

AC 25.04.24 ITEM NO: 2.1

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.BSc
Subject: Information Technology

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

PROGRAM OUTCOMES

PO	Description
	A student completing Bachelor's Degree in Science (Information Technology) Program will be able to
PO1	To think analytically, creatively and critically in developing robust, extensible and highly maintainable technological solutions to simple and complex problems.
PO2	To apply their knowledge and skills to be employed and excel in IT professional careers and/or to continue their education in IT and/or related postgraduate programmes.
PO3	To be capable of managing complex IT projects with consideration of the human, financial and environmental factors.
PO4	To work effectively as a part of a team to achieve a common stated goal in a professional manner.
PO5	To adhere to the highest standards of ethics, including relevant industry and organizational codes of conduct.
PO6	To communicate effectively with a range of audiences both technical and non-technical.
PO7	To develop an aptitude to engage in continuing professional development
PO8	To understand corporate approach towards the projects in a research oriented qualitative manner

**Deccan Education Society's
Kirti M. Doongurseer College
(Autonomous) Proposed
Curriculum as per NEP-2020**

Year of implementation- 2024-2025

Name of the Department-Information Technology

Semester	Course Code	Course Title	Vertical	Credit
I	24ITMJ111	Programming Principles with C	Major	2
	24ITMJ112	Digital Electronics	Major	2
	24ITMJP11	Major Practical-1 & 2	Major	2
	24ITOE131	Introduction to IT and Internet	OE	2
	24ITOE132	Cyber Law	OE	2
	24ITVC141	Database Management System	VSC	2
	24ITSE142	OS with Linux	SEC	2
II	24ITMJ211	Object Oriented Programming	Major	2
	24ITMJ212	Data Structure	Major	2
	24ITMJ241	Major Practical-1 & 2	Major	2
	24ITMR221	Fundamentals of Mathematics & Statistics Part-1	Minor	2
	24ITOE231	Decision Making using Information Technology	OE	2
	24ITOE232	E-Commerce	OE	2
	24ITVC241	Advance Web Programming	VSC	2
	24ITSE242	Python Programming	SEC	2

SEMESTER- I

Course Code	MAJOR SEM – I	Credits	Lectures /Week
24ITMJ111	Paper I- Programming principles with C	2	2
Course Outcomes:			
After successful completion of this course, students would be able to			
<ul style="list-style-type: none"> • To develop the logical ability of the student. • Basic concepts to be cleared using suitable examples. • Different approach towards the problem. • To handle the errors and find suitable solutions. 			
Unit			
Unit		Topics	
No of Lectures			
I	<p>Introduction: Algorithms, History of C, Structure of C Program. Program Characteristics, Compiler, Linker and preprocessor, pseudo code statements and flowchart symbols, Desirable program characteristics. Program structure. Compilation and Execution of a Program, C Character Set, identifiers and keywords, data types and sizes , constants and its types, variables, Character and character strings, typedef, typecasting</p> <p>Type of operators: Arithmetic operators, relational and logical operators, Increment and decrement operators, assignment operators, the conditional operator, Assignment operators and expression, Precedence and order of Evaluation and C Preprocessor</p> <p>Control Flow: Statements and Blocks, If-Else, Else-If, Switch, Loops- While and For Loops-Do-while, Break and Continue, Goto and Labels. Arrays.</p>	15	
II	<p>Functions and Program Structure: Basics of functions. User defined and Library functions, Function parameters, Return values, Recursion</p> <p>Pointer: Pointer and Addresses, Pointer and Function Arguments, Dynamic memory allocation.</p> <p>Structures: Basics of structures, Structures and Functions, Arrays of Structures, Pointers to Structures, Unions, Bit-fields.</p>	15	
Textbooks:			
<ol style="list-style-type: none"> 1. Let us C Yashwant P. Kanetkar BPB publication 2. Programming in ANSI C by E.Balagurusamy, Tata McGraw-Hill 3. Programming Language by Brian W. Kernighan and Denis M. Ritchie, PHI publication. 			

