AC: 02.06.2025 ITEM NO: 1.1

Deccan Education Society's

Kirti M. Doongursee College of Arts, Science and Commerce (AUTONOMOUS)

Affiliated to

UNIVERSITY OF MUMBAI

Syllabus for
Program: Bachelor of Science
Course: F.Y.B.Sc.
Subject:Computer Science

Choice Based Credit System (CBCS)
with effect from
Academic Year 2024-2025

PROGRAM OUTCOMES

PO	Description
A student completing Bachelor's Degree in **Science** Program will be able to	
PO1	Disciplinary Knowledge: Demonstrate comprehensive knowledge of the disciplines that form a part of a graduate Programme. Execute strong theoretical and practical understanding generated from the specific graduate Programme in the area of work.
PO2	Critical Thinking and Problem solving: Exhibit the skills of analysis, inference, interpretation and problem-solving by observing the situation closely and design the solutions
PO3	Social competence: Display the understanding, behavioral skills needed for successful social adaptation, work in groups, exhibit thoughts and ideas effectively in writing and orally.
PO4	Research-related skills and Scientific temper: Develop the working knowledge and applications of instrumentation and laboratory techniques. Able to apply skills to design and conduct independent experiments, interpret, establish hypothesis and inquisitiveness towards research
PO5	Trans-disciplinary knowledge: Integrate different disciplines to uplift the domains of cognitive abilities and transcend beyond discipline-specific approaches to address a common problem.
PO6	Personal and professional competence: Performing dependently and collaboratively as a part of a team to meet defined objectives and carry out work across interdisciplinary fields. Execute interpersonal relationships, self-motivation and adaptability skills and commit to professional ethics.
PO7	Effective Citizenship and Ethics: Demonstrate empathetic social concern and equity centered national development, and ability to act with an informed awareness of moral and ethical issues and commit to professional ethics and responsibility.
PO8	Environment and Sustainability: Understand the impact of the scientific solutions in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development.

Deccan Education Society's

Kirti M. Doongursee College

(Autonomous) Proposed

Curriculum as per NEP-2020

Year of implementation- 2024-2025

Name of the Department-Computer Science

Semester	Course Code	Course Title	Vertical	Credit
I	24CSMJ111	Fundamentals of Computers	Major	2
	24CSMJ112	Introduction to OOPs using C++	Major	2
	24CSMJP111	CS practical 1 (Part A+B)	Major	2
	24CSOE131	Introduction to IT and Internet	OE	2
	24CSOE132	Cyber Law	OE	2
	24CSVC141	Introduction to HTML	VSC	2
	24CSSCE151	Python	SEC	2
II	24CSMJ211	Principles of Operating Systems	Major	2
	24CSMJ212	Database Systems	Major	2
	24CSMJP21	CS practical 2 (Part A+B)	Major	2
	24CSMR221	Discrete Mathematics	Minor	2
	24CSOE231	Decision Making using Information Technology	OE	2
	24CSOE232	E-Commerce	OE	2
	24CSVC241	Introduction to JavaScript and PHP	VSC	2
	24CSSC251	Introduction to SQL	SEC	2

SEMESTER-I

Course Code	MAJOR SEM – I	Credits	Lectures /Week
24CSMJ111	**Paper I - Fundamentals of Computer**	**2**	**2**

Course Outcomes:

After successful completion of this course, students would be able to

CO1: Identify logic gates with symbols and truth tables. State Demorgan's theorems

CO2: Understand the basics of digital electronics needed for computers.

CO3: Apply the various rules and laws of Boolean Algebra for designing digital circuits.

CO4: Analyze the digital circuits using K-map.

Unit	Topics	No of Lectures
I	**Logic Gates:** Logic gates: definition, symbols, truth tables, Boolean expressions, combinational circuits, circuit simplification, flip-flops and sequential circuits, decoders, multiplexers, registers, counters, and memory units. **Number System and Codes:** Decimal, binary, octal, hexadecimal number systems, Arithmetic operations on number systems, Number System Conversion, ASCII Code.	**15**
II	**Boolean Algebra** Rules and laws of Boolean algebra, logic expression, De Morgan's theorems, their proof, Sum of products form (min. terms), Product of sum form (max. terms), Simplification of Boolean expressions using Boolean algebra and Karnaugh map up to 4 variables	**15**

References:

- Rajaraman, V., Adabala, Neeharika, Fundamentals of Computers, PHI Learning Pvt Ltd, 6th ed., 2015

Additional References:

- M. Mano, Computer System Architecture 3rd edition, Pearson Education 2014.

- R P Jain, Modern Digital Electronics, Tata McGraw Hill Education Pvt. Ltd., 4th Edition, 2010
- Digital Principals, Schaum's outline series, Tata McGraw Hill, 2006

Course Code	MAJOR SEM – I	Credits	Lectures /Week
24CSMJ112	**Paper II - Introduction to OOPs using C++**	**2**	**2**

Course Outcomes:

After successful completion of this course, students would be able to

CO1: Describe various data types and OOPs concepts.
CO2: Understand the importance of OOPs approach over procedural language.
CO3:Apply the concepts of OOPS like encapsulation, inheritance and polymorphism.
CO4:Illustrate the use of different concepts of OOPs and basic file operations.

