamental understanding of electronic instruments and measurement techniques, focusing on accuracy, precision, and calibration. The course equips learners with practical skills in using modern instruments for analyzing and troubleshooting electronic systems.

UNIT I **(06 Hrs)**

Basic of measurements: Review of performance specification of instruments- accuracy, precision, sensitivity, resolution range etc. Error in measurement and loading effects.

Units, Measurements and Conversion: Need for measurement related to electronics (resistance, capacitance, inductance, voltage, current, frequency, time, power, energy and wavelength) and their units (Milli, micro, kilo, nano, pico, mega, gega etc.) and conversion. Concept of pixel and resolution.

UNIT II **(13 Hrs)**

Measuring instruments: Working principles and construction of ammeters and voltmeters (moving coil and moving iron type), difference between ammeter and voltmeter, extension of their range and simple numerical problems. Principle and working of: Wattmeter (dynamometer type). Multi-meter:- Construction & various functions of multi-meter & the various measurements that are made using multi-meter, Specification of multi-meter & their significance and its limitations.

Electronic voltmeter: Advantages over conventional multi-meter for voltage measurement with respect to input impedance and sensitivity.

Digital Voltmeter & Digital Multi-meter: Block diagram of DVM (digital voltmeter) & Digital Multi-meter, Specification of digital multi-meter.

UNIT III **(10 Hrs)**

Basics of Electricity and Magnetism: Coulomb's law and dielectric constant, relation between electric field, flux, intensity potential, and potential difference, basics of magnetism, magnetic domain, non-magnetic and Ferro-magnetic materials, self and mutual induction, electromagnetic waves and propagation of electromagnetic waves in atmosphere, electromagnetic spectrum.

UNIT IV **(12 Hrs)**

Digital Storage Oscilloscope (DSO): Block diagram & principle of working; Comparison between Analogue and Digital Storage Oscilloscope.

Signal Generators and Analysis Instruments: Attenuators and its various types, Radio frequency (RF) oscillators: Colpitt's Oscillator, Hartley Oscillator, Wave Analyser, and Spectrum Analyser.

Transducer: Classification of transducers, qualitative treatment of Strain Gauges, Various types of transducers: Capacitive transducer, Inductive transducer, Oscillation transducer, Piezoelectric transducer. Linear Variable Differential Transducer (LVDT), Thermistors and its applications, Thermocouples.

Semiconductor Devices: Energy bands in solids, Intrinsic and extrinsic semiconductors, P type and N type semiconductors, P-N junction diodes, zener diodes, LED, photo transistor, solar cells, introduction to rectifiers and regulators

Text Book:

1. "Electronics Measurement and Instrumentation" by A. K. Sawhney, Dhanpat Rai and Sons, New Delhi.
2. "Electronics Instrumentation" by J. B. Gupta, Satya Prakashan, New Delhi.

Reference Books:

1. "Elements and Electronic Instruments and Measurement", Carr Pearson.
2. Malvino A. P. and Leach, "Digital Principles and Application", TMH.
3. Morris Mano, "Computer System Architecture", PHI.

ARYAVART INTERNATIONAL UNIVERSITY
Tilthai, Dharmanagar, North Tripura

COMPUTER STORAGE DEVICES

Code: 24CS206
Max Marks: 70

Course Objective: The course objectives of this course are to understand the structure, function and characteristics of computer systems. It also enables students to understand the design of the various functional units and components of computers, identify the elements of modern instructions sets and their impact on processor design, explain the function of each element of a memory hierarchy and identify and compare different methods for computer I/O.

UNIT I **(12 Hrs)**

Magnetic Storage: History of Magnetic Storage- How Magnetic Fields Are Used to Store Data- Read/Write Head Designs- Ferrite- Metal-In-Gap- Thin Film- Magneto- Resistive Heads- Giant Magneto-Resistive Heads; Head Sliders- Data Encoding Schemes- RLL Encoding- Encoding Scheme Comparisons- Partial-Response, Maximum-Likelihood Decoders- Capacity Measurements- Areal Density- Increasing Areal Density with Pixie Dust-Perpendicular Magnetic Recording.

UNIT II **(15 Hrs)**

Definition of a Hard Disk: Hard Drive Advancements- Form Factors- 5 1/4" Drive- 1" Drives- Hard Disk Drive Operation- The Ultimate Hard Disk Drive Analogy- Tracks and Sectors- Disk Formatting Partitioning- High-Level Formatting- Basic Hard Disk Drive Components- Hard Disk Platters (Disks Recording Media- Oxide Media- AFC Media- Read/Write Heads- Read/Write Head Designs- Stepper Motor Actuators- Voice Coil Actuators- Linear Actuators- Servo Mechanisms- Wedge Servo- Embedded Servo Automatic Head Parking- Air Filters- Hard Disk Temperature Acclimation- The Faceplate or Bezel- Hard Disk Features- Capacity BIOS Limitations-Operating System Limitations- Performance-Transfer Rate Average Seek Time-Average Access Time-Cache Programs and Caching Controllers-Interleave Selection Reliability-SMART- Cost.

UNIT III **(15 Hrs)**

The Role of Removable-Media Drives: The Importance of Data Backups-Data Transfer Between Systems Floppy-based Driver Installation for Removable-Media Devices- Comparing Disk, Tape, and Flash Memory Technologies-Magnetic Disk Media- Magnetic Tape Media-Flash Memory Media-Interfaces for Removable Media Drives- Floppy Disk Drives, Past and Present-Alternatives to Floppy Drives-Floppy Drive Interfaces Drive Components-Power and Data Connectors-The Floppy Disk Controller Cable-How the Operating System Uses a Floppy Disk-Analyzing 3 1/2" Floppy Disk Media Construction- Floppy Disk Media Types and Specifications-Floppy Drive Installation Procedures.

UNIT IV **(15 Hrs)**

High-Capacity Magnetic Storage Devices: Iomega Zip-Iomega REV-Iomega REV Drives- Magneto-Optical Drives-Comparing MO to "Pure" Magnetic Media-Flash Memory Devices- Types of Flash Memory Devices-Comparing Flash Memory Devices-Moving Data in Flash Memory Devices to Your Computer-Key Factors in Selecting a Removable-Media Drive- Micro-drive Technology-Tape Drives-Hard-Tape Backup Technologies-Choosing a Tape Backup Drive-Tape Standards and Compatibility-Tape Drive Backup Software-Backup and Restoration Troubleshooting-Motherboard BIOS- ROM Hardware-ROM Chip Types PROM- EPROM-EEPROM/Flash ROM-ROM BIOS Manufacturers-Flash BIOS -CMOS Setup Specifications.

UNIT V **(15 Hrs)**

Optical Technology: CD-Based Optical Technology-Data Encoding on the Disc-DVD- Data Encoding on the Disc-Blu-ray Disc-HD-DVD-Optical Disc Formats-CD-ROMXA- Multisession Recording Overview-Photo CD Disc Types-CD-ROM File Systems- DVD Formats and Standards-CD/DVD Read-Only Drives and Specifications-Direct Memory Access and Ultra-DMA-Interface-Loading Mechanism-Internal Versus External Drives- Writable CDs-Recording Software-CD Copy Protection-CD/DVD Drive and Software Installation and Support-Booting from a Floppy Disk with CD/DVD Drive Support- Troubleshooting Optical Drives.

Text Book:

1. "Upgrading and Repairing PC's", 17th Edition By Scott Mueller; Publisher: Que; Pub Date: March 24, 2006 ; Print ISBN-10: 0-7897-3404-4.
2. Govinda Rajulu B, "PC IBM and Clones– Hardware, Troubleshooting and Maintenance", Tata McGraw Hill Publishing Company Ltd., New Delhi, 1991.

Reference Books:

1. "Hardware bible" By: Winn L Rosch, TechMedia publications.

2. "Trouble shooting, maintaining and repairing PCs" By: Stephon J Bigelow; Tata McGraw Hill Publication.
3. "Modern All about printers" By: Manohar Lotia, Pradeep Nair, Bijal Lotia BPB Publications.

PERSONALITY DEVELOPMENT SKILLS

Code: 24GN301
Max Marks: 70

Course Objective: The objective of the course is to bring about personality development with regard to the different behavioural dimensions that have far reaching significance in different situations. Personality development and life skills are the collective exposure of personal character traits of an individual which can be his thought pattern, feelings, and emotional exuberance. Psychology treats personality development as an ongoing and dynamic process which is largely impacted by the atmosphere. The evaluating factors of personality are openness to experience, extra version, agreeableness, and conscientiousness.

UNIT I **(5 hours)**
Personality Development, Professional Etiquettes, Art of Social Conversation, Basic Body Language, Meeting and Greeting Skills.

UNIT II **(5 hours)**
Leadership and Team-Building Skills; Decision-Making and Problem-Solving through Effective Communication Strategies. Role plays, Team building.

UNIT III **(8 hours)**
Confidence Building Skills Self-Introduction, Self-Awareness, Mock Interviews, Extempore, Group Discussion.

UNIT IV **(4 hours)**
Stress and Time Management
Stress management - Meaning, types, Impact /Consequences (Mind, Body and Health), Tips for Busting Stress, Case Studies.
Time management- Importance and Techniques. Case Studies.

Text Book:
1. "Business Communication" by Asha Kaul- PHI.
2. "Personality Development and Communication Skills- I" by Urmila Rai and S. M. Rai- Himalaya Publishing House.
3. "Communication Skills" by Sanjay Kumar and Pushp Lata, Oxford University Press.
4. "Business Communication" by Meenakshi Raman and Prakash Singh, Oxford University Press.

Reference Books:
1. "Life Management and Stress Management" by Shawn Chhabra.
2. "Personality Development and Communication Skills-II"- by C. B. Gupta.
3. "Self-Awareness: The Hidden Driver of Success and Satisfaction"– Travis Bradberry.
4. "Business Communication" by Hory Sankar Mukherjee, Oxford University Press.

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PC ASSEMBLY & TROUBLESHOOTING LAB

Code: 24CS294
Max Marks: 70

(BASED ON 24CS204) PC Assembly & Troubleshooting:
List of Practical:

1. Assembling and De Assembling of Computer System.
2. Loading and configuration procedure of Microsoft Client O/S Win XP /Win 7 and Windows 8.
3. Installation of utility tools (Software).
4. Installation of utility tools (Drivers).
5. Firewall configuration, Antivirus/Internet security loading and configuration procedure.
6. Installation and configuration of I/O devices – Printers, Webcams, Scanners.
7. Installation and configuration of I/O devices – Digital Camera, USB Wi-Fi, USB BT, USB Storages, Projectors.
8. Multiple OS loading and trouble shooting.

ELECTRONICS INSTRUMENTS AND MEASUREMENTS LAB

Code: 24CS295
Max Marks: 70

(BASED ON 24CS205) Electronics Instruments and Measurements:
List of Practical:

1. Familiarisation of digital multi-meter and its usage in the measurements of
   (i) resistance,
   (ii) current,
   (iii) AC & DC voltages
   And for
   (i) continuity test
   (ii) diode test and
   (iii) Transistor test.
2. Measure the AC and DC voltages, frequency using a CRO and compare the values Measured with other instruments like Digital Multi-meter.
3. Formation of Sine, Square wave signals on the CRO using Function Generator and measure their frequencies. Compare the measured values with actual values.
4. Display the numbers from 0 to 9 on a single Seven Segment Display module by Applying voltages.
5. Display the letters a to h on a single Seven Segment Display module by applying voltages.
6. Measurement of body temperature using a digital thermometer and list out the error and corrections.

