

A decorative graphic on the left side of the page consists of a 4x2 grid of squares. The top-left square is light red, the top-right is dark red, the middle-left is light blue, and the middle-right is dark red. The bottom row consists of two grey squares. The background of the entire page is a light red gradient.

MCA Syllabus

Faculty of Management

Savitribai Phule Pune University

7	<p>Two Servers are mandatory [One Linux server & One Windows server]</p> <ul style="list-style-type: none"> • Windows Server : Microsoft Windows Server for 20 users for intake of 60 students • Linux Server : Fedora/Ubuntu
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Note: Institutes may use any other alternate open source software.

Hardware Requirements:		
Desktop Computers :	Processor: Dual Core or above	RAM: Min. 2 GB or Above
Server :	Processor: Xeon/equivalent AMD or above	RAM: Min 8 GB or above

SEMESTER I				
Sr. No.	Subject Code	Subject Title	Internal	External
1	IT11	Problem Solving using C++	30	70
<p>Course Objective:</p> <ol style="list-style-type: none"> 1. To learn advanced features of the C++ programming language as a continuation of the previous course. 2. To learn the characteristics of an object - oriented programming language: data abstraction and information hiding, inheritance, and dynamic binding of the messages to the methods. 3. To learn the basic principles of object-oriented design and software engineering in terms of software reuse and managing complexity. 4. To enhance problem solving and programming skills in C++ with extensive programming projects. <p>Course Outcome:</p> <p>After the completion of this course, a successful student will be able to do the following:</p> <ol style="list-style-type: none"> 1. Use the characteristics of an object-oriented programming language in a program. 2. Use the basic object-oriented design principles in computer problem solving. 3. Use the basic principles of software engineering in managing complex software project. 4. Program with advanced features of the C++ programming language. 5. Develop programs in the UNIX/Linux programming environment. 				
Sr. No	Topic Details		% Weightage	No. of Sessions

1	<p>1. Introduction to Computers and C++ Programming</p> <p>1.1 COMPUTER SYSTEMS Hardware, Software High-Level Languages, Compilers, History Note</p> <p>1.2 PROGRAMMING AND PROBLEM-SOLVING Algorithms, Program Design Object-Oriented Programming The Software Life Cycle</p> <p>1.3 INTRODUCTION TO C++ Origins of the C++ Language, A Sample C++ Program</p> <p>1.4 TESTING AND DEBUGGING Kinds of Program Errors</p>	4	2
2	<p>2 C++ Basics</p> <p>2.1 VARIABLES AND ASSIGNMENTS Variables, Identifiers, Variable Declarations Assignment Statements</p> <p>2.2 INPUT AND OUTPUT Output Using cout, Include Directives and Namespaces Escape Sequences</p> <p>2.3 DATA TYPES AND EXPRESSIONS The Types int, double, char, bool C++11 Types Type Compatibilities Arithmetic Operators and Expressions</p> <p>2.4 PROGRAM STYLE Indenting, Comments, Naming Constants</p>	6	2
3	<p>3 More Flow of Control</p> <p>3.1 USING BOOLEAN EXPRESSIONS Relational operators, Logical operators, Bitwise operators Evaluating Boolean Expressions</p> <p>3.2 MULTIWAY BRANCHES If – else Statement, Nested Statements Multiway if-else Statements The switch Statement</p> <p>3.3 MORE ABOUT C++ LOOP STATEMENTS The while Statements Increment and Decrement Operators The for Statement The break Statement, The continue Statement, Nested loop</p>	6	3
4	<p>4 Functions</p> <p>4.1 PREDEFINED FUNCTIONS Using Predefined Functions, Random Number Generation Type Casting Older Form of Type Casting</p>	8	3

	<p>4.2 PROGRAMMER-DEFINED FUNCTIONS Function Definitions, Functions That Return a Value</p> <p>4.3 STORAGE CLASSES auto, register, static, extern</p> <p>4.4 OVERLOADING FUNCTIONNAMES</p> <p>4.5 CALL-BY-REFERENCE PARAMETERS A First View of Call-by-Reference, Call-by-Reference in Detail</p> <p>4.6 RECURSION Recursive Design Techniques Direct and indirect recursion</p>		
6	<p>6 Arrays and Strings</p> <p>6.1 INTRODUCTION TO ARRAYS Declaring and Referencing Arrays Use for Loops with Arrays Arrays in Memory</p> <p>6.2 ARRAYS IN FUNCTIONS Indexed Variables as Function Arguments Entire Arrays as Function Arguments Functions That Return an Array</p> <p>6.3 MULTIDIMENSIONAL ARRAYS Multidimensional Array Basics Multidimensional Array Parameters</p> <p>6.4 AN ARRAY TYPE FOR STRINGS C-String Values and C-String Variables Other Functions in <cstring></p> <p>6.5 THE STANDARD string CLASS Introduction to the Standard Class string I/O with the Class string</p>	8	4
7	<p>7 Pointers and Dynamic Arrays</p> <p>7.1 POINTERS Pointer Variables, Pointer Arithmetic Basic Memory Management Dangling Pointers</p> <p>7.2 DYNAMIC ARRAYS Creating and Using Dynamic Arrays Multidimensional Dynamic Arrays</p>	5	2
8	<p>8 Classes and Objects</p> <p>8.1 STRUCTURES AND UNION Structures/Unions for Diverse Data Structures/Unions as Function Arguments Use Hierarchical Structures</p> <p>8.2 CLASSES Defining Classes and Member Functions Public and Private Members</p>	8	3