Unit	Topics	No of Lectures
I	**Introduction to Programming Concepts:** Object oriented programming paradigm, basic concepts of object oriented programming, benefits of object oriented programming, object oriented languages, applications of object oriented programming. Tokens-keywords, identifiers, constants-integer, real, character and string constants, backslash constants, features of C++ and its basic structure, simple C++ program without class, compiling and running C++ program. **Data Types, Data Input Output and Operators:** Basic data types, variables, rules for naming variables, programming constants, the type cast operator, implicit and explicit type casting, cout and cin statements, operators, precedence of operators. **Decision Making, Loops, Arrays and Strings:** Conditional statements-if, if...else, switch loops- while, do...while, for, types of arrays and string and string manipulations **Classes, Abstraction & Encapsulation:** Classes and objects, Dot Operator, data members, member functions, passing data to functions, scope and visibility of variables in function. **Constructors and Destructors:** Default constructor, parameterized constructor, copy constructor, private constructor, destructors. **Working with objects:** Accessor - mutator methods, static data and static function, access specifiers, array of objects.	**15**

II	**Polymorphism -** Binding-static binding & overloading, constructor overloading function overloading, operator overloading, overloading unary and binary operators. **Modeling Relationships in Class Diagrams:** Association, Aggregation- Composition and examples covering these principles **Inheritance:** Defining base class and its derived class, access specifiers, types of inheritance-single, multiple, hierarchical, multilevel, hybrid inheritance, friend function and friend class, constructors in derived classes. **Pointers:** Introduction to pointers, * and & operators, assigning addresses to pointer variables, accessing values using pointers, pointers to objects & this pointer, pointers to derived classes **File Handling:** File Stream classes, opening and closing file-file opening modes, text file handling, binary file handling.	**15**

References:

- Balagurusamy E., 8th Edition, McGraw Hill Education India,Object Oriented Programming with C++
- Lee/Tepfenhart, Pearson Education,UML & C++: A Practical Guide to Object Oriented Development, 2nd Edition2015

Additional References:

- Venugopal, Publisher: McGraw-Hill Education, Mastering C++ ,2017
- KanetkarYashwant,Let Us C++ , Publisher: BPB Publications, 2020
- Object Oriented Analysis and Design by Timothy Budd TMH, 2001

Course Code	MAJOR SEM-I Practical	Credits	Lectures/Week
24CSMJP111	**CS Practical(A+B)**	**2**	**4**

Part A : Fundamentals of Computer

Course Outcomes:

After successful completion of this course, students would be able to

CO1: Describe the circuit diagrams using different symbols of electronic components.

CO2:Discuss working of circuits of individual experiments.

CO3:Apply DeMorgan's theorems, laws of Boolean algebra to construct different practical circuits.

CO4:Analyze observations of each experiment based on the aim and objectives of an experiment.

CO5:Evaluate observed outputs with expected theoretical outputs.

1	Study of discrete Logic gates: Study and verify the truth table of various logic gates (NOT, AND, OR, EX-OR, and EX-NOR).
2	Study of NAND and NOR gate as universal gate.
3	Simplify given Boolean expression

4	Design and verify a half/full adder
5	Design and verify half/full subtractor
6	Design and verify the operation of flip-flops using logic gates.
7	Verify the operation of a counter
8	Verification of De Morgan's theorems
9	Using SPIM, write and test an adding machine program that repeatedly reads in integers and adds them into a running sum. The program should stop when it gets an input that is 0, printing out the sum at that point.
10	Using SPIM, write and test a program that reads in a positive integer using the SPIM system calls. If the integer is not positive, the program should terminate with the message "Invalid Entry;" otherwise, the program should print out the names of the digits of the integers, delimited by exactly one space. For example, if the user entered "528," the output would be "Five Two Eight."

PART B	**Introduction to OOPs using C++ - Practical**
Course Outcomes: After successful completion of this course, students would be able to CO1:List the errors and warnings for the given input. CO2:Explain and demonstrate the execution process of the programs. CO3:Solve the problems based on each OO concept. CO4:Write modularized program code for implementing OO concepts.	
1	Program to demonstrate use of data members & member functions.
2	Programs based on branching and looping statements using classes.
3	Program to demonstrate one and two dimensional arrays using classes.
4	Programs to demonstrate various types of constructors and destructors.
5	Programs to demonstrate use of public, protected & private scope specifiers.
6	Programs to demonstrate single and multilevel inheritance.
7	Programs to demonstrate friend function, inline function, this pointer
8	Programs to demonstrate function overloading and overriding.
9	Programs to demonstrate use of pointers.
10	Programs to demonstrate text and binary file handling.

Course Code	OPEN ELECTIVE SEM – I	Credits	Lectures /Week
24CSOE131	**Paper I Introduction to IT and Internet**	**2**	**2**

Course Outcomes:

After successful completion of this course, students would be able to

CO1:Learn various input, output, memory and local network devices

CO2:Explain the characteristics and usage of various elements of a computer, a network and operating systems. Explain basic terminology related to data and information

CO3: Apply the knowledge of Security Aspects and Preventions to the threats and Malware

CO4: Analyzing and measuring IT risk

Unit	Topics	No of Lectures
I	**Information technology concepts:** Concept of Data, Information and Knowledge Concept of Database Introduction to Information Systems and its major components. Types and Levels of Information systems. Main types of IT Support systems Computer based Information Systems (CBIS) ● Types of CBIS - brief descriptions and their interrelationships/hierarchies ● Office Automation System(OAS) ● Transaction Processing System(TPS) ● Management Information System(MIS) ● Decision Support Systems (DSS) ● Executive Information System(EIS) ● Knowledge based system, Expert system **Internet** · Basic of Computer networks - LAN, WAN; Concept of Internet; Applications of Internet; Connecting to internet; Knowing the Internet; Basics of internet connectivity related troubleshooting. ·World Wide Web - Web Browsing softwares, Search Engines; Understanding URL; Domain name; IP Address; Using E-governance website. · Switch, Router, and Gateways, Identification of Nodes in a Networked Communication, Internet, Web and the Internet of Things, Domain Name Systems.	**15**

