Semester – 3

BRANCH	Subject Title	Subject Code
B.Sc. (Computer Science – Major)	COMPUTER NETWORK	CSM1-131

Course Learning Outcomes(CLO)

On completion of this course, learners will be able to:

1. Understand the basic structure, operation and characteristics of digital computer.
2. Be able to design simple combinational digital circuits based on given parameters.
3. Familiarity with working of arithmetic and logic unit as well as the concept of pipelining
4. Know about hierarchical memory system including cache memories and virtual memory.
5. Understand concept and advantages of parallelism. Threading, multiprocessors and multicore processors.
6. Know the contributions of Indians in the field of computer architecture and related technologies.

Unit - I

Introduction to Computer Network: Use of computer network: Access to information, person to person communication, electronic commerce, internet of things;
Types of computer network: Broadband access network, Mobile and wireless network, content delivery network, transit network, Enterprise network. Network Technology: Personal Area Network, Local Area Network, Metropolitan Area Network, Wide Area Network, internetworks, example of network (Internet, Mobile network, wireless network-Wi-Fi); Reference Model: OSI, TCP/IP, Critique of the OSI and TCP/IP reference models; Policy, Legal & Social Issues: Online speech, net neutrality, security & privacy, disinformation. **Keywords**: IoT, Broadband, LAN, MAN, WAN, OSI, TCP/IP.

Unit – II

Physical Layer: Guided Transmission Media: Twisted pairs, coaxial cable, Fiber Optics; Wireless Transmission: The electromagnetic spectrum, frequency hopping spread spectrum, direct sequence, spread spectrum, ultra-wideband communication;
Cellular Network: Common concepts - cells, handoff, paging 1G, 2G, 3G, 4G & 5G technology.
Keywords: Coaxial cable, fiber optics, 2G, 3G, 4G, 5G.

Unit - III

Data Link Layer:
Service Provided to Network Layer: Data Link Control: Framing, Flow and Error Control; Error detecting codes, Error correcting codes;
Data Link Protocols: Basic transmission and receipt, simplex link layer protocol, Full duplex, Sliding window protocol, Packet over SONET, ADSL, Point-to-Point Protocol.
Switching Techniques: Packet Switching, Circuit Switching, Datagram Networks, Virtual-Circuit Networks, and Structure of a Switch.
Network Devices & Drivers: Router, Modem, Repeater, Hub, Switch, Bridgeand Gateways (fundamental concepts).Keywords: error correcting codes, error detecting codes, SONET, ADSL, point -to-point protocol Router, Modem, Repeater, Hub, Switch, Bridge,Gateways.

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Unit - IV

Network Layer: Network Layer Issues, Routing Algorithm: Optimality, principle of shortest path algorithm, Flooding, Distance Vector Routing, Broadcast Routing; congestion in network, traffic management approaches; IP Addresses, IPv4 Addresses, IPv6 Addresses,
Virtual Circuit Networks: Frame Relay and ATM,
Transport Layer:Process-Process Delivery: UDP, TCP.
Application layers: DNS, SMTP, POP, ftp, http and https. Basics of Wi-Fi (Fundamental concepts only).
Streaming audio and video: digital audio and video, streaming stored

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Unit - V

. **Network Security and Information Security:** Fundamentals of network and information security: principles of security and attack. Security Goals (Confidentiality, Integrity, and Availability), Non-Repudiation.
Overview of Security Threats and Vulnerability: Types of attacks on Confidentiality, Integrity and Availability. Vulnerability and Threats: Phishing Attacks, E-mail threats, Web-threats, Intruders and Hackers, Insider threats, SQL injection Attacks, Ransomware. Malware: Worms, Virus, Spams, Adware, Spyware, Trojans. Security Technology: Firewalls, Intrusion detection and prevention systems, Scanning and Analysis Tools: Biometric access controls, Cipher methods, Cryptographic algorithms, Cryptographic tools, Protocols for secure communication.
Keywords: phishing, SQL injection, Worms, Computer virus, Spyware, Trojans, Firewall, Cipher,

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Practical

Practicals

Study of UTP network cable

- Study the color code of UTP cable
- Categories of UTP n/w cable
- Shielding of n/w cable
- Electricity interference with n/w cable
- Maximum length for which data cable can be used
- Crimping of RJ45 connector and Punching of data n/w
- cable
- Penta scanning of cabling work
- Rules of UTP laying

Knowledge of Structured Cabling and its components

- Information outlet with box
- Network Rack (4U, 6U, 9U, 12U, 24U, 32U, 42U)
- Patch Panel
- Rack Management

Study of Optical Fiber cable

- Different cores of OFC (6 core, 12, 24 core)
- Multimode & Single mode OFC cable

- Shielding of OFC
- Splicing/Termination of OFC
- OTDR Testing
- LIU fixing
- LIU management (pigtail/fiber patchcord)
- Media Convertor o SFP module
- Rules of OFC laying

Use of tools

- Crimping Tool
- Punching Tool

- Nose plier

- Wire Stripping and Cable Cutter

- Multimeter

- RJ45 RJ11 RJ12 Cat5 Cat6 Network Cable Tester

- In-Line Coupler (RJ45 F/F)

- RJ45 NETWORK SPLITTER ADAPTER 2-way.