	<p>Constructors and Destructors</p> <p>Overloaded Constructors</p> <p>8.3 ABSTRACT DATA TYPES</p> <p>Classes to Produce Abstract Data Types</p>		
9	<p>9 Friends, Overloaded Operators, and Arrays in Classes</p> <p>9.1 FRIEND FUNCTIONS</p> <p>Need of Friend Function</p> <p>9.2 OVERLOADING OPERATORS</p> <p>Overloading Operators</p> <p>Constructors for Automatic Type Conversion</p> <p>Overloading Unary Operators</p> <p>Overloading Binary Operators</p> <p>Overloading >>, <<, [], ()</p> <p>9.3 ARRAYS AND CLASSES</p> <p>Arrays of Classes</p> <p>Arrays as Class Members</p> <p>9.4 DATA CONVERSION</p> <p>Conversions between Basic Types</p> <p>Conversions between Objects and Basic Types</p> <p>Conversions between Objects of Different Classes</p> <p>Conversions: When to Use What.</p>	12	5
10	<p>10 Inheritance</p> <p>10.1 INHERITANCE BASICS</p> <p>Derived Classes</p> <p>Constructors in Derived Classes</p> <p>The protected Qualifier</p> <p>Redefinition of Member Functions</p> <p>Redefining Versus Overloading</p> <p>Access to a Redefined Base Function</p> <p>10.2 INHERITANCE DETAILS</p> <p>Functions That Are Not Inherited</p> <p>Assignment Operators and Copy Constructors in Derived Classes</p> <p>Destructors in Derived Classes</p> <p>10.3 POLYMORPHISM</p> <p>Late Binding</p> <p>Virtual Functions in C++</p> <p>Virtual Functions and Extended Type Compatibility</p>	12	4
11	<p>11 Separate Compilation and Namespaces</p> <p>11.1 NAMESPACES</p> <p>Namespaces and using Directives</p> <p>Creating a Namespace</p> <p>Qualifying Names</p> <p>Unnamed Namespaces</p>	2	1

12	<p>12 Exception Handling</p> <p>12.1 EXCEPTION - HANDLING BASICS</p> <p>Defining Your Own Exception Classes</p> <p>Multiple Throws and Catches</p> <p>Throwing an Exception in a Function</p> <p>12.2 PROGRAMMING TECHNIQUES FOR EXCEPTION HANDLING</p> <p>When to Throw an Exception</p> <p>Uncaught Exceptions</p> <p>Nested try-catch Blocks</p> <p>Exception Class Hierarchies</p> <p>Rethrowing an Exception</p>	5	2
13	<p>13 I/O Streams</p> <p>13.1 STREAMS AND BASIC FILE I/O</p> <p>Why Use Files for I/O?, File I/O</p> <p>Stream Classe, Stream Errors</p> <p>13.2 TOOLS FOR STREAM I/O</p> <p>Formatting Output with Stream Functions</p> <p>Manipulators</p> <p>Streams as Arguments to Functions</p> <p>13.3 CHARACTER I/O</p> <p>The Member Functions get and put</p> <p>The putback Member</p> <p>13.4 FILE PONTERS</p> <p>Specifying the Position, Specifying the Offset</p> <p>Random access file</p>	10	3
14	<p>14 Templates</p> <p>14.1 TEMPLATES FOR ALGORITHM ABSTRACTION</p> <p>How to Define Templates</p> <p>Templates for Functions</p> <p>14.2 TEMPLATES FOR DATA ABSTRACTION</p> <p>Syntax for Class Templates</p>	6	2
15	<p>15 Standard Template Library</p> <p>15.1 ITERATORS</p> <p>Using Declarations, Iterator Basics, Kinds of Iterators</p> <p>Constant and Mutable Iterators, Reverse Iterators</p> <p>Other Kinds of Iterators</p> <p>15.2 CONTAINERS</p> <p>Sequential Containers</p> <p>Container Adapters – stack, and queue</p> <p>Associative Containers - set and map</p> <p>15.3 GENERIC ALGORITHMS</p> <p>Nonmodifying Sequence Algorithms</p> <p>Container Modifying Algorithms</p> <p>Set Algorithms, Sorting Algorithms</p>	8	4

Referance Book

- 1) Programming with ANSI C++ Bhushan Trivedi, Oxford University Press
- 2) Sams Teach Yourself C++ in One Hour a Day (8th Edition) - Siddhartha Rao
- 3) C++: A Beginner's Guide, Second Edition - Herbert Schildt
- 4) Accelerated C++: Practical Programming by Example - Andrew Koenig, Barbara E. Moo
- 5) Object-Oriented Programming in C++, 4th Edition - Robert Lafore