Theory Paper

Total: 100 Marks
External: 70 Marks
Internal: 30 Marks

External: 70 Marks
10 Question (MCQ): 1 marks each (1x10 = 10)
Answer any 6 out of 8 (Very Short 20-30 Words): 2 marks each (2x6 = 12)
Answer any 6 out of 8 (Short 50-70 Words): 3 marks each (3x6 = 18)
Answer any 6 out of 8 (Long 100-120 Words): 5 marks each (5x6 = 30)

Internal: 30 Marks
Two Internal Assessment Examinations will be conducted, each carrying 50 marks. The higher of the two scores will be considered for the final assessment.

Lab

Practical: 100 Marks
External: 70 Marks
Internal: 30 Marks

External (Two programs): 70 Marks

- **Program Writing**: 10 + 10 Marks
- **Algorithm& Flowchart**: 5 + 5 Marks
- **Program Execution**: 15 + 15 Marks
- **Viva**: 10 Marks

Internal Assessment (30 Marks)
Internal Assessment Examinations will be conducted, carrying 50 marks

- **Record**: 5 Marks
- **Attendance**: 5 Marks
- **Program Writing**: 15 Marks
- **Program Execution**: 15 Marks
- **Viva**: 10 Marks

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ARYAVART INTERNATIONAL UNIVERSITY

Tilthai, Dharmanagar, North Tripura-799250

Syllabus for B Sc (Hardware and Networking)

Semester 3

Theory									
Course Code	**Topic**	**L**	**T**	**P**	**Credit**	**Theory Marks**	**Internal Marks**	**Practical Marks**	**Total Marks**
24CS302	Computer Organization and Architecture	4	0	0	4	70	30	0	100
24CS602	E-Commerce	4	0	0	4	70	30	0	100
24CS303	Computer Networks	4	0	0	4	70	30	0	100
24CS306	Mastering in LAN and Troubleshooting	4	0	0	4	70	30	0	100
24GN101	Environmental Studies	2	0	0	2	70	30	0	100
Practical									
24CS393	Computer Networks Lab	0	0	2	2	0	30	70	100
24CS394	Mastering in LAN and Troubleshooting Lab	0	0	2	2	0	30	70	100
	Total				**24**	**350**	**210**	**140**	**700**

ARYAVART INTERNATIONAL UNIVERSITY
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Detailed Syllabus

COMPUTER ORGANIZATION AND ARCHITECTURE

Code: 24CS302
Max Marks: 70

Course Objectives: The course objectives of *Computer Organization and Architecture* are to discuss and make student familiar with the Principles and the Implementation of Computer Arithmetic, Operations of CPU including RTL, ALU. It also focuses on Instruction Cycle and Busses, Fundamentals of different Instruction Set Architectures and their relationship to the CPU Design, Memory System and I/O Organization and Principles of Multiprocessor Systems.

UNIT I **(11 Hrs)**
Boolean algebra and Logic: Basics Laws of Boolean Algebra, Logic Gates, Simplifications of Boolean equations using K-maps SOP and POS, Don't Care condition.
Arithmetic Circuits: Adder, Subtractor, Parallel binary adder/Subtractor.

UNIT II **(11 Hrs)**
Combinational Circuits: Multiplexers, De-Multiplexers, Decoders, Encoders.
Flip-flops: S-R, D, J-K, T, Clocked Flip-flop, Race around condition, Master slave Flip-Flop, Realisation of one flip-flop using other flip-flop, Applications of flip flop: Latch, Registers, Counters (elementary treatment to be given).

UNIT III **(11 Hrs)**
Data Transfer Operations: Register Transfer, Bus and Memory Transfer, Registers and micro-operations.
Basic Computer Organizations and Design: Instruction Codes, Computer Registers, Instruction Cycle, General Register Organization, Stack Organization, Instruction Formats, Addressing Modes.

UNIT IV **(11 Hrs)**
Input-Output Organization: Peripheral Devices, Input-Output Interfaces, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access (DMA).
Memory Organization: Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory.

Text Book:

1. Morris Mano, "Computer System Architecture", 3rd Edition, Prentice-Hall of India Private Limited, 1999.
2. Moris Mano, "Digital Logic and Computer Design", PHI Publications, 2002

Reference Books:

1. R. P. Jain, "Modern Digital Electronics", TMH, 3rd Edition, 2003.
2. WIliam Stallings, "Computer Organization and Architecture", 4th Edition, Prentice Hall of India Private Limited, 2001.
3. Subrata Ghosal, "Computer Architecture and Organization", Pearson 2011.
4. Malvino, "Digital Computer Electronics: An Introduction to Microcomputers", McGraw Hill.

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E-COMMERCE

Code: 24CS602
Max Marks: 70

Course Objectives: This course provides an introduction to information systems for business and management. It is designed to familiarize students with organizational and managerial foundations of systems, the technical foundation for understanding information systems.

UNIT I **(10 Hrs)**

Introduction: Definition of Electronic Commerce, Evolution of e-commerce, E-Commerce& E Business, Unique features of e-commerce, applications of E-Commerce, advantages and disadvantages of E-commerce, Types of e-commerce: B2B, B2C, C2C, M-commerce, Social Commerce

E-commerce infrastructure: Technological building blocks: Internet, web and mobile applications

UNIT II **(11 Hrs)**

Building an e-commerce presence: Planning, System Analysis, Design, Choosing Software, Hardware, Other E-commerce site tools: Tools For website design, Tools for SEO, Interactivity and active contents (Server-side scripting)

Important Components of E-commerce website: Product Cataloguing, Product Listing Page, Product description Page, Cart building and Checkout, third party integrations: Payment systems, Data Layer Integrations for analytics, Customer support integration, Order tracking, Shipping, return and cancellation

New Technologies for E-commerce: Chatbots, Recommendation systems (Personalisation), Smart Search, Product Comparison, Augmented reality, Big data, Cloud computing

UNIT III **(11 Hrs)**

Electronic Payment Systems-

Overview of Electronics payments, electronic Fund Transfer, Digital Token based Electronics payment System, Smart Cards, Credit Cards, Debit Cards, Emerging financial Instruments Smartphone wallet, Social / Mobile Peer to Peer Payment systems, Digital Cash and Virtual Currencies, Online Banking, Payment Gateway, Electronic Billing Presentment and Payment.

UNIT IV **(11 Hrs)**

Security Threats and Issues: Cybercrimes, Credit card frauds/theft, Identity fraud, spoofing, sniffing, DOS and DDOS attacks, social network security Issues, Mobile Platform Security issues, Cloud security issues

Technology Solutions: Encryption: Secret Key Encryption, Public Key Encryption, Digital Certificates and public key infrastructure

Securing channels: Secured Socket Layer (SSL), Transport Layer Security (TLS), Virtual Private Network (VPN), Protecting Networks: Firewalls, Proxy Servers, Intrusion detection and protection systems, Anti-Virus software

Text Book:

1. Kenneth C. Laudon, "E-Commerce: Business, Technology and Society", 15th Edition, Pearson education.
2. K. K. Bajaj & Debjani Nag, "E-Commerce: The Cutting Edge of Business", McGraw Hill, II edition, 2015
3. Efraim Turban, Jae Lee, David King, H. Michael Chung, "Electronic Commerce – A Managerial Perspective", Addison-Wesley.

Reference Books:

1. "The Complete Reference: Internet", Margaret Levine Young, Tata McGraw Hill.
2. "E-Commerce: Concepts, Models, Strategies", CSV Murthy, Himalayas Publishing House.
3. "Frontiers of Electronic Commerce", Ravi Kalakota & Andrew B. Wilson, Addison-Wesley (An Imprint of Pearson Education).
4. "Network Security Essentials: Applications & Standards", William Stallings, Pearson Education.

ARYAVART INTERNATIONAL UNIVERSITY
Tilthai, Dharmanagar, North Tripura

COMPUTER NETWORKS

Code: 24CS303
Max Marks: 70

Course Objectives: As a student in Computer Networking, students will gain valuable skills in computer networks (switching, routing), system and network administration, computer and network security, operating systems, web programming, databases, and project management.

UNIT I **(10 Hrs)**
Basic Concepts: Components of data communication, distributed processing, Line configuration, topology, transmission mode, and categories of networks.
OSI and TCP/IP Models: Layers and their functions, comparison of models.
Transmission Media: Guided and unguided, Attenuation, distortion, noise, throughput, propagation speed and time, wavelength, Shannon Capacity.

UNIT II **(12 Hrs)**
Telephony: Multiplexing, WDM, TDM, FDM, circuit switching, packet switching and message switching.
Data Link Layer: Types of errors, Framing (character and bit stuffing), error detection & correction methods; Flow control; Protocols: Stop & wait ARQ, Go-Back- NARQ, Selective repeat ARQ.

UNIT III **(12 Hrs)**
Network Layer: Internetworking & Devices: Repeaters, Hubs, Bridges, Switches, Router, Gateway, Modems.
Addressing: IPv4 and IPv6 addressing, IPv4 subnetting; Routing: Unicast Routing Protocols: RIP, OSPF, BGP.
Routing: Routing Methods- Static and Dynamic Routing, Routing basic commands, Distance vector protocol, Link state protocol.

UNIT IV **(10 Hrs)**
Transport and upper layers in OSI Model: Transport layer functions and Protocols, connection management, functions of session layers, Presentation layer, and Application layer.

Text Book:

1. A. S. Tenenbaum, "Computer Networks", Pearson Education Asia, 4th Ed., 2003.
2. Behrouz A. Forouzan, "Data Communication and Networking", 2nd edition, Tata Mc Graw Hill.

Reference Books:

1. D. E. Comer, "Internetworking with TCP/IP", Pearson Education Asia, 2001.
2. William Stallings, "Data and computer communications", Pearson education Asia, 7th Ed., 2002.
3. Leinwand, A., Pinsky, B. (2001). "Cisco router configuration". United Kingdom: Cisco Press.

ARYAVART INTERNATIONAL UNIVERSITY
Tilthai, Dharmanagar, North Tripura

MASTERING IN LAN AND TROUBLESHOOTING

Code: 24CS303
Max Marks: 70

Course Objectives: The objective of this course is to help network administrators identify the root cause of a network issue in order to fix it. Troubleshooting skills are important because they enable employees to identify and solve problems quickly.