Additional References:

Mastering C by K R Venugopal, Tata McGraw-Hill

Programming with C by Byron Gottfried, Tata McGRAW-Hill

Course Code	MAJOR SEM – I	Credits	Lectures /Week
24ITMJ112	Paper II - Digital Electronics	2	2
Course Outcomes:			
After successful completion of this course, students would be able to			
<ul style="list-style-type: none"> ● Recall the principles of the Number system. ● Understand the structure of various number systems, binary arithmetic and its applications in digital design. ● Apply the Boolean algebra using logic gates and Karnaugh Maps ● Construct and design Combinational and Sequential Logic circuits 			
Unit			
Unit		Topics	
No of Lectures			
I	<p>Number System: Analog System, digital system, numbering system, binary number system, octal number system, hexadecimal number system, conversion from one number system to another, floating point numbers, weighted codes binary coded decimal, non-weighted codes Excess – 3 code, Gray code.</p> <p>Binary Arithmetic: Binary addition, Binary subtraction, Negative number representation, Subtraction using 1's complement and 2's complement.</p> <p>Boolean Algebra and Logic Gates: Introduction, Logic (AND OR NOT), Boolean theorems, Boolean Laws, De Morgan's Theorem, Reduction of Logic expression using Boolean Algebra, Deriving Boolean expression from given circuit, exclusive OR and Exclusive NOR gates, Universal Logic gates, Implementation of other gates using universal gates.</p>	15	
II	<p>Minterm, Maxterm and Karnaugh Maps: Introduction, minterms and sum of minterm form, maxterm and Product of maxterm form, Reduction technique using Karnaugh maps – 2/3/4 variables K-maps, Grouping of variables in K-maps, K-maps for product of sum form, minimize Boolean expression using K-map and obtain K-map from Boolean expression.</p> <p>Multiplexer, Demultiplexer, Encoder and Decoder: Introduction, Multiplexer, Demultiplexer, Decoder, Encoders.</p> <p>Sequential Circuits: Flip-Flop: Introduction, Terminologies used, S-R flip-flop, D flip-fop, JK flip-flop, Race-around condition, Master – slave JK flip-flop, T flip-flop.</p>	15	
Textbooks:			
<ul style="list-style-type: none"> ● Digital Electronics and Logic Design, N.G. Palan, Tech Nova, 1st Edition, 2000. ● Make Electronics, Charles Platt, O' Reilly, 1st Edition, 2010. ● Modern Digital Elesectronics, R.P. Jain, Tata McGraw Hill, 4th Edition, 2009. ● Digital Principles and Application, Malvino and Leach, 8th Edition, 2014 			

Course Code	MAJOR SEM-I Practicals	Credits	Lectures /Week
24ITMJ11	IT Practical 1 (Part A+B)	2	4

Part A- Programming Principles with C Practical	
Course Outcomes: Learners will be able to,	
<ul style="list-style-type: none"> ● Write the programs for Developing applications. ● Understand of a functional hierarchical code organization ● Work with textual information, characters and strings. ● Understand the differences between syntax errors, runtime errors, and logic errors 	
1	a. Write an algorithm and draw flowchart for Area of circle. b. Write an algorithm and draw flowchart to print the given no. is even or odd. c. Write an algorithm and draw flowchart to print 1 to 10 numbers. d. Write an algorithm and draw flowchart for sum of 1 to 5 numbers. e. Write an algorithm and draw flowchart to compute the addition of digits of a given number
2	a. Write a program using while loop to reverse the digits of a number. b. Write a program to calculate the factorial of a given number. c. Write a program to find the roots of quadratic equation. d. Write a program to print the Fibonacci series..
3	a. Write a program in C to check entered character vowel or consonant b. Write a program to C program to print day name of week using switch-case. c. Write a program to read three values from keyboard and print out the largest of them without using if statement.
4	a. Write a program to print the pattern of asterisks as shown below : <pre>* ** *** ****</pre> b. Write a program to print the pattern of asterisks as shown below : <pre>**** *** ** *</pre> c. Write a program to print Floyd's Triangle.
5	a. Write a program to print area of square using function. b. Write a program using recursive function.

	<p>c. Write a program to square root, abs() value using function.</p> <p>d. Write a program using goto statement.</p>
6	<p>a. Write a program to print rollno and names of 10 students using array.</p> <p>b. Write a program to read a matrix of size m*n.</p> <p>c. Write a program to sort the elements of array in ascending or descending order.</p>
7	<p>a. Write a program to extract the portion of a character string and print the extracted part.</p> <p>b. Write a program to find the given string is palindrome or not.</p> <p>c. Write a program to using strlen(), strcmp() function.</p>
8	<p>a. Write a program to display the values using different data types and its address using pointer.</p> <p>b. Write a program to perform addition and subtraction using pointer.</p>
9	<p>a. Write a program to copy the contents of the file from one file into other.</p> <p>b. Write a program to print the structure using</p> <ul style="list-style-type: none"> • Title • Author • Subject • Book ID <p>Print the details of two students.</p>