SEMESTER I					
Sr. No.	Subject Code	Subject Title	Internal	External	
1	IT12	Software Engineering using UML	30	70	
<p><u>Course Objectives:</u></p> <ol style="list-style-type: none"> 1. To study basic concepts of software engineering 2. To study phases of SDLC and different process models 3. Students learn & understand the Requirement analysis and system Design. 4. Students get acquainted with the agile software development methodology <p><u>Course Outcome:</u></p> <p>Student will able to</p> <p>CO1: Distinguish different process model for a software development. (Understanding)</p> <p>CO2: Design software requirements specification solution for a given problem definitions of a software system.(Application)</p> <p>CO3: Apply software engineering analysis/design knowledge to suggest solutions for simulated problem</p> <p>CO4: Recognize and describe current trends in the area of software engineering</p>					
Sr. No	Topic Details		% Weightage	No. of Sessions	Reference Books
1	1. Introduction to development approach SSAD and OOAD 1.1. Overview of Software Development with SSAD 1.1.1. Basic System Development Life Cycle with different users and their role in SDLC.		10	5	1,2,3, 4,14

	<p>1.1.2. Different Approaches and Models for System Development.</p> <p>1.1.2.1. Waterfall Model</p> <p>1.1.2.2. Spiral Model</p> <p>1.1.2.3. Prototyping Model</p> <p>1.1.2.4. RAD</p> <p>1.1.2.5. Rational Unified Process</p>			
2	<p>2. Requirement Engineering</p> <p>2.1. Types of Requirements – Functional and Nonfunctional</p> <p>2.2. Four Phases of Requirement Engineering</p> <p>2.3. Software requirement Specification (SRS)</p> <p>2.3.1. Structure and contents of SRS</p> <p>2.3.2. IEEE standard format for SRS</p> <p>Case studies should be covered on the above topic</p>	20	8	1,3, 10,13
3	<p>3. Use-case Driven Object oriented Analysis</p> <p>3.1. Introduction to oops concepts</p> <p>3.1.1. Class and object</p> <p>3.1.2. Abstraction and encapsulation</p> <p>3.1.3. Method and messages</p> <p>3.1.4. Interface, Inheritance and polymorphism</p> <p>3.1.5. Structural Diagram - Class Diagram and Object diagram</p> <p>3.1.6. Associations and links</p> <p>3.1.7. Aggregation , Composition and containment</p> <p>3.1.8. Inheritance, Sub Types and IS-A hierarchy</p> <p>3.2. Behavioral Diagram</p> <p>3.2.1. Use case Diagram</p> <p>3.2.1.1. Identify Actors</p> <p>3.2.1.2. Identify Use cases: describing how the user will use the system</p> <p>3.2.1.3. Develop use-case Model</p> <p>3.2.1.4. Description of Use case Diagram.</p> <p>3.2.2. Activity Diagram</p> <p>3.2.3. Sequence diagram</p> <p>3.2.4. Collaboration Diagram.</p> <p>3.2.5. State Transition Diagram</p> <p>Case studies should be covered on the above topic</p>	40	18	5,6,7,8,11,12,13,14,15,16

4	4. User Interface Design 4.1. Elements of good design 4.2. Eight golden rules for design 4.3. Features of modern GUI, Menus, Scroll bars, windows, buttons, icons, panels, error messages etc. Case studies should be covered on the above topic	10	6	1,13
5	5. Current trends in Software Engineering 5.1. Introduction to Web Engineering 5.2. Agile Process 5.2.1. Agile Process Models 5.2.1.1. Extreme Programming(XP) 5.2.1.2. Adaptive Software Development (ASD) 5.2.1.3. Dynamic Systems Development Method (DSDM) 5.2.1.4. Scrum 5.2.1.5. Crystal 5.2.1.6. Feature Driven Development(FDD)	20	8	1,9,13

Reference Books:

1. **Software Engineering by Roger Pressman (6th edition)**
2. **Object-Oriented Software Engineering: A Use Case Driven Approach by Ivan Jacobson**
3. **Software Engineering by Sommerville, Pearson, 8th Ed**
4. **Analysis & Design of Information System James Senn, TMH, 2nd Ed**
5. **Object Oriented System Development - Ali Bahrami McGRAW-HILL International Edition**
6. **Object-Oriented Software Engineering - Ivar Jacobson Pearson Education INC**
7. **UML Instant – Thomas A Pendar – Wiley Publication**
8. **UML in Nutshell ,O’reilly Pub**
9. **Agile Software Engineering with visual studio by Sam Guckenheimer, Neno Loje.**
10. **Software Requirements by Karl Wiegers**
11. **Object Oriented Modeling and Design with UML by James Rumbaugh, Michael Blaha**
12. **Object Oriented Systems and Techniques with UML & Java by Udit Agarwal**
13. **Software Engineering by Chandramouli Subramanian, Saikat Dutt**
14. **Object Oriented systems Analysis and Design using UML by Simon Bennett**
15. **UML 2 Bible by Tom Pender**
16. **The Unified Modeling Language user guide by Grady Booch, James Rumbaugh, Ivar Jacobson**