UNIT I **(14 Hrs)**

Networking Tools: Crimping tool, punching tool: Impact and Punch down Tool, Multi Punch Tool, RJ45 Punch Down Tool, Impact Tool, Computer Punch Tool – deluxe, Cable cutter, I/O device, I/O Face Plate, I/O Box, LAN Cards, Connectors: RJ-11 (Registered Jack), RJ-45 (Registered Jack), F-Type, ST (Straight Tip) and SC (Subscriber Connector or Standard Connector), Fiber LC (Local Connector), MT-RJ (Mechanical Transfer Registered Jack),USB (Universal Serial Bus), LAN Patch Panel, Network Switch Rack.
Testing and Networking Tools: Introduction, Types of tools: LAN Testers, Application tools: IP scanner, Test Network Speed, Bandwidth Monitor 2 Lite Edition, Netbrute Scanner, piecework's IT Desktop, Ping, ipconfig, fstat, iproute, route, netstat, ipconfig /release, ipconfig /renew

UNIT II **(12 Hrs)**

Working of cables: Coaxial cable, Unshielded twisted pair (UTP), Types of UTP Cable, Shielded Twisted-Pair Cable, Fibre optics, Patch Cords: UTP Patch cords, Fibre patch cords, Cable Manager, Cable Tag, Cable stripper, Scissors.
Working on Hub and Switch: Types of Hub: Active Hub, Passive Hub and Intelligent Hub, Types of switches: Unmanaged Network Switches, Managed Switches, Smart Switches. Setting up of network: UTP cables, Switch, LAN tester, Switch Rack, Patch Panel, Cable Manager, Cable tagging, I/O box, I/O face plate, patch cords, connectors, terminals.

UNIT III **(12 Hrs)**

Patching of LAN Cable: Strip cable end, Untwist wire ends, Arrange wires, Trim wires to size, Attach connector, Check, Crimp, and Test. Setting up of LAN: UTP cables, Switch, LAN tester, Switch Rack, Patch Panel, Cable Manager, Cable tagging, I/O box, I/O faceplate, patch cords, connectors, terminals.
Internet connectivity: Different types of internet connection: Wireless, mobile, Hotspot, Dial-up, Broadband, DSL, Cable, Satellite, ISDN, Internet Service Provider (ISP), bandwidth or speed tester, Internet connectivity switch and PC, configuration of switch, managing of switching, troubleshooting of switching, testing application for switch.

UNIT IV **(10 Hrs)**

Wi-Fi Connectivity: Basic Configuration of Wi-Fi device or access point, IP address configuration, DNS Address, DHCP mode, Security and Password, Admin login and password, MAC Filtering, Monitoring, Backup and restore, etc.
Switch connectivity: Managed and unmanaged switch, Basic configuration of switch, mac-filtering, IP address configuration, DNS address, DHCP Mode, Admin login and Password, VLAN, backup file and restore settings.

Text Book:

1. "CCNA Cisco Certified Network Associate Study Guide" 3rd Edition, McGraw Hill Education.
2. "Cisco Networking Essentials", by McMillan, troy. John Wiley & Sons.
3. Vikas Gupta, "Comdex Hardware and Networking Course Kit", 1st Edition, Dreamtech Press.

Reference Books:

1. "Crypto and Network Security", 3rd Edition, McGraw Hill Education.
2. "Cisco a Beginner's Guide", Fifth Edition, McGraw-Hill/Osborne Media.
3. "Networking: The Complete Reference". 1st Edition, McGraw Hill Education.
4. Tannenbaum, A. S., 2003. "Computer Networks", Prentice Hall.
5. Stallings, William, "Local and Metropolitan Area Networks". Macmillan Publishing Co.
6. "Black: Data Network", Prentice Hall of India.

ARYAVART INTERNATIONAL UNIVERSITY
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ENVIRONMENTAL STUDIES

Code: 24GN101
Max Marks: 70

Course Objectives: The "Environmental Studies" course provides students with an understanding of the key environmental issues facing the world today. Topics include ecosystem dynamics, biodiversity, climate change, pollution, and sustainable development. Students will learn to evaluate the impact of human activities on the environment and explore solutions for promoting environmental conservation and sustainability.

UNIT I **(10 Hrs)**

Introduction to Environmental Studies:

- Multidisciplinary nature of environmental studies; Components of environment: atmosphere, hydrosphere, lithosphere, and biosphere.
- Scope and importance; Concept of sustainability and sustainable development.
- Emergence of environmental issues: Climate change, Global warming, Ozone layer depletion, Acid rain etc.
- International agreements and programmer: Earth Summit, UNFCCC, Montreal and Kyoto protocols, Convention on Biological Diversity(CBD), Ramsar convention, The Chemical Weapons Convention (CWC), UNEP, CITES, etc.

UNIT II **(10 Hrs)**

Ecosystems and Natural Resources:

- Definition and concept of Ecosystem.
- Structure of ecosystem (biotic and abiotic components); Functions of Ecosystem: Physical (energy flow), Biological (food chains, food web, ecological succession), ecological pyramids and homeostasis.
- Types of Ecosystems: Tundra, Forest, Grassland, Desert, Aquatic (ponds, streams, lakes, rivers, oceans, estuaries); importance and threats with relevant examples from India.
- Ecosystem services (Provisioning, Regulating, Cultural, and Supporting); Ecosystem preservation and conservation strategies; Basics of Ecosystem restoration.
- Energy resources: Renewable and non-renewable energy sources; Use of alternate energy sources; Growing energy needs; Energy contents of coal, petroleum, natural gas and bio gas; Agro-residues as a biomass energy source.

UNIT III **(10 Hrs)**

Biodiversity and Conservation

- Definition of Biodiversity; Levels of biological diversity: genetic, species and ecosystem diversity.
- India as a mega-biodiversity nation; Biogeographic zones of India; Biodiversity hotspots; Endemic and endangered species of India; IUCN Red list criteria and categories.
- Value of biodiversity: Ecological, economic, social, ethical, aesthetic, and informational values of biodiversity with examples.
- Threats to biodiversity: Habitat loss, degradation, and fragmentation; Poaching of wildlife; Man-wildlife conflicts; Biological invasion with emphasis on Indian biodiversity; Current mass extinction crisis.
- Biodiversity conservation strategies: in-situ and ex-situ methods of conservation (National Parks, Wildlife Sanctuaries, and Biosphere reserves.
- Case studies: Contemporary Indian wildlife and biodiversity issues, movements, and projects (e.g., Project Tiger, Project Elephant, Vulture breeding program, Project Great Indian Bustard, Crocodile conservation project, Silent Valley movement, Save Western Ghats movement, etc).

UNIT IV **(9 Hrs)**

Environmental Pollution and Control Measures:

- Environmental pollution (Air, water, soil, thermal, and noise): causes, effects, and controls; Primary and secondary air pollutants; Air and water quality standards.
- Nuclear hazards and human health risks.
- Solid waste management: Control measures for various types of urban, industrial waste, Hazardous waste, E-waste, etc.; Waste segregation and disposal.
- Environmental Impact Assessment and Environmental Management System.

Text Book:

1. Sanjay Kumar Batra, Kanchan Batra, Harpreet Kaur. "Environmental Studies". Taxmann's, Fifth Edition.
2. M. M. Sulphey. "Introduction to Environment Management". PHI Learning, 2019.
3. S. P. Mishra, S. N. Pandey. "Essential Environmental Studies". Ane Books Pvt. Ltd.; Sixth Edition.

Reference Books:

1. Asthana, D. K. (2006). "Text Book of Environmental Studies". S. Chand Publishing.
2. Basu, M., Xavier, S. (2016). "Fundamentals of Environmental Studies". Cambridge University Press, India.
3. Bharucha, E. (2013). "Textbook of Environmental Studies for Undergraduate Courses". Universities Press.
4. Mahapatra, R., Jeevan, S.S., Das, S. (Eds) (2017). "Environment Reader for Universities", Centre for Science and Environment, New Delhi.
5. Masters, G. M. & Ela, W. P. (1991). "Introduction to environmental engineering and science". Englewood Cliffs, NJ: Prentice Hall.
6. Odum, E. P., Odum, H. T. & Andrews, J. (1971). "Fundamentals of Ecology". Philadelphia: Saunders.
7. Sharma, P. D. & Sharma, P. D. (2005). "Ecology and Environment". Rastogi Publications.

COMPUTER NETWORKS LAB

Code: 24CS393
Max Marks: 70

(BASED ON 24CS303) Computer Networks:

List of Experiments:

1. Implement the data link layer framing methods such as character, character stuffing and bit stuffing.
2. Implement on a data set of characters the three CRC polynomials – CRC 12, CRC 16 and CRC CCIP.
3. Implement Dijkstra's algorithm to compute the Shortest path thru a graph.
4. Take an example subnet graph with weights indicating delay between nodes. Now obtain Routing table art each node using distance vector routing algorithm.
5. Take an example subnet of hosts. Obtain broadcast tree for it.
6. Take a 64 bit playing text and encrypt the same using DES algorithm.
7. Write a program to break the above DES coding.
8. Using RSA algorithm encrypt a text data and Decrypt the same.

MASTERING IN LAN AND TROUBLESHOOTING LAB

Code: 24CS393
Max Marks: 70

(BASED ON 24CS306) Mastering in LAN and Troubleshooting:

List of Experiments:

1. Recognize the physical topology and cabling (coaxial, OFC, UTP, STP) of a network.
2. Recognition and use of various types of connectors RJ-45, RJ-11, BNC and SCST.
3. Making of cross cable and straight cable.
4. Install and configure a network interface card in a workstation.
5. Identify the IP address of a workstation and the class of the address and configure the IP Address on a workstation.
6. Managing user accounts in windows and LINUX.
7. Sharing of Hardware resources in the network.
8. Use of Netstat and its options.
9. Connectivity troubleshooting using PING, IPCONFIG.
10. Installation of Network Operating System (NOS).
11. Create a network of at least 6 computers.
12. Study of Layers of Network and Configuring Network Operating System.

13. Study of Routing and Switching, configuring of Switch and Routers, troubleshooting of networks.
14. Study of Scaling of Networks, Design verities of LAN and forward of Traffic.
15. Study WAN concepts and Configure and forward Traffic in WAN.
16. Configure IPv4 and IPv6 and learn Quality, security and other services.
17. Learn Network programming 18 Troubles shoot Networks.

Theory Paper

Total: 100 Marks
External: 70 Marks
Internal: 30 Marks

External : 70 Marks
10 Question (MCQ): 1 marks each (1x10 = 10)
Answer any 6 out of 8 (Very Short 20-30 Words): 2 marks each (2x6 = 12)
Answer any 6 out of 8 (Short 50-70 Words): 3 marks each (3x6 = 18)
Answer any 6 out of 8 (Long 100-120 Words): 5 marks each (5x6 = 30)

Internal : 30 Marks
Two Internal Assessment Examinations will be conducted, each carrying 50 marks. The higher of the two scores will be considered for the final assessment.

