REVISED COURSE CURRICULUM FOR

(3rd) THIRD SEMESTER

(COMPUTER ENGINEERING)

W.E.F. 2023-24

BOARD OF TECHNICAL EDUCATION

MUNI MAYA RAM
MARG PITAMPURA,
DELHI-110034

Computer Engineering
Third Semester/Second Year

Scheme For
Third Semester: Computer Engineering

S. No.	Course Code	Course Title	Hours Per Week			Internal Marks	External Marks (3 Hours)	Credits
			L	T	P			
1	23COPC201	Digital Electronics	2	0	0	50	100	2
2	23COPC203	Principles of Programming in C	3	0	0	50	100	3
3	23COPC205	Data Base Management System	2	0	0	50	100	2
4	23COPC207	Operating Systems	3	0	0	50	100	3
5	23COPC209	Basics of Computer Network	2	0	0	50	100	2
6	23COPC251	Digital Electronics Lab	0	0	4	50	50	2
7	23COPC253	Principles of Programming in C Lab	0	0	4	50	50	2
8	23COPC255	DataBase Management System Lab	0	0	4	50	50	2
9	23COSI257	*Summer Internship-I	0	2	0	50	50	2
		Total				450	700	20

*Four Week Summer Internship Training after Second Semester will be evaluated on the basis of Daily Diary/Training Report/PPT Presentation

Course Code	23COPC201
Course Title	Digital Electronics
Credits	Total: 2 (Theory - 2), L:0 T:0 P:2
Semester	III (Computer Engineering)
Course Category	Mandatory

Course Objective: The objective is to acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits and to prepare students to perform the analysis and design of various digital electronic circuits.

Unit 1	Introduction to Digital & Analog Systems: Fundamental Concepts, Digital Waveforms, Logic Systems, Combinational and Sequential Logic Functions, Programmable Logic, Fixed-Function Logic Devices.	
Unit 2	Number system and Code: Standard representation in different number system : Binary, Decimal, Octal , Hexadecimal and its conversion, Number system codes: BCD code, Digital Codes -Excess-3 code, Gray code, Binary to Excess -3 code conversion and vice versa , ASCII code, EBCDIC code , Error Detection Codes.	
Unit 3	Logic Gates: Logical Operators, Logic Gates-Basic Gates, Other gates, Active high and Active low concepts, Universal Gates and realization of other gates using universal gates, Gate Performance Characteristics and Parameters.	
Unit 4	Rules and laws of Boolean algebra, De Morgan's Theorems, Boolean Expressions and Truth Tables, Standard SOP and POS forms, Canonical representation of Boolean expressions, Duality Theorem, Simplification of Boolean Expressions, Minimization Techniques for Boolean Expressions using Karnaugh Map .	
Unit 5	Combinational Logic Circuits- Introduction to combinational Circuits, Adders-Half-Adder and Full-Adder, Subtractors- Half and Full Subtractor; Parallel adder and Subtractor; Ripple Carry and Look-Ahead Carry Adders. BCD adder, BCD subtractor, Parity Checker/Generator, Multiplexer, Demultiplexer, Encoder, Priority Encoder; Decoder ,BCD to Seven segment Display Decoder/Driver, LCD Display, and Comparators.	
Unit 6	Semiconductor Memory Basics, Types-RAM, ROM, Programmable ROMs, Flash Memory, Memory Expansion, Special Types of Memories, Magnetic and Optical Storage	

Course Outcome:

- Explain the importance of digitization.
- Realize all the logic gates using different methods.
- Realize all logic functions with universal gates : NAND and NOR.
- Design and interpret the truth tables of various Combinational and Sequential circuits.
- To understand and examine the structure of various number systems and its application in digital design.
- To develop skill to build, and troubleshoot digital circuit

Text Books

1. R.P Jain, "Modern Electronics" , TMH , 2nd Edition.
2. Malvino & Leach- Digital Principles & Application-Mcgraw Hill- 5th Edition.
3. Mano, M. Morris- Digital Logic and Computer Design- Prentice Hall (India)

Reference Books:

1. R.J Tocci, "Digital System", PHI 2000
2. I.J. Nagrath, "Electronics, Analog & Digital", PHI 1999.

Online Resources:

1. https://www.tutorialspoint.com/digital_circuits/digital_circuits_tutorial.pdf
2. https://learnabout-electronics.org/Downloads/Digital-Electronics-Module-05.pdf
3. https://www.youtube.com/watch?v=lgVwPW8OanU
4. https://www.youtube.com/watch?v=cdMJvFT-Afc

Course Code	23COPC203
Course Title	Principles of Programming in C
Credits	Total: 3 (Theory - 3), L:3 T:0 P:0
Semester	III (Computer Engineering)
Course Category	Mandatory

Course Objective:
This course is intended to give know-how knowledge of C programming in length and breadth. The discipline of computing, understand fundamentals of programming such as variables, conditional and iterative execution, arrays, etc. and should be able to use the C compiler to create, debug and run simple C programs.

Unit 1	Problem Solving and Program Design	
	Problem Solving and Introduction to Programming: Activities involved in Problem Solving, Programming Language, Programming Paradigms, Characteristics of a good program, Classification of Programming Languages, Common programming errors. Program Design: Algorithm, Flowchart, Pseudocode: Introduction, Steps involved and detailed construction, Problems on selection, looping, flow chart analysis.	
Unit 2	C Basics, Decision Making, and Looping	
	Features of C and its Basic Structure, Simple C programs, Constants, Integer Constants, Real Constants, Character Constants, String Constants, Backslash Character Constants, Concept of an Integer and Variable, Rules for naming Variables and assigning values to variables. Arithmetic Operators, Unary Operators, Relational and Logical Operators, The Conditional Operator, Library Functions, Bitwise Operators, The Increment and Decrement Operators, The Size of Operator, Precedence of operator Floating-point Numbers, Converting Integers to Floating-point and vice-versa, Mixed-mode Expressions, The type cast Operator, The type char, Keywords, Character Input and Output, Formatted input and output, The gets () and puts () functions, Interactive Programming.	
Unit 3	Control Statements, Decision Making and Functions	
	The goto statement, The if statement, The if-else statement, Nesting of if statements, The conditional expression, The switch statement, The while loop, The do...while loop, The for loop, The nesting of for loops, The break statement and continue statement. Function Philosophy, Function Basics, Function Prototypes, and Passing Parameters: Passing Parameter by value and Passing Parameter by reference, passing string to function, Passing array to function, Structures and Functions Recursion	

Unit 4	Arrays and Pointers	
	One Dimensional Arrays, Passing Arrays to Functions, Multidimensional Arrays, Strings Basics of Pointers, Pointers and One-dimensional Arrays, Pointer Arithmetic, Pointer Subtraction and Comparison, Similarities between Pointers and One-dimensional Arrays, Null pointers, Pointers and Strings, Pointers and two-dimensional arrays, Arrays of Pointers.	
Unit 5	Storage Classes and Files	
	Storage Classes and Visibility, Automatic or local variables, Global variables, Static variables, External variables Defining and Opening a file, Closing Files, Input/output Operations on Files, Predefined Streams, Error Handling during I/O Operations, Random Access to Files, Command Line Arguments.	

Course Outcome:

After undergoing the subject, the students will be able to:

- Identify the problem and formulate an algorithm for it.
- Identify various control structures and implement them.
- Identify various types of variables.
- Use pointers in an array and structure.
- Use structures and unions for handling data.
- Explain the concepts of the C programming language.
- Explain and implement the language constructs concepts.
- Install C software on the system and debug the programme.
- Explain and execute member functions of C in the programme.
- Describe and implement array concepts in C programmes.
- Describe and execute pointers.
- Expose File System using File Handling

Text Books

- The Art of Programming Through Flowcharts & Algorithms, Anil Bikas Chaudhuri.
- Programming In C by Reema Thareja, Oxford University Press
- Programming in C by Kamthane & Kamthane, Pearson Education
- Let us C by Yashwant Kanetkar, BPB Publication
- Programming in C by Gottfried, Schaum Series, , Tata McGraw Hill Education Pvt Ltd, New Delhi
- Exploring C by Yashwant Kanetkar; BPB Publications, New Delhi