Tutorials should be taken based on following topics

1. Case studies for writing SRS
2. Examples on Use case diagram
3. Examples on Class diagram

4. Examples on Object diagram
5. Examples on Sequence diagram
6. Examples on Collaboration diagram
7. Examples on designing input/output screen layout

Sr. No.	Subject Code	Subject Title	Internal	External
3	IT13	Database Management System	30	70
Course Objectives	<ol style="list-style-type: none"> 1. Identify structure of database system using data models and ER models 2. Demonstrate SQL , XML schema 3. Provide database design approaches with normalization 4. Define and discuss transaction management and concurrency control 			
Course Outcomes	<p>CO1: Describe the basic concepts of DBMS and various databases used in real applications.</p> <p>CO2: Design relational database using E-R model and normalization</p> <p>CO3: Demonstrate nonprocedural structural query languages for various database applications</p> <p>CO4: Apply concepts of Object Based Database, XML database and non-relational databases.</p> <p>CO5: Explain transaction management and recovery management for real applications</p>			
Sr. No.	Topic Details		Weightage (%)	No. of Sessions
1	<p>Basic concepts</p> <p>1.1 Introduction</p> <p>1.2 Database and Need for DBMS,</p> <p>1.3 Characteristics, Users, Views, schema,</p> <p>1.4 3-tier architecture,</p> <p>1.5 Introduction of Parallel, Distributed Databases, Mobile databases and Cloud databases.</p> <p>1.6 Models (Relational model, Object Models)</p> <p>1.7 Advantages and disadvantages of each model.</p>		10	5
2	<p>Data Modeling and Relational Database Design</p> <p>2.1 Entities-attributes,</p> <p>2.2 Relationship</p> <p>2.3 Attributes, relationship set, Keys,</p>		25	10

	<p>2.4 Codd's rules,</p> <p>2.5 Generalization, aggregation, ER diagrams,</p> <p>2.6 Normalization (1 NF, 2 NF, 3 NF, BCNF),</p> <p>2.7 Introduction to SQL, DDL, DML Queries.</p>		
3	<p>Specialty databases and applications</p> <p>3.1 Obstacles using Relational Data Model & Emergence of Special Databases</p> <p>3.2 Object Oriented Databases (OODBMS)</p> <p>3.2.1 Feature</p> <p>3.2.2 Advantages of OODBMS Architecture</p> <p>3.2.3 ODL,OQL</p> <p>3.2.4 OODBMS Vs RDBMS</p> <p>3.2.4 Object Relational Database, Schema, Mapping</p> <p>3.2.5 OODBMS Vs ORDBMS</p> <p>3.3 XML</p> <p>3.3.1 Structure of XML Data</p> <p>3.3.2 XML Document Schema</p> <p>3.3.3 Querying and Transformation</p> <p>3.3.4 Application Program Interfaces to XML</p> <p>3.3.5 Storage of XML Data</p> <p>3.3.6 XML Applications</p>	15	7
4	<p>Transaction processing and Concurrency</p> <p>4.1 Concept of transaction processing, ACID properties, States of transaction</p> <p>4.2 Serializability and testing for serializability</p> <p>4.3 Concurrency control, schemes</p> <p>4.4 Locking techniques</p> <p>4.5 Timestamp based protocols</p>	25	9

	4.6 Granularity of data items 4.7 Deadlocks		
5	Recovery Systems and Backup 5.1 Failure classifications 5.2 Recovery & Atomicity 5.3 Log base recovery 5.4 Recovery with concurrent transactions 5.5 Failure with loss of non-volatile storage 5.6 Database backup & recovery from catastrophic failure 5.7 Remote backup system	23	7
6	No SQL Database 6.1 Introduction ,Need& Advantages 6.2 Types of No SQL Database 6.3 No SQL database vs RDBMS	2	2

Reference Books:

1. Introduction to database systems C.J.Date, Pearson.
2. Database system concept Korth, TMH,5th Ed.
3. Principles of Database Management James Martin, PHI.
4. Engineering MIS for Strategic Business Processes ArpitaGopal Excel Books
5. Fundamentals of Database SysemsElmasriNavathe, Pearson,5th ed.
6. Object-oriented modeling and design Rumbaugh and Blaha, PHI.
7. Object-oriented analysis and design Grady Booch,Pearson,3rd Ed.
8. Database Management Systems Bipin Desai, Galgotia Pub.
9. Database system practical Approach to design, implementation & management Connoly& Begg,Pearson,4th Ed.
10. Database Management systems Ramakrishnan&Gehrke, McGraw-Hill,3rd Ed.
11. NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence Martin Fowler

Sr. No.	Subject Code	Subject Title	Internal	External
1	IT14	Essential of Operating System	30	70

Course Objectives:

1. To learn the fundamentals of Operating Systems and handle processes and threads and their communication
2. To learn the mechanisms involved in memory management in contemporary OS
3. To know the functionality of Multiprocessor OS and Mobile OS.
4. To gain knowledge on distributed operating system concepts.
5. To learn about Basics of Linux.
6. To learn programmatically to implement Linux OS mechanisms
7. To know about Basic Administration of Linux

Course Outcome:

Student will able to

CO1: Analyze the overview, structure of OS and process management and synchronization.