Part B- Digital Electronics Practicals	
<p>Course Outcomes:</p> <p>After successful completion of this course, students would be able to</p> <ul style="list-style-type: none"> • Understand the structure of various number systems, binary arithmetic and its applications in digital design • Apply the Boolean algebra using logic gates and Karnaugh Maps • Construct and design Combinational and Sequential Logic circuits 	
1	<p>Study of Logic gates and their ICs and universal gates:</p> <p>a. Study of AND, OR, NOT, XOR, XNOR, NAND and NOR gates</p> <p>b. IC 7400, 7402, 7404, 7408, 7432, 7486, 74266</p>
2	<p>Study of Logic gates and their ICs and universal gates:</p> <p>a. Implement AND, OR, NOT, XOR, XNOR using NAND gates.</p> <p>b. Implement AND, OR, NOT, XOR, XNOR using NOR gates.</p>
3	<p>Implement the given Boolean expressions using a minimum number of gates.</p> <p>a. Verifying De Morgan's laws.</p> <p>b. Implement other given expressions using a minimum number of gates.</p> <p>c. Implement other given expressions using a minimum number of ICs.</p>
4	<p>Implement combinational circuits.</p> <p>Design and implement combinational circuits based on the problem given and minimizing using K-maps.</p>
5	<p>Implement code converters.</p>

	<ul style="list-style-type: none"> a. Design and implement Binary – to – Gray code converter. b. Design and implement Gray – to – Binary code converter.
	<p>Implement code converters.</p> <ul style="list-style-type: none"> 6 a. Design and implement Binary – to – BCD code converter b. Design and implement Binary – to – XS-3 code converter
	<p>Implement Encode and Decoder.</p> <ul style="list-style-type: none"> 7 a. Design and implement 8:3 encoder. b. Design and implement 3:8 decoder.
	<p>Implement Multiplexer and Demultiplexers</p> <ul style="list-style-type: none"> 8 a. Design and implement a 4:1 multiplexer. Study of IC 74153, 74157 b. Design and implement 1:4 demultiplexer. Study of IC 74139
	<p>Implement Multiplexer and decoder.</p> <ul style="list-style-type: none"> 9 a. Implement the given expression using IC 74151 8:1 multiplexer. b. Implement the given expression using IC 74138 3:8 decoder.
	<p>Study of flip-flops.</p> <ul style="list-style-type: none"> 10 a. Study of IC 7473. b. Study of IC 7474. c. Study of IC 7476. d. Conversion of Flip-flops.

Course Code	OPEN ELECTIVE SEM – I	Credits	Lectures /Week
24ITOE131	Paper I Introduction to IT and Internet	2	2
<p>Course Outcomes:</p> <p>After successful completion of this course, students would be able to</p> <ul style="list-style-type: none"> • Describe various components of a computer, network and e-security systems • Explain the characteristics and usage of various elements of a computer, a network and operating systems • Use various input, output, memory and local network devices • Explain basic terminology related to data and information 			
Unit	Topics	No of Lectures	
I	<p>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</p> <p>Computer based Information Systems (CBIS)</p> <ul style="list-style-type: none"> • 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 <p>Internet</p> <ul style="list-style-type: none"> • 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	15	

	<p>Management</p> <ul style="list-style-type: none"> ● 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. <p>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.</p>	
<p>Textbooks:</p> <ol style="list-style-type: none"> 1. Information Technology for Management, 6TH ED (With CD) 2. By Efraim Turban, Dorothy Leidner, Ephraim Mclean, James Wetherbe 3. Microsoft Office Professional 2013 Step by Step 4. By 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
24ITOE132	Paper II – Cyber Law	2	2
Course Outcomes:			
After successful completion of this course, students would be able to			
<ul style="list-style-type: none"> • Make Learner Conversant With The Social And Intellectual Property Issues Emerging From ‘Cyberspace. • Explore The Legal And Policy Developments In Various Countries To Regulate Cyberspace; • Develop The Understanding Of Relationship Between Commerce And Cyberspace • Give Learners In Depth Knowledge Of Information Technology Act And Legal Frame Work Of Right To Privacy, Data Security And Data Protection. 			
Unit			
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	
Textbooks:			
<ul style="list-style-type: none"> • Cyber law –The Indian perspective by Pavan Duggal • The Indian Cyber Law with The Information Technology Act 2000 by Suresh T Viswanathan Edition 2022 			
Additional References:			
<ul style="list-style-type: none"> • CYBER FRAUDS, CYBERCRIMES & LAW IN INDIA by Pavan Duggal 			