Lab

Practical: 100 Marks
External: 70 Marks
Internal: 30 Marks

External (Two programs): 70 Marks

Program Writing: 10 + 10 Marks
Algorithm& Flowchart: 5 + 5 Marks
Program Execution: 15 + 15 Marks
Viva: 10 Marks

Internal Assessment (30 Marks)
Internal Assessment Examinations will be conducted, carrying 50 marks

Record: 5 Marks
Attendance: 5 Marks
Program Writing: 15 Marks
Program Execution: 15 Marks
Viva: 10 Marks

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ARYAVART INTERNATIONAL UNIVERSITY

Tilthai, Dharmanagar, North Tripura-799250

Syllabus for B Sc (Hardware and Networking)

Semester 4

Theory									
Course Code	**Topic**	**L**	**T**	**P**	**Credit**	**Theory Marks**	**Internal Marks**	**Practical Marks**	**Total Marks**
24CS503	Operating System	4	0	0	4	70	30	0	100
24CS321	Basics of Python Programming	4	0	0	4	70	30	0	100
24MG112	Digital Marketing	4	0	0	4	70	30	0	100
24CS613	IT Act and Cyber Laws	4	0	0	4	70	30	0	100
24IN401	Internship-I	0	0	4	4	0	100	0	100
Practical									
24CS591	Linux - OS Lab	0	0	2	2	0	30	70	100
24CS392	Python Programming Lab	0	0	2	2	0	30	70	100
	Total				**24**	**280**	**280**	**140**	**700**

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Detailed Syllabus

OPERATING SYSTEMS

Code: 24CS503
Max Marks: 70

Course Objectives: The operating systems course is an essential part of any Computer-Science education. The purpose of this course is to understand the mechanisms of the Operating Systems like Process Management, Process Synchronization, Memory Management, File System Implementation, Storage Structures used in OS and Protection Principles. How effectively the OS is utilizing the CPU resources with the help of these mechanisms.

UNIT I **(10 Hrs)**
Introduction to OS: Functionality of OS - OS design issues - Structuring methods (monolithic, layered, modular, micro-kernel models) - Abstractions, processes.
OS Principles: System calls, System/Application Call Interface – Protection: User/Kernel modes – Interrupts.

UNIT II **(24 Hrs)**
Scheduling: Processes Scheduling - CPU Scheduling: Pre-emptive, non-pre-emptive – Multiprocessor scheduling – Deadlocks - Resource allocation and management - Deadlock handling mechanisms: prevention, avoidance, detection, recovery.
Concurrency: Inter-process communication, Synchronization - Implementing synchronization primitives (Peterson's solution, Bakery algorithm, synchronization hardware) - Semaphores – Classical synchronization problems, Monitors: Solution to Dining Philosophers problem.

UNIT III **(12 Hrs)**
Memory Management: Main memory management, Memory allocation strategies, Virtual memory: Hardware support for virtual memory (caching, TLB) – Paging - Segmentation - Demand Paging - Page Faults – Page Replacement –Thrashing.

UNIT IV **(8 Hrs)**
Storage Management, Protection and Security : Disk structure and attachment – Disk scheduling algorithms (seek time, rotational latency based)-System threats and security – Policy vs mechanism - Access vs authentication.

UNIT V **(6 Hrs)**
System protection: Access matrix – Capability based systems - OS: performance, scaling, future directions in mobile OS, Recent Trends.

Text Book:
1. Abraham Silberschatz, Peter B. Galvin, Greg Gagne. "Operating System Concepts", Wiley (2018).
2. Stallings (2006), "Operating Systems, Internals and Design Principles", 5th edition, Pearson Education, India.

Reference Books:
1. Ramez Elmasri, A. Gil Carrick, David Levine. "Operating Systems: A Spiral Approach". McGraw Hill Higher Education (2010).
2. Remzi H. Arpaci-Dusseau, Andrea C. Arpaci-Dusseau. "Operating Systems: Three Easy Pieces". Arpaci-Dusseau Books, Inc (2015).
3. Andrew S. Tanenbaum, "Modern Operating Systems". Pearson, 4th Edition (2016).
4. William Stallings. "Operating Systems: Internals and Design Principles". Pearson, 9th Edition (2018).

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BASICS OF PYTHON PROGRAMMING

Code: 24CS321
Max Marks: 70

Course Objectives: This course is designed to introduce programming concepts using Python to students. The course aims to develop structured as well as object-oriented programming skills using Python. The course also aims to achieve competence amongst its students to develop correct and efficient Python programs to solve problems spanning multiple disciplines.

UNIT I: INTRODUCTION TO PYTHON
Installing Python, basic syntax, interactive shell, editing saving and running a script; The concept of data types, variables, assignments; Immutable variables; Numerical types, Operators(Arithmetic Operator, Relational Operator, Logical or Boolean Operator, Assignment Operator, Ternary Operator, Bitwise Operator, Increment or Decrement Operator) and expressions; Comments in the program, Understanding error messages.

UNIT II: CREATING PYTHON PROGRAMS
Input and Output Statements, Control Statements (Branching, Looping, Conditional Statement, Exit function, Difference between break, continue and pass).
Function: Defining a function, calling a function, types of function, Function Arguments, Anonymous Functions, global and local variables, Recursion.

UNIT III: STRINGS AND TEXT FILES
Manipulating files and directories, os and sys modules, text files: reading/writing text and numbers from/to a file, creating and deleting a formatted file (csv or tab-separated).
String Manipulations: subscript operator, indexing, slicing a string; strings and number system: converting string to numbers and vice-versa, Binary, octal and hexadecimal numbers.

UNIT IV: LISTS, TUPLES AND DICTIONARIES
Basic list operators, replacing, inserting and removing an element, searching and sorting lists, Accessing tuples, Operations, Working Functions and Methods, dictionary literals, Adding and Removing keys, accessing and replacing values, traversing dictionaries.
Data Structures using Lists: Elementary Data Representation- Linear List Array, Stacks, Queues, Linked Lists, and Trees.

UNIT V: MODULES
Importing module, Math module, Random Module, Packages, Composition.
Exception Handling: Exception, Exception Handling, except clause, try, finally clause, User-Defined Exceptions.

Text Books:

1. T. Budd. “Exploring Python”, TMH, 1st Ed, 2011.
2. Allen Downey, Jeffrey Elkner, Chris Meyers. “How to think like a computer scientist: Learning with Python”, Freely available online, 2012.
3. Luca Massaron John Paul Mueller. “Python for Data science For Dummies”, Wiley, 2nd Ed., 2019.

Reference Books:

1. https://docs.python.org/3/tutorial/index.html
2. http://interactivepython.org/courselib/static/pythonds

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DIGITAL MARKETING

Code: 24MG112
Max Marks: 70

Course Objectives: This course is an initiative designed to educate students in the area of Digital Marketing. This course provides an understanding of the ever evolving digital landscape and examines the strategic role of digital marketing processes and tools in designing the overall Marketing strategy and the Digital Marketing Plan. It explores the challenges of Interactive media, the online market place, and the creative challenges of communicating and retention strategies of customers through these media, the main search engines and the future trends in digital marketing.

UNIT I **(11 hours)**

Digital Marketing Basics: Digital Marketing meaning and its importance, Traditional vs Digital Marketing, Benefits of Digital Marketing, Internet Marketing basics, Digital Marketing channels, Types of Business models, Digital Marketing strategies (P.O.E.M framework), Inbound and Outbound marketing, Digital Transformation model, 4Cs of Digital Marketing.

UNIT II **(11 hours)**

Social Media Marketing: Introduction, Social Media marketing strategies, Overview of Social media platforms – Instagram, Snapchat, Facebook, Mobile, Twitter, Content Planning and Strategy, Influential marketing, Content marketing, Digital Marketing campaign.

UNIT III **(11 hours)**

Search Engine Optimization: Introduction to SEO, On-Page and Off-Page Optimization, Role of Keywords in SEO, Organic vs Non-Organic SEO, Blogging as marketing strategy, Types of Blogs.
Search Engine Marketing: Introduction to Paid marketing, Google Adwords, Types of campaigns and Campaign creation.

UNIT IV **(11 hours)**

Tools for SMM and Marketing communication: Overview of Buffer, Hootsuite, Canva, Trello and Hot jar.
Web Analytics: Meaning, Purpose and process, Types, Tools for analytics– Google analytics, Audience analytics, Acquisition analytics, Behaviour analytics and Conversion analytics.

Text Books:

1. Rajan Gupta, Supriya Madan, “Digital Marketing”, BPB Publication, Ist Edition, 2022
2. Seema Gupta, “Digital Marketing”, McGraw Hill, 2nd Edition, 2018.
3. Puneet Singh Bhatia, “Fundamentals of Digital Marketing”, Pearson, 2nd Edition, 2020.

Reference Books:

1. Ian Dodson, “The Art of Digital Marketing”, Wiley, 2017.
2. Nitin Kamat, Chinmay Nitin Kamat, “Digital Marketing”, Himalaya Publishing House, 1st Edition, 2017.
3. Vandana Ahuja, “Digital Marketing”, Oxford University Press, 8th Edition, 2019.
4. Judy Strauss, Raymond Frost, “E- Marketing”, PHI learning, 5th Edition, 2009.
5. Moutusy Maity, “Internet Marketing”, Oxford University Press, 2018.
6. Stephanie Diamond, “Digital Marketing”, Wiley, 2019.
7. T. N. Swaminathan, Karthik Kumar, “Digital Marketing From Fundamentals to Future”, Cengage, 1st Edition, 2019.

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IT ACT AND CYBER LAWS

Code: 24CS613
Max Marks: 70

Course Objectives: The course aims at acquainting the students with Cyber Crime & Computer related Crimes and also freedom of speech in cyber space. It also provides an elementary understanding of the Indian Penal Law and Cyber Crimes.

UNIT I **(14 Hrs)**

Introduction to the Cyber World and Cyber Law: Cyber World: An Overview, The internet and online resources, Introduction to Computer Crimes and Cyber Crimes, Distinction between cybercrimes and conventional crimes, Reasons for commission of cyber-crime, Cyber forensic.
Classification of cyber-crimes: Cyber criminals and their objectives, Planning of attacks.
Types of cybercrimes: Cyber Stalking; Forgery and Fraud, Social engineering attacks, Phishing, DoS and DDoS attacks, Identity Theft, Salami Attack, Net Extortion.
Introduction to Cyberspace: Cybercrime, Threats to the virtual world, Cyber Crimes & Social Media attacks, Cyber Squatting, Cyber Espionage, Cyber Warfare, Cyber Terrorism, Cyber Defamation, Crime related to IPRs, Computer Vandalism etc.
Access and Unauthorized Access, Data Security, E-Contracts and E-Forms

UNIT II **(14 Hrs)**

Introduction to Cyber Law, Need for Cyber Law
Evolution of the IT Act, Genesis and Necessity - Salient features of the IT Act, 2000, Various authorities under IT Act and their powers, Penalties & Offences, Amendments.
Impact on other related Acts (Amendments) - Amendments to Indian Penal Code, Indian Evidence Act, Bankers Book Evidence Act, Reserve Bank of India Act - Cyberspace Jurisdiction.
Online Safety for all with special reference for women and children, Misuse of individual information. Violation of privacy, Trafficking of Information and Data

UNIT III **(10 Hrs)**

E–Commerce and Laws in India: Digital/Electronic Signature in Indian Laws, Digital Certificates, Certifying Authority, E-Commerce Issues and provisions in Indian Laws, Concept of E-Governance and its Implication in India, Issues related to E-Taxation in Cyberspace, E-Contracts and its validity in India (f) Cyber Tribunal & Appellate Tribunal.