II	IT Risk - Definition, Measuring IT Risk, Risk Mitigation and Management ● E-Business Risk Management Issues: Firewall concept and component, Benefits of Firewall ● Security on the Internet: Network and website security risks Website Hacking and Issues therein. Security and Email ● Information Security Environment in India with respect to real Time Application in Business Types of Real Time Systems, Distinction between Real Time, On – line and Batch Processing System. Real Time Applications viz. Railway / Airway / Hotel Reservation System, ATMs, EDI Transactions - definition, advantages, examples; E - Cash, Security requirements for Safe E-Payments. Security Aspects Threats and Prevention, Malware - virus, Worms, Ransomware. Trojan, spyware, adware, key loggers, Modes of Malware distribution, Antivirus, HTTP vs HTTPS, Firewall, Cookies, Hackers and Crackers.	**15**

References:

1. Efraim Turban, Dorothy Leidner, Ephraim Mclean, James Wetherbe, Information Technology for Management, 6TH ED (With CD)
2. Microsoft Office Professional 2013 Step by Step
3. Beth Melton, Mark Dodge, Echo Swinford, Andrew Couch, Tata McGraw Hill Joseph, P.T. : E-commerce An Indian Perspective

Course Code	**OPEN ELECTIVE SEM – I**	**Credits**	**Lectures /Week**
24CSOE132	**Paper II– Cyber Law**	**2**	**2**

Course Outcomes:

After successful completion of this course, students would be able to

CO1: Understand the Social And Intellectual Property Issues Emerging From 'Cyberspace.

CO2: Identify the Legal And Policy Developments In Various Countries To Regulate Cyberspace

CO3: Develop the Understanding Of Relationship Between Commerce And Cyberspace

CO4: Analyze the knowledge Of Information Technology Act And Legal Framework Of Right To Privacy, Data Security And Data Protection.

Unit	Topics	No of Lectures
I	Introduction to Cyber World, Introduction to Indian Cyber Law , Distinction between Cyber Crime and Conventional Crime , Cyber Criminals and their Objectives , Kinds of Cyber Crime-cyber stalking; cyber pornography; forgery and fraud; crime related to IPRs; Cyber terrorism; computer vandalism etc.	**15**
II	Overview of General Laws and Procedures in India, Penalties & Offences under the IT Act, 2000	**15**

References:

- Pavan Duggal,Cyber law –The Indian perspective

Additional References:

- Pavan Duggal,CYBER FRAUDS, CYBERCRIMES & LAW IN INDIA

Course Code	VOCATIONAL SKILL COURSE SEM – I	Credits	Lectures/ Week
24CSVC141	Paper I - Introduction to HTML (Practical Based)	2	2

Course Outcomes:

After successful completion of this course, students would be able to

CO1:Recall key concepts and terminology related to web programming and apply them in practical exercises.

CO2:Recognize the fundamental web programming concepts and their application in real-world scenarios.

CO3:Use web programming languages and tools to create dynamic, interactive, and responsive web applications.

CO4:Evaluate the effectiveness of web programming solutions in terms of functionality, usability, and security.

Unit	Topics	No of Sessions
I	**Internet and the World Wide Web:** What is the Internet? Applications of Internet, E-mail, Telnet, FTP, Internet Service Providers, Domain Name Server, Internet Address, World Wide Web (WWW): World Wide Web and its Evolution, Uniform Resource Locator (URL), Browsers, Search Engine, Web Server, HTTP Protocol. **HTML5:** Introduction, Formatting Text by using Tags, Using Lists, Creating Hyperlinks and Bookmarks, Defining Metadata about an HTML Document, Redirecting to another URL. **CSS:** Implementing Styles using CSS – Stylesheets, Formatting Text, Paragraphs and Links using CSS, CSS Selectors **HTML Media:** Embedding Images, Creating Client-side and Server-side Image Map, Embedding audio and video on web page	15
II	**Frames,Tables and Forms:** Creating web pages using frame tag **,**Creating Simple Table, Table Dimension, Merging Table Cells. **Formatting Tables:** Applying Borders, Background and Foreground fills, Changing Cell Padding, Spacing and Alignment, Collecting user input with HTML Forms	15

References:

- Thomas A. Powell, McGraw Hill, 5th edition,The Complete Reference HTML & CSS
- Faithe Wempen, Microsoft Press, 2011,Step by Step HTML5

Additional References:

- Robin Nixon, O'Reilly,Learning PHP, MySQL, JavaScript, CSS & HTML5, 3rd edition, 2018

Course Code	SEM I –Computer Science (Practical)	Credits	Practical/Week
24CSVC141	**Paper I - Introduction to HTML (Practical Based)**	**2**	**2**

Course Outcomes:

After successful completion of this course, students would be able to

CO1:(Remember) static web pages using Hyper Text Markup Language (HTML).
CO2:(Understanding) Understand how to effectively implement HTML.
CO3:(Apply). To construct basic websites using HTML and Cascading Style Sheets
CO4:(Analyze) Deploy a local web server and run a simple web application.

1	Design a web page using different text formatting tags
2	Design a web page with links to different pages and allow navigation between web pages.
3	Design a web page that automatically redirects the user to another page.
4	Design a web page demonstrating different stylesheet types.
5	Design a web page demonstrating grouping selectors.
6	Design a web page demonstrating different semantics.
7	Design a web page embedding image, audio and video.
8	Design a web page with Imagemaps.
9	Design a web page with different tables.
10	Design a web page with a form that uses all types of controls.