Reference Books:

- The C Programming Language Kernighan & Ritchie
- Computer system & Programming in C by Amit K. Mishra

Online Resources:
● e-books/e-tools/relevant software to be used as recommended by ● AICTE/UPBTE/NITTTR. ● http://swayam.gov.in,http://spoken-tutorial.org ● Code::Blocks: https://www.codeblocks.org/ ● Visual Studio Code: https://code.visualstudio.com/ ● Flowgorithm: http://www.flowgorithm.org/

Course Code	23COPC205
Course Title	Database Management System
Credits	Total: 2 (Theory - 2), L:2 T:0 P:0
Semester	III (Computer Engineering)
Course Category	Mandatory

Course Objective:
Understand the Concept of Data, Database and Storage and Management of Data.

Unit 1	Introductory Concept of DBMS	
	Basic concepts: Database & database users, characteristics of the databases, database systems, concepts and architecture, Data Models, Schemas & instances, DBMS architecture & data independence, Overview of hierarchical, Network & Relational Database Management Systems.	
Unit 2	Data Models	
	Data Modelling using the Entity-Relationship Model: ER model concepts, notation for ER diagram, mapping constraints, Concepts of keys, Extended ER model - Generalization, Specialization, Aggregation, ER diagram to tables Mapping. Data Models: The importance of data models, Basic building blocks, Business rules, The evolution of data models, Degrees of data abstraction, Logical view of data, keys, integrity rules.	
Unit 3	SQL	
	Introduction on SQL: SQL commands and types, DML, DDL, DCL, TCL. SQL Data Types and literals, Operators in SQL. Database Objects: Table, View, Sequence, index, Synonym, Queries	
Unit 4	Normal Forms	
	Normal Forms: Functional Dependencies, Non-loss Decomposition, First, Second, Third Normal Forms, Dependency Preservation, Boyce/Codd Normal Form, Multi-valued Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal Form.	
Unit 5	PL/SQL	
	PL/SQL Programming: Introduction to PL/SQL, Structure of PL/SQL Block, PL/SQL language: Operators, Control Structure, Cursors, Triggers, Procedures, and functions.	

Course Outcome:
● The concepts related to database, database techniques, SQL and database operations are introduced in this subject. This creates a strong foundation for application data design. ● Explain the various database components, models, DBMS architecture and Database Security ● Construct advanced SQL queries on data and apply Procedural abilities through PL/SQL. ● Examine the use of normalization and functional dependency for database design. ● Appraise the concepts of transaction, concurrency control and recovery in databases.

Text Books
● Abraham Silberschatz, Henry F. Korth, S. Sudharshan, —Database System Concepts‖, 5th Edition, Tata McGraw Hill, 2006 ● Elmasri and Navathe, —Fundamentals of Database Systems, 6th Ed., Pearson, 2013 ● Database Management Systems; Alex Leon & mathew Leon; Tata McGraw Hill Education; ● SQL, PL/SQL – The Programming Language of OracleBy Ivan Bayross, BPB Publications

Reference Books:
● C.J.Date, A.Kannan, S.Swamynathan, —An Introduction to Database Systems, 8th Edition, Pearson Education, 2006. ● J. D. Ullman, —Principles of Database Systems‖, 2nd Ed, Galgotia Publications, 1999. ● Vipin C. Desai, —An Introduction to Database Systems, West Publishing Co.

Online Resources:
Oracle 10g MySql

Course Code	23COPC207
Course Title	Operating System
Credits	Total: 3 (Theory - 3), L:3 T:0 P:0
Semester	III (Computer Engineering)
Course Category	Mandatory

Course Objective:
A general introduction to various ideas in implementation of operating systems, particularly UNIX. Introduce to various options available so as to develop capacity to compare, contrast, and evaluate the key trade-offs between different design choices.