UNIT IV **(12 Hrs)**

Intellectual Property Rights - Domain Names and Trademark Disputes, Concept of Trademarks in Internet Era, Cyber Squatting, Reverse Hijacking Jurisdiction in Trademark Disputes, Copyright in the Digital Medium, Copyright in Computer Programmes.
Cyber Laws in India – Crime against Individual, Crime against Property, Crime against Nation, Indian Case Laws, An introduction to International Cyber Laws

Text Book:

1. Supriya Madan, Rajan Gupta, “Security in Cyber Space and its Legal Perspective”, AGPH Books
2. Sharma J. P., & Kanojia S. (2016). “Cyber Laws”. New Delhi: Ane Books Pvt. Ltd.
3. Duggal, P. “Cyber Laws”. (2016) Universal Law Publishing.
4. Kamath, N. (2004). “Law relating to computers, internet and e-commerce: A guide to Cyber Laws and the Information Technology Act, 2000 with rules, regulations and notifications” (2nd ed.). Delhi: Universal Law Publishing Co.
5. “Cyber security”: Nina Godbole, Wiley Publication 2016.

Reference Books:

1. Baase, S. (2013). “A Gift of Fire: Social, Legal, and Ethical Issues for Computing”.
2. “Cyber Law Simplifies”. Vivek Sood, McGraw Hill Publication.
3. “Introduction to Cyber Security”. Anand Shinde.
4. “Technology” (4th ed.) Upper Saddle River, NJ: Pearson Education.

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LINUX LAB

Code: 24CS591
Max. Marks: 70
(BASED ON 24CS501) Java Programming

Core Practical:

1. Connect to the Linux Server and understand the basic Directory Structure of Linux.
2. To understand help commands like: -man, info, help, what is, apropos
3. To understand basic directory navigation commands like cat, cd, mv, cp, rm, mkdir, rmdir, file, pwd command.
4. To understand basic commands like: - date, cal, echo, bc, ls, who, whoami, hostname, uname, tty, aliase.
5. To understand vi basics, three modes of vi Editor, how to write, save, execute a shell script in vi editor.
6. To understand process related commands like: -ps, top, pstree, nice, renice in Linux.
7. To understand how to examine and change File permissions.
8. Set a file to be read-only with the chmod command. Interpret the file permissions displayed by the ls -l command.
9. Delete one or more directories with the rmdir command. See what happens if the directory is not empty. Experiment (carefully!) with the rm -r command to delete a directory and its content
10. Change your directory to the directory exercises. Create a file in that directory, named the file as example1 using the cat command containing the following text: water, water everywhere and all the boards did shrink; water, water everywhere, no drop to drink.
11. Write basic shell script to display the table of a number.
12. Write basic shell script to input a character from user and then check whether it is uppercase, lowercase or digit.
13. Write basic shell script to calculate factorial of a number.
14. Write basic shell script to input the month number and generate corresponding calendar.
15. Write basic shell script to list all directories.
16. Write basic shell script to display greatest of three numbers.
17. Write basic shell script to check whether the number entered by user is prime or not.

Note:

1. **In total 15 practical to be implemented. 2 additional practicals may be given by the course instructor.**
2. **This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.**

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PYTHON PROGRAMMING LAB

Code: 24CS392
Max Marks: 70
(BASED ON 24CS321) Basics of Python Programming:

1. Basics & operations

a) Running instructions in Interactive interpreter and a Python Script.
b) Write a program to purposefully raise Indentation Error and correct it.
c) Write a program to compute distance between two points taking input from the user (Pythagorean Theorem).
d) Write a program add.py that takes 2 numbers as command line arguments and prints its sum.

2. Control Flow

a) Write a Program for checking whether the given number is an even number or not.
b) Using a for loop, write a program that prints out the decimal equivalents of 1/2, 1/3, 1/4, . . . ,1/10.
c) Write a program using a for loop that loops over a sequence. What is sequence?
d) Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero.

3. Control Flow - Continued

a) Find the sum of all the primes below 200.
Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first 10 terms will be:
1, 2, 3, 5, 8, 13, 21, 34, 55, 89,...
b) By considering the terms in the Fibonacci sequence whose values do not exceed 400, find the sum of the even-valued terms.

4. DS

a) Write a program to count the numbers of characters in the string and store them in a dictionary data structure.
b) Write a program to use split and join methods in the string and trace a birthday with a dictionary data structure.
c) Write a program combining lists that combines these lists into a dictionary.
d) Write a program to count the frequency of characters in a given file. Can you use character frequency to tell whether the given file is a Python program file, C program file or a text file?

5. Files

a) Write a program to print each line of a file in reverse order.
b) Write a program to compute the number of characters, words and lines in a file.

6. Functions

a) Write a function ball collides that takes two balls as parameters and computes if they are Colliding. Your function should return a Boolean representing whether or not the balls are Colliding.
Hint: Represent a ball on a plane as a tuple of (x, y, r), r being the radius If (distance between two balls centres) <= (sum of their radii) then (they are colliding).
b) Find mean, median, mode for the given set of numbers in a list.

7. Functions - Continued

a) Write a function nearly equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b.
b) Write a function dups to find all duplicates in the list.
c) Write a function unique to find all the unique elements of a list.

8. Functions - Problem Solving

a) Write a function cumulative product to compute cumulative product of a list of numbers.
b) Write a function reverse to reverse a list. Without using the reverse function.
c) Write a function to compute gcd, lcm of two numbers. Each function shouldn't exceed one line.

9. Multi-D Lists

a) Write a program that defines a matrix and prints.
b) Write a program to perform addition of two square matrices.
c) Write a program to perform multiplication of two square matrices.

10 - Modules

a) Install packages requests, flask and explore them using (pip).
b) Write a script that imports requests and fetches content from the page E.g. (Wiki).
c) Write a simple script that serves a simple HTTP Response and a simple HTML Page.

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Theory Paper

Total: 100 Marks
External: 70 Marks
Internal: 30 Marks

External: 70 Marks
10 Question (MCQ): 1 marks each (1x10 = 10)
Answer any 6 out of 8 (Very Short 20-30 Words): 2 marks each (2x6 = 12)
Answer any 6 out of 8 (Short 50-70 Words): 3 marks each (3x6 = 18)
Answer any 6 out of 8 (Long 100-120 Words): 5 marks each (5x6 = 30)

Internal: 30 Marks
Two Internal Assessment Examinations will be conducted, each carrying 50 marks. The higher of the two scores will be considered for the final assessment.

Lab

Practical: 100 Marks
External: 70 Marks
Internal: 30 Marks

External (Two programs): 70 Marks
- **Program Writing**: 10 + 10 Marks
- **Algorithm& Flowchart**: 5 + 5 Marks
- **Program Execution**: 15 + 15 Marks
- **Viva**: 10 Marks

Internal Assessment (30 Marks)
Internal Assessment Examinations will be conducted, carrying 50 marks
- **Record**: 5 Marks
- **Attendance**: 5 Marks
- **Program Writing**: 15 Marks
- **Program Execution**: 15 Marks
- **Viva**: 10 Marks

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Syllabus for B Sc (Hardware and Networking)

Semester 5

Theory									
Course Code	**Topic**	**L**	**T**	**P**	**Credit**	**Theory Marks**	**Internal Marks**	**Practical Marks**	**Total Marks**
24CS506	Fundamentals of Microprocessor	4	0	0	4	70	30	0	100
24CS507	Server Administration	4	0	0	4	70	30	0	100
24CS315	Computer Graphics	4	0	0	4	70	30	0	100
24GN401	Indian Constitution	2	0	0	2	70	30	0	100
24PR401	Minor Project	2	0	0	2	0	100	0	100
24PR502	Seminar/Conference Presentation	0	0	2	2	0	100	0	100
Practical									
24CS592	Computer Graphics Lab	0	0	2	2	0	30	70	100
		0	0	2	2	0	30	70	100
	Total				**22**	**280**	**380**	**140**	**800**

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Detailed Syllabus

FUNDAMENTALS OF MICROPROCESSOR

Code: 24CS506
Max Marks: 70

Course Objectives: To introduce students to the basic architecture, operation, and programming of microprocessors. The course focuses on developing a strong understanding of instruction sets, interfacing techniques, and applications of microprocessors in embedded systems and real-world problem-solving.

UNIT I
Introduction of Microprocessor, Block Diagram of Micro Computer, Block Diagram of CPU with system Bus - Architecture–Bus Organization– Bus Organization in Microprocessor, Pin Detail, Diagram of Microprocessor, Data & Address deviation, Generate Control Signal in Microprocessor, Detail of Microprocessor Functional diagram and pin out diagram of 8085.

UNIT II
Addressing modes of 8085 – Direct addressing Mode-Indirect Addressing Mode – Data Transfer - Instruction set of 8085 – simple programs.

UNIT III
I/O Schemes – Peripherals and Interfaces. Input – Output Organization: Input – output interface – I/O Bus and Interface – I/O Bus Versus Memory Bus – Isolated Versus Memory – Mapped I/O – Example of I/O Interface. Asynchronous data transfer: Strobe Control and Handshaking – Priority Interrupt: Daisy-Chaining Priority, Parallel Priority Interrupt. Direct Memory Access: DMA Controller, DMA Transfer. Input – Output Processor: CPU-IOP Communication.

UNIT IV
Memory Organization: Memory Hierarchy – Main Memory- Associative memory: Hardware Organization, Match Logic, Read Operation, Write Operation. Cache Memory: Associative, Direct, Set associative Mapping – Writing Into Cache Initialization. Virtual Memory: Address Space and Memory Space, Address Mapping Using Pages, Associative Memory Page Table, Page Replacement.

UNIT V
Introduction to 8086: Pin out diagram -Functional Block diagram of 8086 – Architecture instruction set-comparison with 8085 & 8086: Interfacing IC –RISC & CISC.

Text Book:
1. “Microprocessor Architecture programming & application with 8085 & 8080” by Ramesh, S. Gaonkar. Wiley eastern.
2. “Introduction to microprocessors” by Adithya. P. Mathus. TMH Publication.
3. “Microprocessor interfaces” by Douglas Hall. MC Graw Hill.

Reference Books:
1. “Microprocessors PC Hardware and interfacing” by N. Mathivanan. PHI.
2. “8086/8088 family Design, programming and interfacing” by John Utter Bery. PHI.

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SERVER ADMINISTRATION

Code: 24CS507
Max Marks: 70

Course Objective: To equip students with the knowledge and skills required for effective server installation, configuration, management, and maintenance. The course focuses on server security, troubleshooting, performance optimization, and practical administration of modern server environments.

UNIT I
Introducing Windows Server 2003 -Windows Server 2003 Editions- Standard Edition-Enterprise Edition- Data centre Edition -Web Edition- Brand New in Windows Server 2003- New Remote Administration Tools -New Active Directory Features -Availability and Reliability Improvements Resultant Set of Policies.

UNIT II
Installation. Hardware Requirements. Hardware Compatibility List. Symmetric Multiprocessing Hardware. Clustering Hardware. Plug and Play Support -ACPI Issues - Developing a Deployment Plan -Document the Hardware Document the Network- Document the Software Document the Legacy Components- Prepare for Problems -Complete the Pre- installation Tasks. -Understanding Installation Models.