Course Code	VOCATIONAL SKILL COURSE SEM – I - Web Programming	Credits	Lectures /Week
24ITVC141	Paper I	2	2
Course Outcomes:			
After successful completion of this course, students would be able to			
<ul style="list-style-type: none"> Recall key concepts and terminology related to web programming and apply them in practical exercises. Recognize the fundamental web programming concepts and their application in real-world scenarios. Use web programming languages and tools to create dynamic, interactive, and responsive web applications. Evaluate the effectiveness of web programming solutions in terms of functionality, usability, and security. 			
Unit	Topics	No of Lectures	
I	<p>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.</p> <p>HTML5: Introduction, Formatting Text by using Tags, Using Lists, Creating Hyperlinks and Bookmarks, Defining Metadata about an HTML Document, Redirecting to another URL.</p> <p>CSS: Implementing Styles using CSS – Stylesheets, Formatting Text, Paragraphs and Links using CSS, CSS Selectors</p> <p>HTML Media: Embedding Images, Creating Client-side and Server-side Image Map, Embedding audio and video on web page.</p>	15	
II	<p>Frames, Tables and Forms: Creating web pages using frame tag ,Creating Simple Table, Table Dimension, Merging Table Cells.</p> <p>Formatting Tables: Applying Borders, Background and Foreground fills, Changing Cell Padding, Spacing and Alignment, Collecting user input with HTML Forms</p>	15	

Textbooks:

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

Additional References:

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

Course Code	SKILL ENHANCEMENT COURSE SEM – I	Credits	Lectures /Week
24ITSC151	Paper I - Linux Operating System	2	2
<p>Course Outcomes:</p> <p>After successful completion of this course, students would be able to</p> <ul style="list-style-type: none"> • Linux Basic Shell Commands and its usage. • Demonstrate the creation and execution of shell scripts in Linux. • Elaborate use the various file system and administration commands to execute shell scripts in linux. • Execute various programming language programs in Linux Platform 			
Unit	Topics	No of Lectures	
I	<p>Linux OS Basics: History, Various Linux Distributions, Unix/Linux OS architecture, Features of Unix/Linux, Use of Linux OS.</p> <p>Basics of Shell: Starting the shell, Shell prompt, Command structure, File Systems and Directory Structure, man pages, more documentation pages</p> <p>Basic Bash shell commands: General purpose utility Commands, Basic commands</p> <p>Files Handling in Linux: Type of files in Linux and its file commands, File handling commands like create file/directory, File Content Commands, Linux I/O Redirection</p> <p>Advanced Bash shell commands: Simple Filters Commands, Filters using regular expressions.</p> <p>Linux environment variable: Default shell environment variables, Using command aliases</p>	15	
II	<p>Linux File Security: Types of file ownership, changing ownership of files, Different file Permission, Changing file permission, Working with types of Files Hardlink and Softlink</p> <p>Linux Security: Understanding Linux Security, Linux Administrator its role and responsibility, uses of root, sudo command, working with passwords</p> <p>Working with Editors: vi editor</p> <p>Basic Shell scripting: Using multiple commands, creating script files and executing script files, displaying messages, using variables, basic arithmetic operators, Exiting the script.</p> <p>Using structured commands: Working with if-then, if-then-else and nested if statements, test command, Compound condition testing, while command, until command, case command.</p>	15	
Textbooks:			

- “Linux Command line and Shell Scripting Bible”, Richard Blum, Wiley India.
- “UNIX: Concepts and Applications”, Sumitabha Das, 4th Edition, McGraw Hill.
- “Official Ubuntu Book”, Matthew Helmke & Elizabeth K. Joseph with Jose Antonio Rey and Philips Ballew, 8th Ed.