Course Code	SKILL ENHANCEMENT COURSE SEM – I	Credits	Lectures/ Week
24CSSE151	Paper I - Python	2	2

Course Outcomes:

After successful completion of this course, students would be able to

CO1:Learn basic syntax and concepts of the Python programming language. Define the structure and components of a Python program.

CO2: Understand data storing and processing mechanism using Arrays, String, List, Tuple and Dictionary. Understand sequential control how to write loops and decision statements in Python

CO3: Writing Python programs using different concepts

CO4: Analyze different control statements like loops,branching and decision making statements in Python

Unit	Topics	No of Lectures
I	**Introduction to Python Language** What is Python?Uses of Python Programming Language / Python Applications, Python for Software development, Python for Networking, Python for Automated Testing, Features of Python Programming Language, Implementations of Python, and Python career opportunities. **Download & Install Python** Download your operating system compatible Python Interpreter, install Python, set environment variables, customize Python shell, write & execute Python programs using Interactive mode and script mode. Python PyCharm or IDE, set Python for PyCharm IDE, configure PyCharm IDE, write & execute Python programs. **Python Language Syntax** Modes of Programming in Python, Interactive mode programming, Script mode programming, Creating Python program file, Python Identifiers, Python keywords, Lines and Indentation, Writing code blocks, Comments in Python, and Quotation in Python. **Python Keywords and Identifiers** Python keywords or Reserved words, Python keywords define	15

	the syntax and structure of the Python language, Python keywords are case sensitive, Python literals (True, False, Null), Python Identifiers, class names, variable names, function names, method names, and Identifier naming rules. **Python Variables** What is Variable?, Declaration of Variables, Assign Values to Variables, Initialization, Reading, Variable naming restrictions, and Types of Python Variables. **Python Data Types** What is Data Type?, Implicit Declaration of Data Types, Python Numbers (Integers, floating-point numbers, and complex numbers), Python Strings, Python boolean data type. **Python Operators** Arithmetic operators, Assignment operators, Unary minus operators, Relational operators, Logical operators, Bitwise operators, Membership operators, Identity operators, Precedence of Operators, Basic Input and Output Functions. **Control Statements:** The if statement, The if … else Statement, The 'if … elif … else' Statement, Loop Statement- while loop, for loop, Infinite loop, Nested loop, The else suite, break statement, continue statement, pass statement, return statement **Python Control Flow – Decision Making** Decision Making / Conditional Statements in Python, Simple If Structure, if-else structure, if elif structure, and nested If Structure. **Python Control Flow – Looping** Python Control Flow Statements, Python Loop Statements. Python while loop, Python for loop, Python range(), Python Nested Loop Structures, and Inserting conditions in Loops and vice versa.	
II	**Python Control Flow – Branching** Python Flow Control – Branching Statements, break statement, continue statement, pass statement, return statement. **Arrays**: Creating Arrays, Indexing and Slicing of Arrays, Basic Array Operations, Arrays Processing, Mathematical Operations on Array, Aliasing Arrays, Slicing and Indexing in Arrays. **Strings:** Creating Strings, Functions of Strings, Working with Strings, Length of a String, Indexing and Slicing, Repeating and Concatenating Strings,	**15**

	List and Tuples: Lists, List Functions and Methods, List Operations, List Slices, Nested Lists, Tuples, Functions in Tuple **Dictionaries**: Creating a Dictionary, Dictionary Methods, Using for Loop with Dictionaries, Operations on Dictionaries, Sorting the Elements of a Dictionary. **Functions**: Function definition and call, Returning Results, Returning Multiple Values from a Function, Built-in Functions, User defined functions, call by reference, call by value, Parameters and Arguments, Formal and Actual Arguments. **File Handling:** Python File Input-Output: Opening and closing files, various types of file modes, reading and writing to files, manipulating directories. Iterables, iterators and their problem-solving applications. **Exception handling:** What is an exception, various keywords to handle exceptions such try, catch, except, else, finally, raise.	

References:

- Yashwant Kanetkar,Aditya Kanetker, Let Us Python: A Programmer-Friendly Guide- 5th Edition

Additional References:

- Martin C. Brown, McGraw Hill,Python: The Complete Reference, 2018
- Magnus Lie Hetland, Apress,Beginning Python: From Novice to Professional, 2017
- Mark Summerfield, Pearson Education, Programming in Python 3,2nd Ed, 2018
- ReemaThareja,Python Programming: Using Problem Solving Approach, Oxford University Press, 2017

SEC- Introduction to Programming with Python – Practical	
Course Outcomes: After successful completion of this course, students would be able to CO1:Learn basic syntax and concepts of the Python programming language. Define the structure and components of a Python program. CO2: Understand data storing and processing mechanism using Arrays, String, List, Tuple and Dictionary. Understand sequential control how to write loops and decision statements in Python CO3: Writing Python programs using different concepts CO4: Analyze different control statements like loops,branching and decision making statements in Python	
1	Installing and setting up the Python IDLE interpreter. Executing simple statements like numeric and Boolean types, assignment, delete statements; the print function for output.

2	Write a program to demonstrate various types of operators available in python with suitable example.
3	Write a Python program to demonstrate the precedence and associativity of operators.
4	Write a Python program to demonstrate if , if-else and nested if else using suitable examples.
5	Write a Python program to demonstrate while loop using suitable examples.
6	Write a Python program to demonstrate for loop using suitable examples.
7	Write a python program to create and manipulate arrays in Python. Also demonstrate use of slicing and indexing for accessing elements from the array.
8	Write a program to implement a list in Python for suitable problems. Demonstrate various operations on it.
9	Write a program to implement tuples in Python for suitable problems. Demonstrate various operations on it.
10	Write a program to implement a dictionary in Python for suitable problems. Demonstrate various operations on it.
11	Write a program in Python to define and call user defined functions with suitable problems.