Unit 1	Overview of Operating System, basic concepts, UNIX/LINUX Architecture, Kernel, services and systems calls, system programs.	
Unit 2	Process Management: Process concepts, operations on processes, IPC, Process Scheduling, Multi- threaded programming Memory management: Memory allocation, Swapping, Paging, Segmentation, Virtual Memory, vari- ous faults.	
Unit 3	File management: Concept of a file, access methods, directory structure, file system mounting, file sharing and protection, file system structure and implementation, directory implementation, free- space management, efficiency and performance. Different types of file systems	
Unit 4	I/O System: Mass storage structure - overview, disk structure, disk attachment, disk scheduling algorithms, swap space management, RAID types.	
Unit 5	OS Security: Authentication, Access Control, Access Rights, System Logs	

Course Outcome:
Students should be able to demonstrate basic knowledge about Operating System, be able to apply OS concepts such as processes, memory and file systems to system design, able to configure OS in an efficient and secure manner.

Text Books
1. Operating System Concepts, Silberschatz and Galvin, Wiley India Limited 2. UNIX Concepts and Applications, Sumitabha Das, McGraw-Hill Education 3. Operating Systems, Internals and Design Principles, Stallings, Pearson Education, India 4. Operating System Concepts, Ekta Walia, Khanna Publishing House

Reference Books:
1. Modern Operating Systems, Andrew S. Tanenbaum, Prentice Hall of India 2. Operating systems, Deitel & Deitel, Pearson Education, India

Online Resources:
1. geeksforgeeks.com,tutorialspoint.com

Course Code	23COPC209
Course Title	Basics of Computer Network
Credits	Total: 2 (Theory - 2), L:2 T:0 P:0
Semester	III (Computer Engineering)
Course Category	Mandatory

Course Objective:
Understand the basics, topologies, and working mechanisms of wired and wireless computer networks.

Unit 1	Basic of Computer Network	
	Goals and Applications of Networks, Network structure, and architecture, The OSI reference model, services, networks topology. Introduction to 5 Layer TCP/IP Network Model, Comparison with 7 Layer OSI Reference Model. Physical Layer: The Physical Layer, Theoretical Basis for Data Communication, Guided Transmission Media, Wireless Transmission, Communication Satellites, Need for Modulation, Digital Signal Encoding Formats – NRZ-L, NRZI, bipolar-AMI, Manchester, Differential Manchester, Digital Modulation.	
Unit 2	Data Link Layer	
	The Data Link Layer: Data Link Layer Design Issues, Error Detection and Correlation, Flow Control Protocols, Stop-and-wait Flow Control, Sliding – Window Flow Control, Error Control, Stop-and-wait ARQ, Go-back-N, Selective-repeat, Example of Data Link Protocols-HDLC. Medium access sublayer: Channel allocations, ALOHA Protocols, Carrier Sense Multiple Access Protocols, CSMA with Collision Detection, Collision free protocols, Ethernet	
Unit 3	Network Layer	
	Network Layer: Point-to-Point network, routing algorithms, congestion control, internetworking, Quality Control The Network Layer in the Internet, IP packet, IP addresses, IPv4 Addressing, Subnetting & Supernetting, Need for NAT, Multicasting, Introduction to IPv6 Addressing, Need for IPv6 Addressing, Global, Local and Site Local Addressing, Multicast, Broadcast, Anycast and Unicast Addressing	
Unit 4	Transport Layer	
	Transport Layer: Design Issue, connection management, TCP window management, User Datagram Protocol, Transmission Control Protocol, Performance Issues, QOS, Transport Layer Security, IP Security, IPSec	

Unit 5	Application Layer	
	Application Layer Protocols: DNS, Electronic Mail, WWW, Streaming Protocols, DHCP & DHCPv6, SMTP, Telnet, SSH, POP, POP3, IMAP Network Security: Need for Network Security, Cryptography and Compression Techniques, Firewall, Various types of Cyber Threats	

Course Outcome:

1. Understand the basics, topologies, and working mechanisms of wired and wireless computer networks.
2. Analyze the features and operations of protocols of OSI reference model & TCP/IP protocol suite.
3. Design, calculate, and apply routing mechanisms for IPv4 & IPv6
4. Identify the networking requirements for an organisation and select & propose appropriate architecture and technologies.
5. Work on Network addressing, design and implementation.