CO2: Analyze and design Memory Management.

CO3: Analyze the various OS like Multiprocessor OS and Mobile OS

CO4: Interpret the mechanisms adopted for file sharing in distributed Applications

CO5: Know about current Linux Distributions-Distros examples and environment.

CO6: Conceptualize the components and can do Shell Programming.

CO7: Know Basic Linux System Administration and Kernel Administration.

Sr. No	Topic Details	Reference Bo No.	% Weightage	No. of Sessions
1	Overview: Overview of operating systems, functionalities and characteristics of OS. Hardware concepts related to OS, CPU states, I/O channels. Process Management and Synchronization: UNIX process control and management, PCB. Job and processor scheduling, scheduling algorithms, process hierarchies. Problems of concurrent processes, critical sections, mutual exclusion, synchronization, deadlock, Mutual exclusion	1,8,9,10	25	12
2	Memory Management : Memory Management Techniques, Contiguous & Non Contiguous allocation, Logical & Physical Memory, Conversion of Logical to Physical address, Paging, Segmentation, Segment with paging, Virtual Memory Concept, Demand paging, Page Replacement algorithm, Thrashing	1,8,9,10	15	7
3	Multiprocessor Operating Systems: System Architectures- Structures of OS – OS design issues – Process synchronization – Process Scheduling and Allocation-	3	15	6

	Mobile Operating Systems: ARM and Intel architectures - Power Management - Mobile OS Architectures - Underlying OS - Kernel structure and native level programming - Runtime issues- Approaches to power management			
4	Distributed Operating Systems: System Architectures- Design issues – Communication models – clock synchronization – mutual exclusion – election algorithms- Distributed Deadlock detection Distributed scheduling - Distributed shared memory - Distributed File system – Multimedia file systems - File placement - Caching	5	10	4
5	Basics of Linux: History, FOSS, current Linux Distributions-Distros examples, Linux Operating System Layers, The Linux Shell (different kinds of shell), Process: (parent and child processes), Files and Directories (File Structure and directory structure), Interaction with System.	4,6,7	10	3
6	Shells and Utilities: Getting Started with Shell Programming: The bash shell, Shell commands, the role of shells in the Linux environment, other standard shells, Write a simple shell script - "Hello World!", Variables in shell:, Bash variable existence check, Customize the bash shell environments: Recalling command history, Path name expansion, Create and use aliases, The tilde expansion, Startup scripts, Commonly Used Commands and Utilities.	4,6,7	15	5
7	Basic Administration of Linux: Basic System Administration (Run levels, User accounts), Kernel Administration: (Linux kernel sources, rebuilding kernel, installing kernel), Managing Users, Managing File Systems, Linux File Permissions, Devices and Modules (device drivers).	4,6,7	10	3

Reference Books:

1. Operating System Concepts, 9th Edition, John Wiley & Sons, Inc. by Avi Silberschatz, Peter Baer Galvin, Greg Gagne,
2. Operating Systems: Internals and Design Principles, 8th edition Pearson Education Limited, 2014 by William Stallings.
3. Modern Operating system by Andrew Tenenbaum.
4. Linux Administration, A Beginner's, Guide by Wale Soyinka, Tata McGraw Hill
5. Distributed Operating System by Andrew Tanenbaum
6. Linux Shell Scripting By Ganesh Naik
7. Linux Bible By Christopher Negus