Additional References:

- “Linux Administration: A Beginner's Guide”, Fifth Edition, Wale Soyinka, Tata McGraw-Hill, 2008.
- “Linux: Complete Reference”, Richard Petersen, 6th Edition, Tata McGraw-Hill

SEMESTER- II

Course Code	MAJOR SEM – II	Credits	Lectures /Week
24ITMJ211	Paper I - Object Oriented Programming with C++	2	2
Course Outcomes:			
After successful completion of this course, students would be able to			
<ul style="list-style-type: none"> ● To recall the basic programming principles ● Be able to explain the difference between object oriented programming and procedural programming. ● Be able to build C++ classes using appropriate encapsulation and design principles ● Be able to program using more advanced C++ features such as composition of objects, operator overloads, dynamic memory allocation, inheritance and polymorphism, file I/O, exception handling, etc. 			
Unit			
Topics		No of Lectures	
I	<p>INTRODUCTION OF OBJECT-ORIENTED CONCEPTS: Introduction, Objects, Class and Instance, Polymorphism, Inheritance, Object-Oriented Analysis, Finding the Objects, Object-Oriented Programming, Object-Oriented Design, Object-Oriented Analysis, Elements of Object Model, Grady Booch Approach.</p> <p>STARTING WITH C++: C++ Overview, C++ Character Set, C++ Tokens, Variables, Counting Tokens, Data Types, Qualifiers, Range of Data Types, Your First C++ Program, Structure of a C++ Program, Styles of, Writing C++ Programs, Programming Examples</p> <p>FEATURES OF C++: Introduction, Operators and Expressions, Declaring Constants, Type Conversion, Decision Making: An Introduction, Unconditional Branching Using Goto, Introduction to Looping</p> <p>OPERATORS AND REFERENCES IN C++: Introduction, Scope Resolution Operator, Reference Variables, The Bool Data Type, The Operator New and Delete, Malloc Vs. New, Pointer Member Operators</p> <p>FUNCTION IN C++: Introduction, Function, Declaration/Prototyping,,The Main Function in C++,Recursion, Call by Reference, Call by Reference Vs Call by Address, Return by Reference, Inline Function, Function Overloading, Function with Default Arguments,Virtual Functions</p>	15	

II	<p>CLASS AND OBJECTS IN C++: Working with Class, Structure in C++, Accessing Private Data Passing and Returning Object, Array of Object, Friend Function, Static Class Members, Constant Member Function</p> <p>WORKING WITH CONSTRUCTOR AND DESTRUCTOR: Introduction, Constructor with Parameters, Implicit and Explicit Call to Constructor, Copy Constructor, Dynamic Initialization of Objects, Dynamic Constructor, Destructor.</p> <p>WORKING WITH OPERATOR OVERLOADING: Introduction, Operator Overloading with Binary Operator Overloading Assignment (=) Operator, Overloading Unary Operators, Overloading Using Friend Function, Rules of Operator Overloading, Type Conversion</p> <p>WORKING WITH INHERITANCE IN C++: Introduction, Types of Inheritance, Public, Private and Protected Inheritance, Multiple Inheritance, Hierarchical Inheritance, Virtual Base Class, Constructor and Destructor in Inheritance.</p>	15
<p>Textbooks:</p> <ul style="list-style-type: none"> ● Object-oriented Programming C++ Simplified, Hari Mohan Pandey, University Science Press, 1st Edition 2017 ● Object Oriented Programming in C++, E Balagurusamy, Tata McGraw- Hill, 5th Edition 2011 ● Object-Oriented Programming in C++, Robert Lafore, Sams, 4th Edition 2002 ● Programming with ANSI C++, Bhushan Trivedi, Oxford University Press, 2nd Edition <p>Additional References:</p> <ul style="list-style-type: none"> ● Demystified Object- Oriented Programming with C++, Dorothy R. Kirk, Packt Publishing Lt, 1st Edition 2021 ● C++ Programming: An Object-Oriented Approach, Behrouz A. Forouzan , Richard F. Gilberg, McGraw-Hill Education, 1st edition 2020 ● C++ How to Program, Paul Deitel, Harvey Deitel, Pearson Education, 10th Edition 2017 		