UNIT III
System Basics for Servers. Manage Your Server. Configure Your Server Wizards Removing Server Roles Configure Your Server Log. Set Up Server Roles Manually. Remote Desktop - Enable Remote Desktop on the Server -Client Remote Connection Software. Starting a Remote Desktop Session- Running a Remote Desktop Session -Leaving a Remote Desktop Session- Managing the Connections from the Server -Joining the Console Session-Using a Snap-in for Remote Desktop. - Changes in IIS -Use Web Edition for IIS. Installing IIS -Set Compatibility Options Manually.

UNIT IV
The Windows Server 2003 Registry. Overview of the Registry. Registry structure. Hives and Hive Files. Registry Data Items. HKEY_CLASSES_ROOT. HKEY_CURRENT_USER. Regedit.exe. Prevent Regedit from Displaying the Last Accessed Key. Accessing Remote Registries. Searching the Registry- Creating Favorites - Tweak and Troubleshoot with the Registry. Exporting Keys - Adding Items to the Registry - Registry Security - Auditing the Registry. Reg.exe. General Guidelines for Reg.exe.

UNIT V
Web Services: Introduction- Infrastructure- SOAP-Building web services- Deploying and publishing web services- Finding and consuming web services.

Text Book:

1. "Windows® Server 2003: The Complete Reference" by Kathy Ivens with Rich Benack, Christian Branson, John Green, David Heinz, Tim Kelly, John Linkous, Christopher McKettrick, Patrick J. Santry, Mitch Tulloch; Publications McGraw- Hill/Osborne.

Reference Books:

1. "Linux: Powerful Server Administration" by Uday Sawant, Oliver Pelz, Jonathan Hobson, William Leemans.

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COMPUTER GRAPHICS

Code: 24CS315
Max Marks: 70

Course Objectives: The main objective of the course is to introduce students with fundamental concepts and theory of computer graphics. It presents the important drawing algorithm, polygon fitting, clipping and 2D transformation curves and an introduction to 3D transformation. It provides the basics of OpenGL application programming interface which allows students to develop programming skills in CG.

UNIT I **(6 Hrs)**
Basic of Computer Graphics: Basic of Computer Graphics, Applications of computer graphics, Display devices, Random and Raster scan systems, Graphics input devices, Graphics software and standards.

UNIT II **(8 Hrs)**
Graphics Primitives: Points, lines, circles and ellipses as primitives, scan conversion algorithms for primitives, fill area primitives including scan-line polygon filling, inside-outside test, boundary and flood-fill, character generation, line attributes, area-fill attributes, character attributers.

UNIT III **(8 Hrs)**
2D transformation and viewing: Transformations (translation, rotation, scaling), matrix representation, homogeneous coordinates, composite transformations, reflection and shearing, viewing pipeline and coordinates system, window-to-viewport transformation, clipping including point clipping, line clipping (Cohen Sutherland, liang-Barsky, NLN), polygon clipping.

UNIT IV **(6 Hrs)**
3D concepts and object representation: 3D display methods, polygon surfaces, tables, equations, meshes, curved lies and surfaces, quadric surfaces, spline representation, cubic spline interpolation methods, Bezier curves and surfaces, B-spline curves and surfaces.

UNIT V **(8 Hrs)**
3D transformation and viewing: 3D scaling, rotation and translation, composite transformation, viewing pipeline and coordinates, parallel and perspective transformation, view volume and general (parallel and perspective) projection transformations.

UNIT VI **(6 Hrs)**
Advance Topics: visible surface detection concepts, back-face detection, depth buffer method, illumination, light sources, illumination methods (ambient, diffuse reflection, specular reflection), and Colour models: properties of light, XYZ, RGB, YIQ and CMY colour models.

Text Book:

1. Donald Hearn & M. Pauline Baker, “Computer Graphics with OpenGL”, Third Edition, 2004, Pearson Education, Inc. New Delhi.
2. Ze-NianLi and Mark S. Drew, “Fundamentals of Multimedia”, First Edition, 2004, PHI Learning Pvt. Ltd., New Delhi.

Reference Books:

1. “Computer Graphics”, D. Hearn and P. Baker - Pearson Education - C Version.
2. “Computer Graphics”, with OpenGL Hearn and Baker, - Pearson.
3. “Computer Graphics”, Sinha & Udai, - TMH.
4. “Computer Graphics”, Foley and van Dam - Person Education.

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Tilthai, Dharmanagar, North Tripura

INDIAN CONSTITUTION

Code: 24GN401
Max Marks: 70

Course Objectives: The objective of the *Indian Constitution* course is to provide the students with a foundational understanding of the principles, structure, and functioning of the Indian Constitution. The course emphasizes the rights and duties of citizens, governance frameworks, and the role of the Constitution in shaping the democratic and legal structure of India.

UNIT I **(07 Hours)**

Introduction to Constitution: Meaning and importance of the Constitution, salient features of Indian Constitution. Preamble of the Constitution. Fundamental rights- meaning and limitations. Directive principles of state policy and Fundamental duties -their enforcement and their relevance.

UNIT II **(06 Hours)**

Union Government: Union Executive- President, Vice-president, Prime Minister, Council of Ministers. Union Legislature- Parliament and Parliamentary proceedings. Union Judiciary-Supreme Court of India – composition and powers and functions.

UNIT III **(07 Hours)**

State and Local Governments: State Executive- Governor, Chief Minister, Council of Ministers. State Legislature-State Legislative Assembly and State Legislative Council. State Judiciary-High court. Local Government-Panchayat raj system with special reference to 73rd and Urban Local Self Govt. with special reference to74th Amendment.

UNIT IV **(06 Hours)**

Election provisions, Emergency provisions, Amendment of the constitution: Election Commission of India-composition, powers and functions and electoral process. Types of emergency-grounds, procedure, duration and effects. Amendment of the constitution- meaning, procedure and limitations.

Text Book:

1. M. V. Pylee, “Introduction to the Constitution of India”,4th Edition, Vikas publication,2005.
2. Durga Das Basu (DD Basu), “Introduction to the constitution of India”, (Student Edition), 19th edition, Prentice-Hall EEE, 2008.

Reference Books:

1. Merunandan, “Multiple Choice Questions on Constitution of India”, 2nd Edition, Meraga publication, 2007.

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MINOR PROJECT

Code: 24PR402
Max Marks: 100

PROJECT REPORT
All the students are required to submit a report based on the project work done by them during the fifth semester.

SYNOPSIS (SUMMARY/ABSTRACT):
All students must submit a summary/abstract separately with the project report. Summary, preferably, should be of about 3-4 pages. The content should be as brief as is sufficient enough to explain the objective and implementation of the project that the candidate is going to take up. The write up must adhere to the guidelines and should include the following:

- Name / Title of the Project
- Statement about the Problem
- Why is the particular topic chosen?
- Objective and scope of the Project
- Methodology (including a summary of the project)
- Hardware & Software to be used
- Testing Technologies used
- What contribution would the project make?

TOPIC OF THE PROJECT
This should be explicitly mentioned at the beginning of the Synopsis. Since the topic itself gives a peep into the project to be taken up, candidate is advised to be prudent on naming the project. This being the overall impression on the future work, the topic should corroborate the work.

OBJECTIVE AND SCOPE:
This should give a clear picture of the project. Objective should be clearly specified. What the project ends up to and in what way this is going to help the end user has to be mentioned.

PROCESS DISCRIPTION:
The process of the whole software system proposed, to be developed, should be mentioned in brief. This may be supported by DFDs / Flowcharts to explain the flow of the information.

RESOURCES AND LIMITATIONS:
The requirement of the resources for designing and developing the proposed system must be given. The resources might be in form of the hardware/software or the data from the industry. The limitation of the proposed system in respect of a larger and comprehensive system must be given.

CONCLUSION:
The write-up must end with the concluding remarks- briefly describing innovation in the approach for implementing the Project, main achievements and also any other important feature that makes the system stand out from the rest. Bachelor of Computer Applications programme offered by USICT at affiliated institutions.

The following suggested guidelines must be followed in preparing the Minor Project Report:
Good quality white A4 size paper should be used for typing and duplication. Care should be taken to avoid smudging while duplicating the copies.

- Page Specification: (Written paper and source code)
- Left margin - 3.0cms
- Right margin- 2.0cms
- Top margin 2.54cms
- Bottom margin 2.54cms
- Page numbers - All text pages as well as Program source code listing should be numbered at the bottom centre of the pages.

Normal Body Text: Font Size: 12, Times New Roman, Double Spacing, Justified. 6 point above and below para spacing
Paragraph Heading Font Size: 14, Times New Roman, Underlined, Left Aligned. 12 point above & below spacing.

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Chapter Heading Font Size: 20, Times New Roman, Centre Aligned, 30 point above and below spacing. Coding Font size: 10, Courier New, Normal

Submission of Project Report to the University:

The student will submit his/her project report in the prescribed format. The Project Report should include:

1. One copy of the summary/abstract.
2. One hard Copy of the Project Report.
3. The Project Report may be about 75 pages (excluding coding).

FORMAT OF THE STUDENT PROJECT REPORT ON COMPLETION OF THE PROJECT

I. Cover Page as per format
II. Acknowledgement
III. Certificate of the project guide
IV. Synopsis of the Project
V. Main Report
   a. Objective & Scope of the Project
   b. Theoretical Background Definition of Problem
   c. System Analysis & Design vis-a-vis User Requirements
   d. System Planning (PERT Chart)
   e. Methodology adopted; System Implementation & Details of Hardware & Software used System Maintenance &Evaluation
   f. Detailed Life Cycle of the Project
      i. ERD, DFD
      ii. Input and Output Screen Design
      iii. Process involved
      iv. Methodology used testing
      v. Test Report, Printout of the Report & Code Sheet
VI. Coding and Screenshots of the project
VII. Conclusion and Future Scope
VIII. References

Formats of various certificates and formatting styles are as:

1. **Certificate from the Guide**

CERTIFICATE

This is to certify that this project entitled " xxxxxx xxxxx xxxxx xxxx xxxx xxx" submitted in partial fulfilment of the degree of Bachelor of Science (Hardware and Networking) to the "xxxxxxxxxxxxxxxxxxxxxxxxxxx" through xxxxxx xxxxx done by Mr./Ms. _____, Roll No. _____is an authentic work carried out by him/her at _____ under my guidance. The matter embodied in this project work has not been submitted earlier for award of any degree to the best of my knowledge and belief.

Signature of the student Signature of the Guide

2. **Project Report Cover Page Format:**

Title of the Project/report
(Times New Roman, Italic, Font size = 24)

Submitted in partial fulfilment of the requirements for the award of the Degree of
Bachelor of Science (Hardware and Networking)
(Bookman Old Style, 16-point, centre)

Submitted to:
(Guide Name)

Submitted by:
(Student's name)
Roll No
College Name

3. Self-Certificate by the students

SELF CERTIFICATE

This is to certify that the dissertation/project report entitled "……" is done by me is an authentic work carried out for the partial fulfilment of the requirements for the award of the degree of Bachelor of Science (Hardware and Networking) under the guidance of _____.
The matter embodied in this project work has not been submitted earlier for award of any degree or diploma to the best of my knowledge and belief.

Signature of the student
Name of the Student
Roll No.