8. D.M Dhamdhare: Operating systems - A concept based Approach, 3rd Edition, Tata McGraw-Hill, 2012.

9. P.C.P. Bhatt: Introduction to Operating Systems Concepts and Practice, 3rd Edition, PHI, 2010.

10. Harvey M Deital: Operating systems, 3rd Edition, Pearson Education, 2011.

Sr. No.	Subject Code	Subject Title	Internal	External
1	BM11	Business Process Domain	30	70
<u>Course Objectives:</u>				
<ol style="list-style-type: none"> 1. To learn & understand the processes and practices in business and their applications 2. To make students understand the necessity and importance of Marketing in business Environment. 3. To understand the concepts & role of e-commerce in business management 4. To introduce advance business applications like CRM and SCM. 5. To learn the financial aspects of business management. 				
<u>Course Outcome:</u>				
Student will able to				
CO1: describe major bases for marketing mix in business CO2: describe various functionalities of human resource process CO3: Identify existing e-commerce model and payment system , CO4: Apply knowledge to evaluate and manage an effective supply chain. CO5: Understand how customer relations are related to business functions and its importance to success Business entity. CO6: use various banking and insurance process for business development.				
Sr. No	Topic Details		% Weightage	No. of Sessions
1	Marketing 1.1 Definition & importance of consumer behavior, 1.2 Steps buyer decision process 1.3 Market Segmentation 1.4 Marketing mix: 7 Ps of marketing		20 %	9
2	Human Resource 2.1 Employee Database 2.2 Recruitment , selection Processes 2.3 Employee Appraisal, 2.4 Leave Types 2.5 Payroll – Salary calculation, Income Tax calculation and reporting, PF, Gratuity, Bonus.		15 %	7
3	E commerce 3.1 Business model of ecommerce: B2B, B2C, C2C, B2G and other models of ecommerce. 3.2 Electronic payment system:		15 %	7

	Credit card, debit card, operational and legal risks of e-payments, risk management options for e-payment system, order fulfillment for e-commerce.		
4	Supply Chain Management (SCM) 4.1 what is supply chain, 4.2 Major drivers of Supply chain, 4.3 Value in Supply Chain- quality, delivery, flexibility 4.4 Source management in Supply Chain- insourcing, outsourcing, Make Vs Buy 4.5 Managing Inventory in Supply chain- definition of inventories, Role of Inventory, Inventory control techniques (ABC Analysis, VED Analysis), Vendor Managed Inventory 4.6 Transportation- Modes of transportation, Transportation Management system (TMS)	20 %	9
5	Customer Relationship Management (CRM) 5.1 What is CRM? , Why we need CRM? 5.2 Customer Life Cycle 5.3 Use of CRM in Business 5.4 CRM implementation Strategy 5.5 CRM Applications in Hospital management, Travel industry, Hotel industry.	15 %	6
6	Banking and Insurance 6.1 Accounts and Deposits, Types of accounts-Saving account, current account, Demat Account 6.2 Digital Payments – NEFT, RTGS, IMPS, BHIM, UPI, Wallets 6.3 Loans and various types of loans- Personal, home loan, vehicle loan, Loan against security, business loans. 6.4 Loan Sanction Process 6.5 Insurance, types of insurance- Life, Health, Accident, Home, Motor, Loan Insurance. 6.6 Insurance processes	15 %	7

Reference Books:

1. Marketing Management: A South Asian Perspective, 14th Edition (English), Philip Kotler, K. Keller, Abraham Koshy and Mithileshwar Jha
2. Supply Chain Management - Strategy, Planning & Operation by Sunil Chopra, Peter Meindl, D. V. Kalra, Pearson Education.
3. Human Resource Management by J. John Bernardin, Tata McGraw Hill Publishing, 4th Edition
4. E-Commerce concept-model-strategies, C.S.V. Murthy, Himalaya Publication House
5. Customer Relationship Management by Kristin Anderson and Carol Kerr, TMGH
6. Management of banking and Financial Services, by Padmalatha Suresh & Justin Paul, Pearson India Ltd, New Delhi

SEMESTER II					
Sr. No.	Subject Code	Subject Title		Internal	External
1	IT21	Data Structure and Algorithm		30	70
<p>Course Objectives:</p> <ol style="list-style-type: none"> To impart the basic concepts of data structure and algorithms To understand concepts about searching and sorting techniques To understand basic concepts about stacks, queues, lists, trees and graphs To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures <p>Course Outcome:</p> <p>Student will able to</p> <p>C01: analyze algorithms and algorithm correctness C02: summarize searching and sorting techniques C03: describe stack, queue and linked list operation C04: have knowledge of tree and graphs concepts</p>					
Sr. No	Topic Details		Reference Book No.	% Weightage	No. of Sessions
1	<p>Introduction to Data Structure</p> <p>1.1 Fundamentals of Data Structure</p> <p>1.2 Operations of Data Structure</p> <p> 1.2.1 Traversing</p> <p> 1.2.2 Searching (Linear and Binary Search)</p> <p> 1.2.3 Sorting (Bubble, Insertion, Selection, Quick and Merge sort)</p> <p> 1.2.4 Inserting and Deleting</p> <p>1.3 Arrays as Data Structure</p> <p>1.4 Storage Representation of Arrays</p> <p>1.5 Polynomial Representation of Arrays</p> <p> 1.5.1 Addition of Two Polynomial</p> <p> 1.5.2 Addition of Sparse Matrix</p>			20	4
2	<p>Stacks</p> <p>2.1 Introduction and Definition</p> <p>2.2 Representation of Stacks</p> <p>2.3 Operations on Stacks</p> <p>2.4 Applications of Stacks</p> <p>2.5 Representation of Arithmetic Expressions</p> <p> 2.5.1 Infix</p> <p> 2.5.2 Postfix</p> <p> 2.5.3 Prefix</p>			15	3
3	<p>Queues</p> <p>3.1 Introduction and Definition</p> <p>3.2 Representation of Queues</p>			15	3