Course Code	MAJOR SEM – II	Credits	Lectures/ Week
24ITMJ212	Paper II- Data Structures	2	2
Course Outcomes:			
After successful completion of this course, students would be able to			
<ul style="list-style-type: none"> • Describe and understand elementary data structures such as stack, queue, linked list, tree • Understand the various concepts for developing algorithmic solutions • Design, use and write programs for elementary data structures such as stack, queue, linked list, tree • Illustrate the use of different data structures on different types of problems. 			
Unit	Topics	No of Lectures	
I	<p>Introduction: Data and Information, Data Structure, Classification of Data Structures, Primitive Data Types, Abstract Data Types</p> <p>Simple Data Structures: Array: Introduction, One Dimensional Array, Memory Representation of One Dimensional Array, Multi-dimensional Arrays, Memory Representation of Two Dimensional Arrays, Advantages and Limitations of Arrays. Stack: Introduction, Operations on the Stack, Memory Representation of Stack, Array Representation of Stack, Evaluation of postfix expression, Recursion. Queue: Introduction, Operations on the Queue, Memory Representation of Queue, Array representation of Queue, Circular Queue. Basic Sorting Techniques - Bubble, Selection, Insertion and Merge Sort and their comparative analysis. Searching Techniques - Linear Search, Binary Search and their comparative analysis.</p>	15	
II	<p>Linked List, singly Linked List, Traversal of Linked List, Searching, Memory Allocation and De-allocation, Insertion in Linked List, Deletion from Linked List, Circular Linked List, Doubly Linked List, Traversal, Search, Insert and Delete in a doubly Linked List, Implementing other Data Structures.</p> <p>Trees: Tree terminologies, Binary Tree, Properties of Binary Tree, Memory Representations of Binary Tree, Binary Tree traversals, Binary Search Tree, Operations on Binary Search Tree.</p>	15	
Textbooks:			

- Schaum's Outlines Data structure Seymour Lipschutz Tata McGraw Hill 2 nd 2005
- Data structure – A Pseudocode Approach with C AM Tanenbaum, Y Langsam and MJ Augustein Prentice Hall India 2 nd 2006

Additional References:

- A Simplified Approach to Data Structures Lalit Goyal, Vishal Goyal, Pawan Kumar SPD 1 st 2014
- An Introduction to Data Structure with Applications Jean – Paul Tremblay and Paul Sorenson Tata MacGraw Hill 2 nd 2007
- Data Structure and Algorithm Maria Rukadikar SPD 1 st 2017

Course Code	MAJOR SEM-II Practicals	Credits	Lectures / week
24ITMJP21	IT Practical 2 (Part A+B)	2	4

PART-A Object Oriented Programming with C++

Course Objectives:

- The student should be able to explain the important characteristics of the C++ programming language.
- The learner must be able to combine components of the C++ programming language to develop structured programs.
- The student must demonstrate the skills essential to compile, debug, and test C++ programs correctly.

1a.	Write a C++ program to create a simple calculator.
b.	Write a C++ program to convert seconds into hours, minutes and seconds.
c.	Write a C++ program to find the volume of a square, cone, and rectangle.
2a.	Write a C++ program to find the greatest of three numbers.
b.	Write a C++ program to find the sum of even and odd n natural numbers
c.	Write a C++ program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
3a.	Write a C++ program using classes and object Student to print name of the student, roll_no. Display the same.
b.	Write a C++ program for Structure bank employee to print name of the employee, account_no. & balance. Display the same also display the balance after withdraw and deposit
4a.	Write a Program to find Maximum out of Two Numbers using friend function. Note: Here one number is a member of one class and the other number is member of some other class.
b.	Write a C++ Program using copy constructor to copy data of an object to another object.
5a.	Write a C++ program to overload new/delete operators in a class.
b.	Write a C++ program to access members of a STUDENT class using pointer to object members
6	Write a C++ Program that illustrates the different types of inheritance.
7	Write a C++ Program to design a student class representing student roll no. and a test class (derived class of student) representing the scores of the student in various subjects and sports class representing the score in sports. The sports and test class should be

	inherited by a result class having the functionality to add the scores and display the final result for a student.
8	Write a C++ program to maintain the records of person with details (Name and Age) and find the eldest among them. The program must use this pointer to return the result.
9	Write a C++ program illustrating the use of virtual functions in class.
10	Write a C++ program to design a class representing the information regarding digital library (books, tape: book & tape should be separate classes having the base class as media). The class should have the functionality for adding new item, issuing, deposit etc. the program should use the runtime polymorphism.

Part B- Data Structures Practicals

Course Outcomes:

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

- List the errors and warnings for the given input.
- Explain and demonstrate the execution process of the programs.
- Solve the problems based on each algorithm.
- Write modularized program code for implementing various operating system algorithms and integrate them.