SEMESTER-II

Course Code	MAJOR SEM – II	Credits	Lectures /Week
24CSMJ211	Paper I- Principles of Operating Systems	2	2

Course Outcomes:

After successful completion of this course, students would be able to

CO1:Describe different concepts of the operating system.

CO2:Discuss the concept of file systems and mass storage structure.

CO3:Apply process scheduling algorithms on a given scenario. Apply deadlock handling techniques to determine the existence of deadlock and recover it.

CO4:Compare and analyze the performance of different algorithms.

Unit	Topics	No of Lectures
I	**Structures**: Definition of Operating System, Functions of Operating System, Operating-System Services, System Calls, Types of System Calls, Operating-System Structure. **Process Concept:** Process concept, Process State, PCB, Process scheduling, Operations on processes. **Process Synchronization**: Inter-process Communication, Critical Section Problem, Semaphores: Usage, Implementation. **Process Scheduling**: Basic Concept - CPU-I/O burst cycle, CPU scheduler, Preemptive,Scheduling,Dispatcher,Scheduling Criteria, Scheduling Algorithms- FCFS, SJF, Priority scheduling, Round-robin scheduling, Multiple queue scheduling, Multilevel feedback queue scheduling. **Deadlocks**: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock	15
II	**Main Memory**: Background, Logical address space, Physical address space, MMU, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table. **Virtual Memory**: Background, Demand Paging, Copy-on-Write, Page Replacement **Mass-Storage Structure**: Overview, Disk Structure, Disk Scheduling, Disk Management.	15

	File-System Interface: File Concept, Access Methods, Directory and Disk Structure. **File-System Implementation**: Allocation Methods, Free-Space Management.	

References:

- Abraham Silberschatz, Peter Galvin, Greg Gagne, Wiley,Operating System Concepts, 2021

Additional References:

- Achyut S. Godbole, Atul Kahate, Operating Systems, Tata McGraw Hill, 2017
- Naresh Chauhan, Principles of Operating Systems, Oxford Press, 2014
- Andrew S Tanenbaum, Herbert Bos, Modern Operating Systems, 4e Fourth Edition, Pearson Education, 2016

Course Code	MAJOR SEM – II	Credits	Lectures /Week
24CSMJ212	Paper II - Database Systems	2	2

Course Outcomes:

After successful completion of this course, students would be able to

CO1:Describe different concepts of Database Systems.
CO2:Discuss the concept Schema and Relational Algebra.
CO3:Apply ER Model and Relational Model concepts.
CO4:Compare and analyze the performance of File organizations.

Unit	Topics	No of Lectures
I	**Introduction to DBMS** – Database, DBMS – Definition, Overview of DBMS, File Systems versus a DBMS, Advantages of DBMS, Levels of abstraction, Data independence, DBMS Architecture.Data models - Client/Server Architecture, Object Based Logical Model, Record Based. Logical Model (Relational, Hierarchical, Network) **Introduction to Database System:** Database Design and ER Diagrams, Entities, Attributes, and Entity Sets , Relationships and Relationship Sets, Additional Features of the ER Model(Key Constraints , Participation Constraints , Weak Entities , Class Hierarchies , Aggregation) **Conceptual Design With the ER Model** (Entity versus Attribute, Entity versus Relationship, Binary versus Ternary Relationships, Aggregation versus Ternary Relationships) **Introduction to the Relational Model** (Creating and Modifying Relations Using SQL), Integrity Constraints over Relations(Key Constraints, Foreign Key Constraints, General Constraints),Enforcing Integrity Constraints(Transactions and Constraints),Querying Relational Data, **Logical Database Design**: ER to Relational (Entity Sets to Tables ,Relationship Sets (without Constraints) to Tables, Translating Relationship Sets with Key Constraints, Translating Relationship Sets with Participation Constraints ,Translating Weak Entity Sets ,translating Class Hierarchies, Translating ER Diagrams with Aggregation)	15

II	**Schema refinement and Normal forms**: Functional dependencies, first, second, third, and BCNF normal forms based on primary keys, lossless join decomposition. **Relational Algebra** operations (selection, projection, set operations union, intersection, difference, cross product, Joins –conditional, equi-join and natural joins, division) **Database Protection**: Security Issues, Threats to Databases, Security Mechanisms, Role of DBA, Discretionary Access Control **Storage and Indexing**: Data on External Storage File Organizations and Indexing (Clustered Indexes, Primary and Secondary Indexes Index Data Structures, Hash-Based Indexing , Tree-Based Indexing)	**15**

References:

- Ramez Elmasri & Shamkant B.Navathe, Fundamentals of Database Systems, Pearson Education, Seventh,Edition, 2017
- Ramakrishnam, Gehrke, Database Management Systems, McGraw-Hill, Third Edition, 2014

Additional References:

- Abraham Silberschatz, Henry F. Korth, et al.,Database System Concepts 7th Edition, 21 July 2021

Course Code	**MAJOR SEM-II Practical**	**Credits**	**Lectures/Week**
24CSMJP21	**CS Practical (A+B)**	**2**	**4**

Part A - Principles of Operating Systems

Course Outcomes:

After successful completion of this course, students would be able to

CO1:List the errors and warnings for the given input.

CO2:Explain and demonstrate the execution process of the programs.

CO3:Solve the problems based on each algorithm.

CO4:Write modularized program code for implementing various operating system algorithms and integrate them.