	3.3 Operation on Queues 3.4 Applications of Queues 3.5 Dequeue 3.6 Circular Queue 3.7 Priority Queue			
4	Linked List 1.1 Definition of Linked List 1.2 Dynamic Memory Management 1.3 Representation of Linked List 1.4 Operations on Linked List 1.4.1 Inserting 1.4.2 Removing 1.4.3 Searching 1.4.4 Sorting 1.4.5 Merging Nodes 4.5 Double Linked List		10	3
5	Trees 5.1 Definition of Tree 5.2 Binary Tree and their types 5.3 Representation of Binary Tree 5.4 Operations on Binary Tree 5.5 Binary Search Tree (BST) 5.6 Traversal of Binary Tree 5.6.1 Preorder Traversal 5.6.2 Inorder Traversal 5.6.3 Postorder Traversal 5.7 Threaded Binary Tree 5.8 AVL Tree 5.9 B-Tree 5.10 Operations on B-Tree		20	4
6	Graphs 6.1 Definition of Graph 6.2 Basic Concepts of Graph 6.3 Representation of Graph 6.2.1 Adjacency Matrix 6.2.2 Adjacency List 6.4 Single Source shortest path algorithm-Dijkstra's algorithm. 6.5 Spanning Tree 6.6 Minimum Spanning Tree 6.6.1 Kruskal's Algorithm 6.6.2 PRIM's Algorithm 6.7 Graph Traversal 6.7.1 Breadth First Search (BFS) 6.7.2 Depth First Search (DFS)		20	4

Books :

1. Lipschutz Schaum's, "Data Structure", Outline Series, TMH, ISBN-0-07-060168-2.

2. D. Samanta, "Classical Data Structure", PHI, ISBN: 8120318749.
3. Fundamental of DS using C++ by Horowitz Sahani, Galgotia pub.
4. Practical Approach to Data Structures by Hanumanthappa.

References :

1. Tenenbaum," Data Structures Using C and C++", Second Edition, PHI, ISBN-81317-0328-2
2. Data Structures Using C and C++ by Langsam Y, PHI,2nd Ed.
3. The Essence of Data Structures using C++ by Brownesy,Kan
4. Data Structure and Algorithms in C++ by Joshi Brijendra Kumar
5. Data Structures with C++: Schaums Outlines by Hubbard John

Sr. No.	Subject Code	Subject Title	Internal	External
1	IT22	Web Technology	30	70

Course Objectives:

1. To impart the design, development and implementation of Dynamic Web Pages.
2. To develop programs for Web using Scripting Languages.
3. To Design and implement dynamic websites with good sense of designing and latest technical aspects

Course Outcome:

Student will able to

CO1: Implement interactive web page(s) using HTML, CSS and JavaScript.

CO2: Build Dynamic web site using server side PHP Programming and Database connectivity.

CO3: Design a responsive web site.

Sr. No	Topic Details	% Weightage	No. of Sessions
1	<p>1.1 Introduction to HTML5,What Is HTML5? Features of HTML5</p> <p>Introduction to Web 2.0 and Web 3.0</p> <p>1.2 History And Major Actors</p> <ul style="list-style-type: none"> • A Little Retrospective • What Is The W3C? • What Is The WHATWG? <p>1.3 Getting Started With HTML5</p> <ul style="list-style-type: none"> • Feature Detection • Support For Legacy Browsers <p>1.4 Structure of a Web Page</p> <ul style="list-style-type: none"> • HTML5 DOCTYPE • Page Encoding • New And Updated Elements • New Attributes • Deprecated Elements And Attributes <p>1.5 Audio and Video</p> <ul style="list-style-type: none"> • The State of Web Audio And Video Based On Plug-in • Attributes And Methods • Understanding Audio/Video Events <p>1.6 HTML5 Canvas</p>	20	10

	<ul style="list-style-type: none"> • Overview Of Graphics In The Browser • Canvas Vs. SVG • Using A Canvas 1.7 Forms 1.8 Working With Paths <ul style="list-style-type: none"> • Drawing Straight Lines • Drawing Circles Or Arcs • Drawing Text • Drawing Images 1.9 Understanding Transforms <ul style="list-style-type: none"> • Translation • Rotation • Scaling 		
2	CSS3 2.1 Introducing CSS3 <ul style="list-style-type: none"> • What is CSS3? • The History of CSS 2.2 Selectors and Pseudo Classes <ul style="list-style-type: none"> • Attribute Selectors • The Target Pseudo-Class • UI Element States Pseudo-Classes 2.3 Fonts and Text Effects <ul style="list-style-type: none"> • Fonts on the Web • Font Services • The @font-face Rule 2.4 Colours, Gradients, Background Images, and Masks <ul style="list-style-type: none"> • Colour • The Opacity Property • Backgrounds 2.5 Transitions, Transforms and Animations <ul style="list-style-type: none"> • Transitions and Transforms 2.6 Embedding Media <ul style="list-style-type: none"> • Video Formats • Styling Video 	15	6
3	Javascript 3.1 Introduction to Javascript, Types of Scripts with suitable example 3.2 Control and looping structure 3.3 Various Operators in Javascript with Example 3.4 Array its Types 3.5 Event Handling with Example 3.6 Math, Date and String objects with Example 3.7 DOM Objects 3.8 Form Validation 3.9 Dynamic effect using Javascript	20	9
4	Jquery 4.1 Intro to jQuery <ul style="list-style-type: none"> • Need of jQuery • Advantages of jQuery 	25	9