Data structures – Practical

1	Writing simple programs using one dimensional and two dimensional array
2	Write a program to implement a stack
3	Write a program to evaluate a postfix expression
4	Write a program to implement a linear queue
5	Write a program to implement a circular queue
6	Write a program to perform linear search and binary search on the given elements.
7	Write a program to implement different sorting techniques such as insertion, bubble, merge and selection sort
8	Write a program to implement a singly linked list
9	Write a program to implement a doubly linked list
10	Write a program to create and traverse a binary search tree

Course Code	MINOR SEM – II	Credits	Lectures /Week
24ITMR221	Paper I- Fundamentals of Mathematics	2	2
Course Outcomes: After successful completion of this course, students would be able to <ul style="list-style-type: none"> • Describe the basic concepts of sets, permutations, relations, graphs, trees • Understand sets and perform operations and algebra on set • Apply the concepts of graphs to solve various problems in day to day life. • Illustrate 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 Representatives 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 its corollaries. Types of graph, Complete graph, bipartite graph, Regular graph, Null graph. Isomorphism of graphs, Adjacency and Incidence Matrix of a Graph.,Kruskals Algorithm, Prims algorithm,Dijkstras Algorithm,Trees and traversing	15	

Textbooks:

- 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
24ITOE231	Paper I– Decision Making using Information Technology	2	2
Course Outcomes:			
After successful completion of this course, students would be able to			
<ul style="list-style-type: none"> • Understand various corporate decision-makings using IT systems • Infer how technology supports business decision making • Describe emerging technologies like ERP, CRM, SCM and trends in enterprise applications • Differentiate and identify the several database management and data warehouse approaches. 			
Unit			
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	
Textbooks:			
1. Information Technology for Management, 6TH ED (With CD) By Efraim Turban, Dorothy Leidner, Ephraim Mclean, James Wetherbe Database System concepts by by Abraham Silberschatz , Henry F. Korth , S. Sudarshan.			

Course Code	OPEN ELECTIVE SEM – II	Credits	Lectures /Week
24ITOE232	Paper II- E-Commerce	2	2
Course Outcomes:			
After successful completion of this course, students would be able to			
<ul style="list-style-type: none"> • To know how the business is carried out through electronic media • To understand the types and ways of doing business over internet • To apply the knowledge after becoming a professional or an entrepreneur • To analyze the security concerns while transacting using electronic media 			
Unit			
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
Textbooks:			
<ul style="list-style-type: none"> • Electronic Commerce: A Managerial Perspective, Turban, E. et al., Prentice Hall-2008. • Frontiers of e-commerce, Ravi Kalakota, Pearson. 			
Additional References:			
<ul style="list-style-type: none"> • Electronic Business and Electronic Commerce Management, 2nd edition, Dave Chaffey, Prentice Hall, 2006 • e-Learning Tools and Technologies, Horton and Horton, Wiley Publishing 			

Course Code	VOCATIONAL SKILL COURSE SEM – II	Credits	Lectures /Week
24ITVC241	Paper I- Advanced Web Programming	2	2
Course Outcomes:			
After successful completion of this course, students would be able to			
<ul style="list-style-type: none"> ● Describe the fundamental concepts of .NET web programming, including ASP.NET, C# and .NET framework ● Summarize the concepts of server-side programming with C# and how it interacts with the web interface. ● Develop web applications using ASP.NET, C# and the .NET framework. ● Evaluate the performance and scalability of a .NET web application. 			
Unit			
Topics		No of Lectures	
I	<p>JavaScript:Introduction, Difference between Client-side and Server-side Scripting, JavaScript Variables and Constants, Data Types, JavaScript Operators, Comments, Functions, JavaScript Objects, Dialog Boxes</p> <p>Statements:Conditional Statements – if else, switch, Loops – while, do while, for, for in, for of, Loop Control – break, continue, labels</p> <p>JavaScript Objects: User-defined Objects, with Keyword, Native Objects – Array, String, Date, Math, Number, RegExp</p> <p>Events and Event Handlers: HTML Events, DOM Events, DOM Event Listeners</p> <p>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.</p> <p>Advanced PHP: PHP Sessions, PHP Cookies, Validating and Sanitizing Data with PHP Filters, PHP mail function.</p> <p>MySQL:Why MySQL? Connect to MySQL, Creating Database and Tables, Selecting Data, Updating Data, Deleting Data, Limiting Data.</p>	15	