1	Process Communication:
2	Write a program to give a solution to the Producer–Consumer problem using shared memory.
3	Process Communication:

4	Write a program to give a solution to the Producer–Consumer problem using message passing.
5	Synchronization:
6	Write a program to give a solution to the Bounded Buffer problem.
7	Synchronization:
8	Write a program to give a solution to the Readers–Writer's problem.
9	Write a program that implements FCFS scheduling algorithm.
10	Write a program that implements (with no preemption) scheduling algorithm.

Part B : **Database Systems – Practical**	
Course Outcomes: After successful completion of this course, students would be able to CO1:List the errors and warnings for the given input. CO2:Explain and demonstrate the concept of Database systems. CO3:Solve the problems based on each concept of Database System. CO4:Analyze the output for the given input	
1	Perform Following: ● Create ER model with - Key Constraints - Participation Constraints - Weak Entities - Class Hierarchies - Aggregation
2	Perform Following: ● Create Relational Model - Create and Modify Relations - Integrity Constraints over Relations(Key Constraints, Foreign Key Constraints, General Constraints)
3	Perform Following: ● Create Relational Model ● Enforcing Integrity Constraints(Transactions and Constraints) ● Querying Relational Data
4	Perform Following: ● Convert ER to Relational (Entity Sets to Tables ,Relationship Sets (without Constraints) to Tables ● Translating Relationship Sets with Key Constraints ● Translating Relationship Sets with Participation Constraints
5	Perform Following: ● Convert ER to Relational (Entity Sets to Tables ,Relationship Sets (without Constraints) to Tables ● Translating Weak Entity Sets

	• Translating Class Hierarchies • Translating ER Diagrams with Aggregation
6	Perform Relational algebra operations on above ER Model.
7	Perform Normalization and schema refinement on above ER and Relational Model
8	Perform Following: Create Clustered index
9	Perform Following: File Tables: Create, Alter and drop. Load Files
10	Perform Following: Create database User, Grant and Deny

Course Code	MINOR SEM – II	Credits	Lectures /Week
24CSMR221	Paper I - Discrete Mathematics	2	2

Course Outcomes:

After successful completion of this course, students would be able to

CO1:Describe the basic concepts of sets, permutations, relations, graphs, trees
CO2:Understand sets and perform operations and algebra on set
CO3:Apply the concepts of graphs to solve various problems in day to day life.
CO4:Demonstrate an understanding of relations and functions and be able to determine their properties, relationships using directed, undirected, weighted graphs and trees

Unit	Topics	No of Lectures
I	**Set Theory Introduction**:- Sets and Elements, Subsets, Venn Diagrams, Set Operations, Algebra of Sets, Duality, Finite Sets, Counting Principle, Classes of Sets, Power Sets, Partitions, Mathematical Induction **Relations**:- Introduction, Product Sets, Relations, Pictorial Representations of Relations, Composition of Relations, Types of Relations, Closure Properties, Equivalence Relations, Partial Ordering Relations. **Functions and Algorithms:** Introduction, Functions, One-to-One, Onto, and Invertible Functions, Mathematical Functions, Exponential and Logarithmic Functions, Sequences, Indexed Classes of Sets, Recursively Defined Functions, Cardinality, Algorithms and Functions, Complexity of Algorithms	15
II	**Counting Principle Cardinality of sets, Basics of Counting**: Addition rule, Product rule, Inclusion and Exclusion Principle, Mathematical Induction:1st and 2nd principle of induction **Introduction to Graphs and Operations on Graphs:** Definition and examples of graph, Handshaking lemma and it's corollaries. Types of graph, Complete graph, bipartite graph, Regular graph, Null graph. Isomorphism of graphs, Adjacency and Incidence Matrix of a Graph. Vertex induced subgraph, Edge induced subgraph, Vertex deleted subgraph, Edge deleted subgraph, Union of two graphs, Intersection of two graphs, Product of two graphs, Ring Sum of two graphs, Fusion of vertices, Complement of a graph.	15

References:

- Kenneth H.Rosen. Discrete Mathematics and its applications. (7th edition) McGraw-Hill Higher Education, 2017.
- Bernard Kolman, Robert C.Busby , and Sharon Cutler Ross. Discrete Mathematical Structures (6th edition). Prentice-Hall, Inc. Upper Saddle River, NJ, USA, 2003.

Additional References:

- John Clark and Derek Holton, a first look at Graph Theory, 2013

Course Code	OPEN ELECTIVE SEM – II	Credits	Lectures /Week
24CSOE231	Paper I– Decision Making using Information Technology	2	2

Course Outcomes:

After successful completion of this course, students would be able to

CO1:Understand various corporate decision-makings using IT systems
Infer how technology supports business decision making

CO2:Describe emerging technologies like ERP, CRM, SCM and trends in enterprise applications.

CO3: Apply the concepts of Database Management System.

CO4: Differentiate and identify the several database management and data warehouse approaches.

Unit	Topics	No of Lectures
I	**Overview of MIS** Understanding Major Functional Systems Marketing & Sales Systems, Finance & Accounting Systems, Manufacturing & Production Systems, Human Resource Systems, Inventory Systems Sub systems, description and organizational levels **Decision support system:** Definition Relationship with MIS, Evolution of DSS, Characteristics, classification, objectives, components, applications of DSS Concepts of ERP, Application, ERP Lifecycle **Concept of e-CRM:** E-CRM Solutions and its advantages, How technology helps? Concept of E-SCM, Strategic advantages, benefits, E-SCM Components and Chain Architecture,Major Trends in e-SCM	15
II	**Introduction to DBMS** Meaning of DBMS, Need for using DBMS. Concepts of tables, records, attributes, keys, integrity constraints, schema architecture, data independence. Concepts and Characteristics of Data Warehousing and Data Mining, Importance of data warehouse for an organization. The scope and the techniques of Data mining in Business Applications.	15

References:

1. Information Technology for Management, 6TH ED (With CD)
2. Efraim Turban, Dorothy Leidner, Ephraim Mclean, James Wetherbe Abraham Silberschatz , Henry F. Korth , S. Sudarshan,Database System concepts

Course Code	**OPEN ELECTIVE SEM – II**	**Credits**	**Lectures /Week**
24CSOE232	**Paper II - E-Commerce**	**2**	**2**

Course Outcomes:

After successful completion of this course, students would be able to

CO1:Know how the business is carried out through electronic media
CO2:Understand the types and ways of doing business over internet
CO3:Apply the knowledge after becoming a professional or an entrepreneur
CO4:Analyze the security concerns while transacting using electronic media

Unit	Topics	No of Lectures
I	**Introduction to E-Business and E-Commerce**:- Define the e-Commerce and e-Business, Define e-Commerce Types of EC transactions. Define e-Business Models. Internet Marketing and e-Tailing. Elements of e-Business Models. Explain the benefits and limitations of e-Commerce.	**15**
II	**E-Business applications, E-Procurement and E- Payment Systems**:- Integration and e-Business suits. ERP, e-SCM, CRM, E-Payment. E-Procurement definition, processes, methods and benefits. Discuss the categories and users of smart cards. Describe payment methods in B2B EC	**15**

References:

- Turban, E. et al.,Electronic Commerce: A Managerial Perspective, Prentice Hall-2008.
- Ravi Kalakota, Pearson,Frontiers of e-commerce,

Additional References:

- Dave Chaffey, Prentice Hall, Electronic Business and Electronic Commerce Management, 2nd edition,2006
- Horton and Horton, e-Learning Tools and Technologies,Wiley Publishing

Course Code	VOCATIONAL SKILL COURSE SEM – II	Credits	Lectures/ Week
24CSVC241	Paper I - Introduction to JavaScript and PHP	2	2

Course Outcomes:

After successful completion of this course, students would be able to

CO1: Learn PHP and XML Format

CO2: Use server side scripting with PHP to generate the web pages dynamically using the database connectivity.

CO3: Apply the HTML and CSS features with different layouts as per need of applications Use the JavaScript to develop the dynamic web pages.

CO4: Analyze the concepts of the World Wide Web, and the requirements of effective web design

Unit	Topics	No of Lectures
I	**JavaScript:**Introduction, Difference between Client-side and Server-side Scripting, JavaScript Variables and Constants, Data Types, JavaScript Operators, Comments, Functions, JavaScript Objects, Dialog Boxes **Statements:**Conditional Statements – if else, switch, Loops – while, do while, for, for in, for of, Loop Control – break, continue, labels **JavaScript Objects:** User-defined Objects, with Keyword, Native Objects – Array, String, Date, Math, Number, RegExp **Events and Event Handlers:** HTML Events, DOM Events, DOM Event Listeners	15
II	**PHP:** Introduction, Server-side Scripting, PHP Syntax and Comments, Variables and Constants, Data Types, Looping, Functions, PHP Form Handling, PHP Arrays, PHP Strings, PHP GET and POST, PHP RegEx, Basic PHP Errors. **Advanced PHP:** PHP Sessions, PHP Cookies, Validating and Sanitizing Data with PHP Filters, PHP mail function. **MySQL:**Why MySQL? Connect to MySQL, Creating Database and Tables, Selecting Data, Updating Data, Deleting Data, Limiting Data.	15

References:

- The Complete Reference HTML & CSS
- Learning PHP, MySQL, JavaScript, CSS & HTML5
- Learning Web Design A Beginner's Guide to Html, CSS, JavaScript, And Web Graphics
- The Complete Reference JavaScript

Course Code	SEM I –	Credits	Practical/Week
24CSVC241	**Introduction to JavaScript and PHP Practical**	**1**	**2**

Course Outcomes:

After successful completion of this course, students would be able to

CO1:HTML Basic Java Script Commands and its usage.
CO2: Demonstrate the creation and execution of Java scripts in Web Page.
CO3: Implement Document Object Model and events in web pages using JavaScript.
CO4: Execute PHP programming language programs in XAMPP Platform

Practical	
1	Using JavaScript, design a web page to accept a number from the user and print its Factorial.
2	Using JavaScript, a web page that prints Fibonacci series/any given series
3	Write a JavaScript program to display all the prime numbers between 1 and 100.
4	Write a JavaScript program to accept a number from the user and display the sum of its digits.
5	Write a JavaScript program to design a simple calculator.
6	Design a form and validate all the controls placed on the form using JavaScript.
7	Write a PHP code to find the greater of 2 numbers. Accept the no. from the user.
8	Write a PHP Program to accept a number from the user and print it factorial.
9	Write a PHP program to demonstrate different array functions.
10	Write a PHP program to demonstrate use of sessions and cookies
11	Write a PHP program to create: Create a database College Create a table Department (Dname, Dno, Number_of_faculty)
12	Write a PHP program to Update rows in a table Delete rows from a table

Course Code	SKILL ENHANCEMENT COURSE SEM – II	Credits	Lectures /Week
24CSSC251	**Paper I - Introduction to SQL**	**2**	**2**

Course Outcomes:

After successful completion of this course, students would be able to

CO1:Describe different concepts of SQL.
CO2:Understand the concepts of SQL.
CO3:Apply SQL concepts.
CO4:Analyze/Experiment with DDL, DML, DCL, DQL and TCL statements.