4. ACKNOWLEDGEMENTS

In the "Acknowledgements" page, the writer recognizes his indebtedness for guidance and assistance of the thesis adviser and other members of the faculty. Courtesy demands that he also recognizes specific contributions by other persons or institutions such as libraries and research foundations. Acknowledgements should be expressed simply, tastefully, and tactfully.

COMPUTER GRAPHICS LAB

Code: 24GN401
Max Marks: 70

(BASED ON 24CS315) Computer Graphics:

PART A

1. Program to create simple geometric objects.
2. Program to implement the DDA technique to draw line.
3. Program to implement the Bresenham's technique to draw line.
4. Program to implement the DDA technique to draw Circle.
5. Program to implement the midpoint circle algorithm.
6. Program to implement 2 Dimensional basic transformations.
7. Program to implement various attributes of Graphics primitives.
8. Program to implement animation.

PART B

1. Using Photoshop to create a greeting card.
2. Colouring a black and white image in photoshop.
3. Correcting an image according to given specifications using photoshop.
4. Implement blinking of eyes using photoshop.
5. Create a banner for a national conference conducted in the college using Corel Draw.
6. Create an advertisement for any product or services using Corel Draw.
7. Create an animation for moving a car (include movement of wheels) using Flash.
8. Create a water rippling effect using masking in Flash.

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Theory Paper

Total: 100 Marks
External: 70 Marks
Internal: 30 Marks

External: 70 Marks
10 Question (MCQ): 1 mark each (1x10 = 10)
Answer any 6 out of 8 (Very Short 20-30 Words): 2 marks each (2x6 = 12)
Answer any 6 out of 8 (Short 50-70 Words): 3 marks each (3x6 = 18)
Answer any 6 out of 8 (Long 100-120 Words): 5 marks each (5x6 = 30)

Internal: 30 Marks
Two Internal Assessment Examinations will be conducted, each carrying 50 marks. The higher of the two scores will be considered for the final assessment.

Lab

Practical: 100 Marks
External: 70 Marks
Internal: 30 Marks

External (Two programs): 70 Marks
- **Program Writing**: 10 + 10 Marks
- **Algorithm& Flowchart**: 5 + 5 Marks
- **Program Execution**: 15 + 15 Marks
- **Viva**: 10 Marks

Internal Assessment (30 Marks)
Internal Assessment Examinations will be conducted, carrying 50 marks
- **Record**: 5 Marks
- **Attendance**: 5 Marks
- **Program Writing**: 15 Marks
- **Program Execution**: 15 Marks
- **Viva**: 10 Marks

.

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Syllabus for B Sc (Hardware and Networking)

Semester 6

Theory									
Course Code	**Topic**	**L**	**T**	**P**	**Credit**	**Theory Marks**	**Internal Marks**	**Practical Marks**	**Total Marks**
24CS203	Web Based Programming	4	0	0	4	70	30	0	100
24CS511	Machine Learning with Python	4	0	0	4	70	30	0	100
24CS614	Mobile Application Development	4	0	0	4	70	30	0	100
24GN201	Human Values and Ethics	2	0	0	2	70	30	0	100
24PR501	Major Project	0	0	6	6	0	100	0	100
Practical									
24CS293	Web Technologies Lab	0	0	2	2	0	30	70	100
	Total				**22**	**280**	**250**	**70**	**600**

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Detailed Syllabus

WEB BASED PROGRAMMING

Code: 24CS203
Max Marks: 70

Course Objectives: The objective of this course is to enable students to understand the concepts and architecture of the World Wide Web, markup languages, embedded dynamic scripting on client-side Internet Programming and web development techniques on client-side.

UNIT I **(10 Hrs)**
Introduction: World Wide Web, Client Server computing concepts. Web Client and Web Server, Client Side and server-side Scripting Languages.
HTML Overview: Introduction to HTML, HTML Document structure tags, HTML comments, Text formatting, Inserting special characters, Anchor tag, adding images and Sound, lists types of lists, Tables, Frames and Floating frames, Developing Forms, Image maps.

UNIT II **(12 Hrs)**
Cascading Style Sheet: Types of Style Sheets – Internal, inline and External style sheets, creating styles, link tag, CSS Properties, CSS Styling, Style Selector- Id, class name and Pseudo Class.
Bootstrap Basics: Introduction to Bootstrap, Responsive web design, Linking with Bootstrap, container class, grids, tables, images, buttons, typography classes, jumbotron, glyphicons.
Introduction to Java Script: Data Types, Control Statements, operators, dialog boxes, built in and User Defined Functions, Objects in Java Script, Handling Events, basic validations, Document Object Model, Browser Object Model.

UNIT III **(12 Hrs)**
Introduction to web applications, Client-Side Scripting Vs Server-Side Scripting, Web Servers: Local Servers and Remote Servers, Installation Process - WAMP, LAMP, XAMPP & MAMP Server, Static website vs Dynamic website development.
Introduction to PHP: Data types, Variables, Super Global Variables, Constants, Comments, Operators and Expressions, Regular Expression, Advantages of PHP.
Control statements: Conditional Statement -if else, if elseif else, nested if, switch case, PHP Loops – for, while, do while and foreach loop.
Arrays: Indexed Array, Associate Array, Multi-dimensional Array, Array pre-defined Functions.
Functions: Defining and Calling Functions, Passing by Value and passing by references, Inbuilt Functions, variable scope, Mail function, PHP Errors.
Working with Forms: Get and Post Methods, HTML form controls and PHP, State Management: Cookies, Session, Query String, Hidden Field.

UNIT IV **(11 Hrs)**
PHP Database Connectivity: Using PHP to Access a Database, Relational Databases and SQL, PHP Data Objects, MySQLi Object Interface, SQLite, MongoDB.
Introduction to MYSQL, creating database and other operations on database, querying a MySQL database with PHP database, connecting to a database, parsing of the query results, Checking data errors.

Text Book:

1. The complete reference HTML and CSS, by Thomas A powell, TMH publication.
2. Jeffrey C. Jackson, "Web Technologies: A Computer Science Perspective", Pearson
3. Internet and World Wide Web Deitel HM, Deitel, Goldberg, Third Edition.
4. Bootstrap: Responsive Web development, Jake Spurlock, O'Reilly, First Edition
5. Programming PHP: Creating Dynamic Web Pages, Kevin Tatroe. Peter Macintyre, Rasmus Lerdorf, O'Reilly, Third Edition

Reference Books:

1. "HTML Black Book". Stephen Holzner, Wiley Dreamtech.
2. Rajkamal, "Web Technology", Tata McGraw-Hill, 2001.
3. Jeffrey C. Jackson, "Web Technologies: A Computer Science Perspective", Pearson.
4. "Professional PHP Programming", Jesus Castagnetto, Harish Rawat, Sascha Schumann, Chris Scollo, Deepak Veliath. Wrox Publications.

5. "PHP 5 Advanced". Larry Ullman, Peachpit Press.
6. "Core PHP Programming". Leon Atkinson (Prentice Hall, ISBN 0130463469).
7. "Beginning PHP 5 and MySQL: From Novice to Professional". W. Jason Gilmore, 2004, Apress, ISBN: 1-893115- 51-8.

MACHINE LEARNING WITH PYTHON

Code: 24CS511
Max Marks: 70

Course Objectives: Machine Learning is broad and fast-growing sub-field of Artificial Intelligence. This course introduces students to the basic concepts and techniques of Machine Learning. The objective of this course is to develop the skills required for Machine Learning Technologies with use of Python to analyse data and solving ML problems like Regression and Classification using machine learning algorithms.

UNIT I **(11 Hrs)**
Introduction to Machine Learning, Why Machine learning, Types of Machine Learning Problems, Applications of Machine Learning. Supervised Machine Learning- Regression and Classification. Binary Classifier, Multiclass Classification, Multilabel Classification. Performance Measures- Confusion Matrix, Accuracy, Precision & recall, ROC Curve. Advanced Python- NumPy, Pandas. Python Machine Learning Library Scikit-Learn, Linear Regression with one Variable, Linear Regression with Multiple Variables, Logistic Regression.

UNIT II **(11 Hrs)**
Supervised learning Algorithms: Decision Trees, Tree pruning, Rule-base Classification, Naïve Bayes, Bayesian Network. Support Vector Machines, k-Nearest Neighbour, Ensemble Learning and Random Forest algorithm.

UNIT III **(11 Hrs)**
Artificial Neural Networks, Hebb Net, Perceptron, Adaline, Multilayer Neural Network, Architecture, Activation Functions, Loss Function, Hyper parameters, Gradient Descent, Backpropagation, Variants of Backpropagation, Avoiding overfitting through Regularization, Applications of Neural Networks.

UNIT IV **(11 Hrs)**
Unsupervised learning algorithms: Introduction to Clustering, K-means Clustering, Hierarchical Clustering, Kohonen Self-Organizing Maps. Implementation of Unsupervised algorithms. Feature selection and Dimensionality reduction, Principal Component Analysis.

Text Book:
1. Geron Aurelien. "Hands-On Machine Learning with Scikit-Learn & TensorFlow", O'REILLY, First Edition, 2017.
2. U Dinesh Kumar and Manaranjan Pradhan. "Machine Learning using Python". Wiley, 2019.
3. Fausett Laurence. "Fundamentals of Neural Networks". Pearson, Ninth Edition, 2012.

Reference Books:
1. Tom Mitchell. "Machine Learning". First Edition, McGraw- Hill, 1997.
2. Budd T A. "Exploring Python". McGraw-Hill Education, 1st Edition, 2011.
3. Jake Vander Plas. "Python Data Science Handbook". O'Reilly,1st Edition,2017.

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MOBILE APPLICATION DEVELOPMENT

Code: 24CS614
Max Marks: 70

Course Objectives: This course is concerned with the development of applications on mobile and wireless computing platforms. Android will be used as a basis for teaching programming techniques and design patterns related to the development of standalone applications and mobile portals to enterprise and commerce systems. Emphasis is placed on the processes, tools and frameworks required to develop applications for current and emerging mobile computing devices. Students will work at all stages of the software development life-cycle from inception through to implementation and testing. In doing so, students will be required to consider the impact of user characteristics, device capabilities, networking infrastructure and deployment environment, in order to develop software capable of meeting the requirements of stakeholders.

UNIT I **(14 Hrs)**

Introduction: Brief history of mobile applications, Different types of mobile applications, Brief history of Android, Introduction to Android Development Environment, Android Application

Design Essentials: Anatomy of an Android applications, Creating First Android Application, Creating Android project, Project organization, setting up real Android device, setting up Android emulator, developing simple user interface, Running your first application

Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter, Permissions.

UNIT II **(11 Hrs)**

User Interface in Android: Adaptive and responsive user interfaces, User Input Controls, Menus, Screen Navigation, Recycler View, Drawable, Themes and Styles, Fragments Fragment Life Cycle, Introduction to Material Design.

Android Application Components: App Widgets, Processes and Threads, User Interface Components, Views and layouts, Input controls, Input Events, Settings, Dialogs, Menus, Notifications, Toasts, Testing the user interface

UNIT III **(11 Hrs)**

Background tasks: Async Task, Async Task Loader, Connecting App to Internet, Broadcast receivers, Services, Notifications, Alarm managers.