II	<p>Introducing .NET: Introduction to .NET, .NET Framework and its architecture, Overview to C#, The Common Language Runtime, The .NET Class Library.</p> <p>The C# Language: C# Language Basics, Variables and Data Types, Object-Based Manipulation, Conditional Logic, Loops, Methods.</p> <p>Types, Objects, and Namespaces: The Basics About Classes, Building a Basic Class, Value Types and Reference Types, Understanding Namespaces and Assemblies, Advanced Class Programming.</p> <p>Web Form Fundamentals: Writing Code, Adding Event Handlers, Understanding the Anatomy of an ASP.NET Application, Introducing Server Controls, Using the Page Class, Using Application Events, Configuring an ASP.NET Application.</p> <p>Form Controls: Stepping Up to Web Controls, Web Control Classes, List Controls, AutoPostBack, Validation Controls, Rich Controls, The Calendar, The AdRotator, Multiview Control, User Controls and Graphics, Website Navigation: Site Maps, The SiteMapPath Control, The TreeView Control, The Menu Control.</p>	15
<p>Textbooks:</p> <ul style="list-style-type: none"> • Beginning ASP.NET 4.5 in C#, Matthew MacDonald Apress 2012, • C# 2015 Anne Bohem and Joel Murach, Murach Third Edition, 2016 • Murach’s ASP.NET 4.6 Web Programming in C#2015, Mary Delamater and Anne Bohem, SPD Sixth Edition, 2016 <p>Additional References:</p> <ul style="list-style-type: none"> • ASP.NET 4.0 programming, J. Kanjilal, Tata McGraw-Hill, 2011 • Programming ASP.NET, D.Esposito, Microsoft Press (Dreamtech), 2011 • Beginning Visual C# 2010, K. Watson, C. Nagel, J.H Padderson, J.D., Reid, M.Skinner, Wrox (Wiley), 2010 		

Course Code	SKILL ENHANCEMENT COURSE SEM – II	Credits	Lectures /Week
24ITSC251	Paper I - Python Programming	2	2
<p>Course Outcomes:</p> <p>After successful completion of this course, students would be able to</p> <ul style="list-style-type: none"> • Learn python programming language basics and define its concept • Understand the data types and represent it in various ways • Demonstrate different programs using python language • Integrate MySQL database to python programming language 			
Unit	Topics	No of Lectures	
I	<p>Introduction: The Python Programming Language, History, features, Installing Python, Running Python program, Debugging : Syntax Errors, Runtime Errors, Semantic Errors, Experimental Debugging, Formal and Natural Languages, The Difference Between Brackets, Braces, and Parentheses, Variables and Expressions Values and Types, Variables, Variable Names and Keywords, Type conversion, Operators and Operands, Expressions, Interactive Mode and Script Mode, Order of Operations.</p> <p>Conditional Statements: if, if-else, nested if –else Looping: for, while, nested loops Control statements: Terminating loops, skipping specific conditions</p> <p>Functions: Function Calls, Type Conversion Functions, Math Functions, Composition, Adding New Functions, Definitions and Uses, Flow of Execution, Parameters and Arguments, Variables and Parameters Are Local, Stack Diagrams, Fruitful Functions and Void Functions, Why Functions? Importing with from, Return Values, Incremental Development, Composition, Boolean Functions, More Recursion, Leap of Faith, Checking Types</p>	15	
II	<p>Strings: A String Is a Sequence, Traversal with a for Loop, String Slices, Strings Are Immutable, Searching, Looping and Counting, String Methods, The in Operator, String Comparison, String Operations.</p>	15	

	<p>Lists: Values and Accessing Elements, Lists are mutable, traversing a List, Deleting elements from List, Built-in List Operators, Concatenation, Repetition, In Operator, Built-in List functions and methods</p> <p>Tuples and Dictionaries: Tuples, Accessing values in Tuples, Tuple Assignment, Tuples as return values, Variable-length argument tuples, Basic tuples operations, Concatenation, Repetition, in Operator, Iteration, Built-in Tuple Functions Creating a Dictionary, Accessing Values in a dictionary, Updating Dictionary, Deleting Elements from Dictionary, Properties of Dictionary keys, Operations in Dictionary, Built-In Dictionary Functions, Built-in Dictionary Methods</p> <p>Files: Text Files, The File Object Attributes, Directories</p> <p>Exceptions: Built-in Exceptions, Handling Exceptions, Exception with Arguments, User-defined Exceptions</p> <p>Regular Expressions – Concept of regular expression, various types of regular expressions, using match function.</p>	
<p>Textbooks:</p> <ul style="list-style-type: none"> ● Python Basics: A Practical Introduction to Python ● Programming with Python ● Think python 2nd Edition <p>Additional References:</p> <ul style="list-style-type: none"> ● A Python Book: Beginning Python, Advanced Python, and Python 		

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.

<u>Question</u>	<u>Based on</u>	<u>Marks</u>
<u>Q.1</u>	<u>Unit I</u>	<u>15</u>
<u>Q.2</u>	<u>Unit II</u>	<u>15</u>

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

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

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