Configuration/ Management of Local Area Network Education

- Implementation of file and printerssharing.
- Installation of ftp server and client.
- Configuring Class A IP Address on LAN Connection in Computer LAB and then use following tools: ping, ipconfig getmac, hostname, nslookup, tracert, arp, pathping, systeminfo.
- Connect the computers in Bocal Area Network.
- Configure static routing using packet tracer software
- Configure Dynamic routing using packet tracer
- Configure VLAN using Managed switch Device/Packet
- High Implementation of Subnetting in Class A, B and C Ping between 2 systems using IPv6 tracer
- Configuration of NAT for incoming packet request

Semester 4

BRANCH	Subject Title	Subject Code
B.Sc. (Computer Science – Major)	OOPS-Object Oriented Paradigm , Benefits of OOP, Applications of OOP.	CSM1-141

Course Learning Outcomes (CLO)

On completion of this course, learners will be able to:

1. Understand the basic structure, operation and characteristics of digital computer.
2. Be able to design simple combinational digital circuits based on given parameters.
3. Familiarity with working of arithmetic and logic unit as well as the concept of pipelining
4. Know about hierarchical memory system including cache memories and virtual memory.
5. Understand concept and advantages of parallelism. Threading, multiprocessors and multicore processors.
6. Know the contributions of Indians in the field of computer architecture and related technologies.

CONTENT

Unit – 1

OOPS-Object Oriented Paradigm , Benefits of OOP, Applications of OOP.
Java: History, Java Features, How Java Differs from C and C++, Java and internet, Java and World Wide Web, Web Browsers, Hardware and Software Requirements, Java Supports Systems, Java Environment.
Java Program Structure - Java Tokens, Java Statements, Implementing a Java Program, Java Virtual Machine, Command Line Arguments and Programming Style

Unit – 2

Java Basics-Constants, Variables, Data Types, Declaration of Variables, Giving Values to Variables, Scope of Variable, Symbolic Constants, Type Casting, Getting Values of Variables, Standard Default Values.
Operators - Arithmetic Operator, Relational Operators, Logical Operators, Assignment Operators, Increment and Decrement Operators, Conditional operators, Bitwise Operators, Special Operators.
Arithmetic Expressions - Evaluation of Expressions, Precedence of Arithmetic Operators, Type Conversions in Expressions, Operator Precedence and Associativity Mathematical Functions.
Decision Making with if Statement, Simple if Statement, if.....Else Statement, Nesting of if ...else Statementit adder, The Switch Statement, The Operator.
Loops :While statement,Do Statement, For Statement, Jump in Loops, labeled loops

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Unit – 3

Class-Defining a Class, Adding Variables, Adding Methods, Creating Objects, Accessing Class Members, **Constructors**-definition and types, Methods Overloading, Static Members, Nesting of Methods. **Inheritance** - Extending a Class, Overloading Methods, Final Variables and Methods, Final Classes, Finalize Methods, Abstract Methods and Classes, Visibility Control Arrays, One Dimensional Array, Strings, Vectors, Wrapper Classes. Defining Interfaces, Extending Interfaces, Implementing Interfaces, Accessing Interface Variables.

Unit- 4

Java API Packages - Using System Packages, Naming Conventions, Creating Packages, Accessing a Package, Using a Package, Adding a Class to a Package, and Hiding Classes. Creating Threads, Extending the Thread Class, Stopping and Blocking a Threads, Life Cycle of a Thread, Using Threads Methods, Threads Exceptions, Threads Priority, Synchronization, Implementing the "Runnable' interface.

Types of Errors - Exceptions, Syntax of Exception Handling Code, Multiple Catch Statements, Using Finally Statements, Throwing Our C Exceptions, Using Exceptions for Debugging.

More About the Applet tag - Passing Parame Display, More About HTML Tags, Display ,Input from the user.

Unit 5

The Graphics Class-Lines and Rectangles Circles and Ellipses, Drawing Ares, Drawing Polygons, Line Graphs, Using Control Loops in Applets, Drawing Bar Charts.