Text Books

- Forouzan, "Data Communication and Networking", TMH, 4th Edition.
- Behrouz A. Forouzan, "TCP/IP Protocol Suite", Tata Mc Grew Hill, 4th Edition, 2009.
- A.S. Tanenbaum, "Computer Networks", PHI, 4th Edition.
- Silvia Hagen, IPv6 Essentials. O'Reilly Media, Inc., 2006

Reference Books:

- W. Stallings, "Data and Computer Communication", Macmillan Press.
- Comer, "Computer Networks and Internet", PHI. 5. Comer, "Internetworking with TCP/IP", PHI
- Kevin R Fall and W. Richard Stevens, "TCP/IP Illustrated, Volume 1: The Protocols", Addison Wesley, 2nd Edition, 2011.

Online Resources:

- https://onlinecourses.nptel.ac.in/noc21_cs18/preview
- http://www.tcpipguide.com/
- https://www.coursera.org/learn/managing-network-cybersecurity/home/welcome
- https://www.coursera.org/learn/wireless-communications/home/welcome
- https://www.coursera.org/learn/tcpip/home/welcome
- https://futureskillsprime.edcast.com/pathways/introduction-to-cyber-security

Course Code	23COPC251
Course Title	Digital Electronics Lab
Credits	Total: 2 (Practical - 2), L:0 T:0 P:2
Semester	III (Computer Engineering)
Course Category	Mandatory

List of Practical
1. Familiarisation of ICs a. Testing of AND Gate b. Testing of NAND gate c. Testing of OR Gate d. Testing of NOR gate e. Testing of XOR gate 2. Verification of truth table for encoder and decoder ICs, Mux and DeMux 3. Verification of the truth table for positive edge triggered, negative edge triggered,level triggered IC flip-flops (At least one IC each of D latch , D flip-flop, JK flip flops). 4. To realise half/full adder and half/full subtractor 5. To convert Binary code to grey code 6. To convert Gray to Binary Code. 7. To design a Seven Segment Decoder. 8. Study the Resistor Transistor Logic(RTL),Diode Transistor Logic (DTL), Transistor-Transistor Logic (TTL).
Note: Additional Practical may be covered as per the syllabus by the faculty

Course Code	23COPC253
Course Title	Principles of Programming in C Lab
Credits	Total: 2 (Practical - 2), L:0 T:0 P:2
Semester	III (Computer Engineering)
Course Category	Mandatory

List of Practical

1. Programming exercises on executing and editing a C program.
2. Programming exercises on defining variables and assigning values to variables.
3. Programming exercises on arithmetic, logical and relational operators.
4. Programming exercises on arithmetic expressions and their evaluation.
5. Programming exercises on formatting input/output using print and scan and their return type values.
6. Programming exercises using if statements.
7. Programming exercises using if – Else.
8. Programming exercises on switch statements.
9. Programming exercises on while and do – while statement.
10. Programming exercises on for – statement.
11. Simple programs using functions and recursive functions.
12. Programs on a one-dimensional array.
13. Programs on a two-dimensional array.
14. (i) Programs for concatenation two strings together. (ii) Programs for comparing two strings.
15. Simple programs using pointers.
16. Simple programs using structures.
17. Simple programs using union.
18. Simple programs for File Handling

Note: Additional Practical may be covered as per the syllabus by the faculty

Course Code	23COPC255
Course Title	Database Management System Lab
Credits	Total: 2 (Practical - 2), L:0 T:0 P:2
Semester	III (Computer Engineering)
Course Category	Mandatory

List of Practical
1. Design a Database and create required tables. For e.g. Bank, College Database 2. Apply the constraints like Primary Key, Foreign key, NOT NULL to the tables. 3. Write a SQL statement for implementing ALTER, UPDATE, and DELETE 4. Write the queries to implement the joins 5. Write the queries for implementing the following functions: MAX, MIN, AVG, COUNT 6. Write the queries to implement the concept of Integrity constraints 7. Write the queries to create the views 8. Perform the queries for triggers 9. Perform the following operation for demonstrating the insertion, updating, and deletion using the referential integrity constraints Note: Additional Practical may be covered as per the syllabus by the faculty