Sensor, Location and Maps: Sensor Basic, Motion and Position Sensors, Location services, Google maps API, Google Places API

UNIT IV **(12 Hrs)**

Working with data in Android: Shared Preferences, App Setting, SQLite primer, Store data using SQLite database, Content Providers, Content Resolver, Loader

Publishing Your App: Preparing for publishing, Signing and preparing the graphics, publishing to the Android Market

Using Common Android APIs: Using Android Data and Storage APIs, managing data using SQLite, Sharing Data between Applications with Content Providers, Using Android Networking APIs, using android Web APIs, Using Android Telephony APIs, Deploying Android Application to the World.

Text Book:

1. Lauren Darcey and Shane Conder. “Android Wireless Application Development”. Pearson Education, 2nd ed. (2011).
2. Wei-Meng Lee. “Beginning Android 4 Application Development”. Wiley India Pvt. Ltd.
3. J. F. DiMarzio. “Android: A Programmers Guide”. McGraw Hill Education (India) Private Limited.

Reference Books:

1. Paul Deitel. “Android for Programmers: An App-Driven Approach”. 1st Edition, Pearson India.
2. Wei-Meng Lee. “Beginning Android Application Development”. Wiley Publishing.

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HUMAN VALUES AND ETHICS

Code: 24GN201

Max Marks: 70

UNIT I (10 Hrs)

Introduction to human values:

- Understanding the need, Basic guidelines, Process of Value Education.
- Understanding the thought provoking issues- Continuous happiness and Prosperity.
- Right understanding- relationship and physical facilities, Choice making- choosing, Cherishing and Acting.
- Understanding values- Personal Values, Social values, Moral values and Spiritual values, Self-Exploration and Awareness leading to Self-Satisfaction; Tools for Self-Exploration.

UNIT II (10 Hrs)

Harmony and role of values in family, society and human relations

- Understanding harmony in the Family- the basic unit of human interaction; Understanding values in human- human relationship; Understanding harmony in the society-human relations.
- Interconnectedness and mutual fulfilment; Coexistence in nature.
- Holistic perception of harmony at all levels of existence-universal harmonious order in society.
- Visualizing a universal harmonium order in society- undivided society (Akhand Samaj), universal order (Sarvabhaum Vyawastha)- from family to world family.

UNIT III (11 Hrs)

Coexistence and role of Indian Ethos:

- Interconnectedness and mutual fulfilment among the four orders of nature-recyclability and self-regulation in nature.
- Ethos of Vedanta; Application of Indian Ethos in organizations in management; Relevance of Ethics and Values in organizations in current times.

UNIT IV (11 Hrs)

Professional ethics

- Understanding about Professional Integrity, respect and equality, Privacy, Building Trusting relationships, Co-operation, Respecting the competence of other profession.
- Understanding about taking initiative, Promoting the culture of openness, Depicting loyalty towards goals and objectives.
- Ethics at the workplace: - cybercrime, plagiarism, sexual misconduct, fraudulent use of institutional resources, etc.
- Ability to utilize the professional competence for augmenting universal human order.

Text Book:

1. A Textbook on Professional Ethics and Human Values by R S Naagarazan.
2. A Foundation Course in Human Values and Professional Ethics by R.R. Gaur, R. Sangal, G.P. Bagaria.
3. Indian Ethos and Modern Management by B L Bajpai New Royal Book Co., Lucknow., 2004, Reprinted 2008.

Reference Books:

1. A N Tripathy, 2003, Human Values, New Age International Publishers
2. Human Values and Professional Ethics by Vaishali R Khosla, Kavita Bhagat
3. I.C. Sharma. Ethical Philosophy of India Nagin & co Julundhar

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MAJOR PROJECT

Code: 24PR501
Max Marks: 70

PROJECT REPORT

All the students are required to submit a report based on the project work done by them during the sixth semester.

SYNOPSIS (SUMMARY/ABSTRACT):
All students must submit a summary/abstract separately with the project report. Summary, preferably, should be of about 3-4 pages. The content should be as brief as is sufficient enough to explain the objective and implementation of the project that the candidate is going to take up. The write up must adhere to the guidelines and should include the following:

- Name/Title of the Project
- Statement about the Problem
- Why are the particular topic chosen?
- Objective and scope of the Project
- Methodology (including a summary of the project)
- Hardware & Software to be used
- Testing Technologies used
- What contribution would the project make?

TOPIC OF THE PROJECT- This should be explicitly mentioned at the beginning of the Synopsis. Since the topic itself gives a peep into the project to be taken up, candidate is advised to be prudent on naming the project. This being the overall impression on the future work, the topic should corroborate the work.

OBJECTIVE AND SCOPE: This should give a clear picture of the project. Objective should be clearly specified. What the project ends up to and in what way this is going to help the end user has to be mentioned.

PROCESS DESCRIPTION: The process of the whole software system proposed, to be developed, should be mentioned in brief. This may be supported by DFDs / Flowcharts to explain the flow of the information.

RESOURCES AND LIMITATIONS: The requirement of the resources for designing and developing the proposed system must be given. The resources might be in form of the hardware/software or the data from the industry. The limitation of the proposed system in respect of a larger and comprehensive system must be given.

CONCLUSION: The write-up must end with the concluding remarks- briefly describing innovation in the approach for implementing the Project, main achievements and also any other important feature that makes the system stand out from the rest.

The following suggested guidelines must be followed in preparing the Final Project Report:
GoodqualitywhiteA4sizepapershouldbeusedfortypingandduplication.Careshouldbetakentoavoid smudging while duplicating the copies.

Page Specification: (Written paper and source code)

- Left margin- 3.0 cms
- Right margin- 2.0 cms
- Top margin- 2.54 cms
- Bottom margin- 2.54 cms
- Page numbers- All text pages as well as Program source code listing should be numbered at the bottom centre of the pages.

Normal Body Text: Font Size: 12, Times New Roman, Double Spacing, justified 6 points above and below para spacing.
Paragraph Heading Font Size: 14, Times New Roman, Underlined, Left Aligned. 12 points above & below spacing.

Chapter Heading Font Size: 20, Times New Roman, Centre Aligned, 30 points above and below spacing.
Coding Font size :10, Courier New, Normal
Submission of Project Report to the University: The student will submit his/her project report in the prescribed format. The Project Report should include:

1. One copy of the summary/abstract.
2. One hard Copy of the Project Report.
3. The Project Report may be about 75 pages (excluding coding).

FORMAT OF THE STUDENT PROJECT REPORT ON COMPLETION OF THE PROJECT

I. Cover Page as per format
II. Acknowledgement
III. Certificate of the project guide
IV. Synopsis of the Project
V. Main Report
    i. Objective & Scope of the Project
    ii. Theoretical Background Definition of Problem
    iii. System Analysis & Design vis-à-vis User Requirements
    iv. System Planning (PERT Chart)
    v. Methodology adopted System Implementation & Details of Hardware & Software used System Maintenance & Evaluation
    vi. Detailed Life Cycle of the Project
        a. ERD, DFD
        b. Input and Output Screen Design
        c. Process involved
        d. Methodology used testing
        e. Test Report, Printout of the Report & Code Sheet
VI. Coding and Screenshots of the project
VII. Conclusion and Future Scope
VIII. References

Formats of various certificates and formatting styles are as:

1. Certificate from the Guide

CERTIFICATE

This is to certify that this project entitled "xxxxxxxxxxxxxxxxxxxxxxxx xxx" submitted in partial fulfillment of the degree of Bachelor of Science (Hardware and Networking) to the "xxxxxxxxxxxxxxxxxxxxxxxx" through xxxxxxxxxx done by Mr./Ms. _____ Enrollment No. _____is an is an authentic work carried out by him/her at _____ my guidance. The matter embodied in this project work has not been submitted earlier for award of any degree to the best of my knowledge and belief.

Signature of the student Signature of the Guide

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2. Project Report Cover Page Format:

Title of the Project/report
(Times New Roman, Italic, Font size= 24)

Submitted in partial fulfilment of the requirements for the award of the degree of Bachelor of Science (Hardware and Networking) (Bookman Old Style, 16points, centre)

Submitted to:
(Guide Name)

Submitted by:
(Student's name)
Enrolment No.:

3. Self-Certificate by the students

SELFCERTIFICATE

This is to certify that the dissertation/project report entitled "……." is done by me is an authentic work carried out for the partial fulfilment of the requirements for the award of the degree of Bachelor of Science (Hardware and Networking) under the guidance of _____. The matter embodied in this project work has not been submitted earlier for award of any degree or diploma to the best of my knowledge and belief.

Signature of the student
Name of the Student
Enrollment No.

4. ACKNOWLEDGEMENTS

In the "Acknowledgements" page, the writer recognizes his indebtedness for guidance and assistance of the thesis adviser and other members of the faculty. Courtesy demands that he also recognizes specific contributions by other persons or institutions such as libraries and research foundations. Acknowledgements should be expressed simply, tastefully, and tactfully.

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WEB TECHNOLOGIES LAB

Code: 24CS293
Max Marks: 70

(BASED ON 24CS203) Web Based Programming:

Core Practicals

1. Write regular expressions including modifiers, operators, and metacharacters.
2. Write a program to show the usage of nested if statement.
3. Write a Program in PHP for type Casting Of a Variables.
4. Write a program to create a menu driven program and show the usage of switch-case.
5. Write a program to show the usage of for/while/do while loop.
6. Write a program to perform all four types of sorting.
7. Write a program to implement Array-pad(), array_slice(), array_splice(), list() functions. (use for each wherever applicable)
8. Write a program to show the application of user defined functions.
9. Write a program that Passes control to another page (include, require, exit and die functions).
10. Write a program to validate the form data using Filter_var() function.
11. Write a program to show the usage of Cookie.
12. Write a program to show the usage of Session.
13. Write a program to implement oops concepts.
14. Do Form handling In PHP Design a personal Information form , then Submit & Retrieve the Form Data Using $_GET(), $_POST() and $_REQUEST() Variables.
15. Design A Login Form and Validate that Form using PHP Programming
16. Create Admin Login, Logout form using session variables.
17. Write a program to create a file.
18. Write a program that use various PHP library functions, and that manipulate files and directories.
19. Write a program to read and display the content of previously created file.
20. Write a program to modify the content of an existing file.
21. Create a web page and which provides File uploading and downloading a file.
22. Design a from which upload And Display Image in PHP.
23. Use phpMyAdmin and perform the following:
24. Write a program to create a mysql database.
25. Write a program to create a table and insert few records into it using form.
26. Write a program to select all the records and display it in table.
27. Write a program to modify (delete/modify/add) a table.
28. Write a PHP script, to check whether the page is called from 'https' or 'http'.

Note:

1. **In total 15 practicals to be implemented. 2 additional practicals may be given by the course instructor.**
2. **This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.**

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Theory Paper

Total: 100 Marks
External: 70 Marks
Internal: 30 Marks

External : 70 Marks
10 Question (MCQ): 1 marks each (1x10 = 10)
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Program Writing: 10 + 10 Marks
Algorithm& Flowchart : 5 + 5 Marks
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Program Execution: 15 Marks
Viva: 10 Marks

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