Concept of Stream-Stream Classes, Byte Stream Classes, Character
Stream Classes, Using streams.
Other Useful I/O Classes - Using the File Class, Input/Output Exceptions, Creation of Files, Reading/Writing Characters, Reading/Writing Bytes, Handing Primitive Data Types, Concatenating and Buffering Files, Random Access fles, Interactive Input and Output, other Stream Classes.

Suggestive list of practicals

1. Find greater number between two numbers -using conditional operator.
2. Find the factorial of number if number is given by user using command line argument.
3. Write a program to check if a number is prime or not.
4. Write a program to display tables from 2 to 10.
5. Write a program to print Fibonacci series.
6. Enter a no. and check whether it is even or odd.
7. Write a Program to find sum & average of 10 no. using arrays. 8. Write a program to display reverse of a digit no. using array.

9. Write a program to demonstrate function overloading.
11. Write a program to calculate the salary of an employee if salary is greater than or equal to 20000 and year of service is greater than or equal to 5 years then bonus will be 2000 otherwise 1000 and print grass salary of employee Education
10. Write a program to display grade according to the marks obtained by the student.
12. Write a program to convert the given no. of days into months & days using with classes, objects and method.
13. Write a program to convert given string into Uppercase and lowercase and get the length of string using array.
14. Create a package called "Arithmetic" that contains methods to deal all arithmetic operations. Also write a program to use the package.
15.Write a program to demonstrate use of constructor and destructor.
16. Define an exception called "Marks out of Bound" exception that is thrown if the entered marks are greater than 100.
17. Write a program using application of single inheritance. Find the area of rectangle & volume of cube.
18. Develop a simple real life application to illustrate the use of multithreading. 19. Write a program using multiple inheritance to calculate area and perimeter of a circle using interface. 20. Write an applet program to draw a Rectangle (color= orange) and a right aligned oval.

a. Using a Spreadsheet Tool

1. Design your class Time Table.

2. Prepare a Mark Sheet of your class result.

3. Prepare a Salary Slip of an employee of an organization.

4. Prepare a bar chart & pie chart for analysis of Election Results.

5. Prepare a generic Bill of a Super Market.

6. Work on the following exercises on a Workbook:

a. Copy an existing Sheet

b. Rename the old Sheet

c. Insert a new Sheet into an existing Workbook

d. Delete the renamed Sheet.

7. Prepare an Attendance sheet of 10 students for any 6 subjects of your syllabus. Calculate their total attendance, total percentage of attendance of each student & average of attendance.

8. Create a worksheet of Students list of any 4 faculties and perform following database functions on it.

a. Sort data by Name

b. Filter data by Class

c. Subtotal of no. of students by Class.

c. Using a Presentation Tool

1. Design a presentation of your institute using auto content wizard, design template and blank presentation.

2. Design a presentation illustrating insertion of pictures, Word Art and ClipArt.

3. Design a presentation, learn how to save it in different formats, copying and opening an existing presentation.

4. Design a presentation illustrating insertion of movie, animation and sound. 5. Illustrate use of custom animation and slide transition (using different effects).

6. Design a presentation using charts and tables of the marks obtained in class.

II. Given the problem statement, students are required to formulate problem, develop flowchart/algorithm, write code in C++, execute and test it. Students should be given assignments on following:

1. a. To learn elementary techniques involving arithmetic operators and mathematical expressions, appropriate use of selection (if, switch, conditional operators) and control structures

b. Learn how to use functions and parameter passing in functions, writing recursive programs.

2. Write a program to swap the contents of two variables.

3. Write a program for finding the roots of a Quadratic Equation.

4. Write a program to find area of a circle, rectangle, square using

5. Write a program to check whether a given number is even or switch case odd.

6. Write a program to print table of any number.

7. Write a program to print Fibonacci series.

8. Write a program to find factorial of a given number.

9. Write a program to convert decimal (integer) number into equivalent binary number.

10. Write a program to check given string is palindrome or not.

11. Write a program to perform multiplications of two matrices.

12. Write a program to print digits of entered number in reverse order.

13. Write a program to print sum of two matrices.

14. Write a program to print multiplication of two matrices.

15. Write a program to generate even/odd series from to 100.

16. Write a program whether a given number is prime or not.

17. Write a program for call by value and call by reference.

18. Write a program to generate a series 1+1/11+2/2+3/3!+-

-+n/n!

19. Write a program to create a pyramid structure

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20. Write a program to create a pyramid structure

21. Write a program to check entered number is Armstrong or not.

22. Write a program for traversing an Array.

23. Write a program to input N numbers, add them and find average.

24. Write a program to find largest element from an array.

25. Write a program for Linear search.

26. Write a program for Binary search.

27. Write a program for Bubble sort.

28. Write a program for Selection sort.