Unit	Topics	No of Lectures
I	What is SQL, Benefits of SQL, Downloading and installing SQL Server, Downloading and Installing SQL Server Express, Downloading SQL Server Management Studio(SSMS), Starting the database engine services, Connect to SQL Server with SSMS, Basics of SSMS and its features, Logical process for executing queries in SQL Server. Create Login, Creating SQL Database User (Understanding the Types of Users, Selecting type of User, Create users with SSMS, Additional options, Create User using T-SQL), Create a database schema, Join a Role, Grant permission to a principal role, Create a server Role and Application Role, Create Credentials. Note: Perform above all operations using SSMS and transact-SQL. SQL Operators, SQL Data types **DDL Statements** - Creating Databases, Using Databases, data types, Creating Tables (with integrity constraints – primary key, default, check, not null), Altering Tables, Renaming Tables, Dropping Tables, Truncating Tables, Backing Up and Restoring Databases. **DML Statements** – Viewing the structure of a table insert, update, delete, Select all columns, specific columns, unique records, conditional select, in clause, between clause, limit, aggregate functions (count, min, max, avg, sum), group by clause, having Clause	**15**
II	**Functions** – String Functions (concat, instr, left, right, mid, length, lcase/lower, ucase/upper, replace,strcmp, trim,ltrim, rtrim, Math Functions (abs, ceil, floor, mod, pow, sqrt, round,	**15**

	truncate) Date Functions (adddate, datediff, day, month, year, hour, min, sec, now, reverse) **Stored procedures** (Create, Execute, create with multiple parameter) **Joining Tables** – inner join, outer join (left outer, right outer, full outer) **Subqueries** – subqueries with IN, EXISTS, subqueries restrictions, Nested subqueries, ANY/ALL clause, correlated subqueries **Views** (creating, altering dropping, renaming and manipulating views) **DCL Statements** (creating/dropping users, privileges introduction, granting/revoking privileges, viewing privileges) **Indexing** (Create and drop)	

References:

- Ramakrishnam, Gehrke, Database Management Systems, McGraw-Hill, Third Edition, 2014
- Ramez Elmasri & Shamkant B.Navathe, Fundamentals of Database Systems, Pearson Education, Sixth Edition, 2010

Additional References:

- Jacob Schulz, Learn SQL: A Practical Guide for SQL Server and Database Fundamentals 2021
- A. Khan,SQL Programming | The Ultimate Guide for Beginner's to Advance, January 2022
- Adam Aspin,Querying SQL Server: Run T-SQL operations, data extraction, data manipulation, and custom queries to deliver simplified analytics, July 2022

Introduction to SQL – Practical	
1	Installing SQL Server Express and exploring its features.
2	Perform following: ● Create Login ● Create SQL database user ● Create user type of user ● Create a database schema ● Join a Role ● Grant permission to a principal role ● Create a server Role and Application Role ● Create Credentials.
3	Perform following:

	• Viewing all databases • Creating a Database • Viewing all Tables in a Database • Creating Tables (With and Without Constraints) • Inserting/Updating/Deleting Records in a Table • Saving (Commit) and Undoing (rollback)
4	Perform the following: • Altering a Table • Dropping/Truncating/Renaming Tables • Backing up / Restoring a Database
5	Perform the following: • Simple Queries • Simple Queries with Aggregate functions • Queries with Aggregate functions (group by and having clause)
6	Queries involving • Date Functions • String Functions • Math Functions
7	Join Queries • Inner Join • Outer Join
8	Subqueries • With IN clause • With EXISTS clause
9	Views • Creating Views (with and without check option) • Dropping views • Selecting from a view
10	DCL statements • Granting and revoking permissions

Evaluation Scheme for First Year (UG) under NEP (2 credits)

I. Internal Evaluation for Theory Courses – 20 Marks

1) Continuous Internal Assessment(CIA) Assignment - Tutorial/ Case Study/ Project / Presentations/ Group Discussion / Ind. Visit. – 10 marks

2) Continuous Internal Assessment(CIA) ONLINE Unit Test – 10 marks

II. External Examination for Theory Courses – 30 Marks

Duration: 1 Hours

Theory question paper pattern: All questions are compulsory.

Question	Based on	Marks
Q.1	Unit I	15
Q.2	Unit II	15

: All questions shall be compulsory with internal choice within the questions.

· Each Question may be sub-divided into sub questions as a, b, c, d, etc. & the allocation of Marks depends on the weightage of the topic.

Paper Pattern of Theory Paper:

DES's Kirti M. Doongursee College (AUTONOMOUS), Dadar (W), Mumbai-28			
Regular / Additional / ATKT Examination			
Duration: 1 Hour			**Max Marks: 30**
Date: **Time:** **Code:** ***(For office use)***			
N. B.	i)	*All Questions are compulsory.*	
	ii)	*Mixing of sub-questions is not allowed*	
	iii)	*Draw neat labeled diagrams wherever necessary.*	
Q. No.			**Marks**
Q.1 A)			**05**
OR			
Q.1 B)			**05**
Q.1 C)			**05**

OR		
Q.1 D)		**05**
Q.1 E)		**05**
OR		
Q.1 F)		**05**
Q.2 G)		**05**
OR		
Q.2 H)		**05**
Q.2 I)		**05**
OR		
Q.2 J)		**05**
Q.2 K)		**05**
OR		
Q.2 L)		**05**

III. Practical Examination

- **Each core subject carries 50 Marks.**
- **Duration: 2 Hours for each practical course.**
- **Minimum 80% practical from each core subjects are required to be completed.**
- **Certified Journal is compulsory for appearing at the time of Practical Exam**

NOTE:

1. **To pass the examination, attendance is compulsory in both Internal & External (Theory + Practical) Examinations.**
2. **There is separate passing in internal and external theory courses.**

NOTE: To pass the examination, attendance is compulsory in both Internal & External (Theory + Practical) Examinations.