	<ul style="list-style-type: none"> • JQuery versions • Features <p>4.2 Retrieving Page Content</p> <ul style="list-style-type: none"> • Using selectors • Using filters • Child,visibility, and content filters in jquery <p>4.3 Manipulating Page Content</p> <ul style="list-style-type: none"> • Creating, getting, and setting content • Manipulating attributes • Inserting content • Wrapping, replacing, and removing content <p>4.4 Methods in jQuery</p> <p>4.5 Events in JQuery</p> <p>4.6 Animation in JQuery</p>		
5	<p>PHP</p> <p>5.1 Installing and Configuring PHP</p> <p>5.2Introduction</p> <ul style="list-style-type: none"> • PHP and the Web Server Architecture, PHP Capabilities • PHP and HTTP Environment Variables <p>5.3 PHP Language Core</p> <ul style="list-style-type: none"> • Variables • Constants • Data Types • Operators • Working with Arrays <p>5.4 Decision Making , Flow Control and Loops</p> <p>5.5 Error Handling and Reporting Considerations</p> <p>5.6 Creating a Dynamic HTML Form with PHP</p> <p>5.7 Database Connectivity with MySql</p> <ul style="list-style-type: none"> • Connection with MySql Database • Performing basic database operations(DML) Insert, Delete, Update, Select) <p>5.8 Using GET, POST, SESSION, and COOKIE Variables</p>	20	11

Text Books :

1. Javascript: the Complete Reference by Thomas Powell, Fritz Schneider
2. HTML & CSS: The Complete Reference, Fifth Edition by Powell Thomas
3. JavaScript The Complete Reference 3rd Edition (Paperback, Powell Thomas)

4. jQuery Reference Guide by Chaffer Jonathan

5. Complete Ref. PHP

Reference Books:

1. Introducing HTML5 - Bruce Lawson, Remy Sharp

2. HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery) 2Ed

3. JavaScript The Complete Reference 3rd Edition (Paperback, Powell Thomas)

4. Learning jQuery - Jonathan Chaffer, Karl Swedberg

5. HTML5 & CSS3 , Castro Elizabeth 7th Edition

6. Head First PHP & MySQL – by Lynn Beighley & Michael Morrison

7. The Joy of PHP Programming: A Beginner’s Guide – by Alan Forbes

Reference Websites:

1. <https://www.w3schools.com>

2. <https://www.html-5-tutorial.com>

3. <https://openclassrooms.com>

4. <https://www.javascript.com>

5. <https://www.tutorialspoint.com/javascript>

6. <https://www.w3schools.com/jquery/>

7. <https://www.tutorialspoint.com/jquery/>

8. <http://www.apache.org>

9. <https://www.guru99.com/php-tutorials.html>

<https://www.w3schools.com/php/>

Sr. No	Subject Code	Subject Title		Internal	External
3	MT21	BUSINESS STATISTICS		30	70
	Objectives: To understand the importance of data-driven business decisions. To understand the basic role of probability in business decision making. To learn the basics of business decision-analysis. To summarize business data numerically and graphically. Learn the basics of beginning predictive business modeling To understand the importance of business sampling methods, and be able to describe different business sampling methods.				

	<p>To understand probability distributions common in business and the relationships between sampling, probability, and uncertainty in business decision making. To learn how to use model-based estimation and prediction methods with business applications</p> <p>To understand the process associated with statistical decisions, defining and formulating problems, analyzing the data, and using the results in decision making.</p>			
	<p>Course Outcome:</p> <ol style="list-style-type: none"> 1. explain basic statistical concepts such as statistical collection, species characteristics, statistical series, tabular and graphical representation of data, measures of central tendency, dispersion and asymmetry, correlation and regression analysis, time series analysis 2. Students will be able to analyze and apply computer-generated statistical output to solve problems. 3. independently calculate basic statistical parameters (mean, measures of dispersion, correlation coefficient, indexes) 4. based on the acquired knowledge to interpret the meaning of the calculated statistical indicators 5. choose a statistical method for solving practical problems in business world and statistically thinking and selecting data analysis techniques for decision-making under uncertainty. 			
Sr. No	Topic Details	Reference book no.	% Weightage	No. of Sessions
1	<p>Unit 1- Introduction to Statistics:</p> <p>Introduction to Statistics, Importance of Statistics in modern business environment. Definition of Statistics, Importance, Scope and Applications of Statistics, Characteristics of Statistics, Functions of Statistics, Limitations of Statistics.</p> <p>Need of Data, Types of Data, Principles of Measurement, Source of Data, Data Classification, Tabulation and Presentation.</p>	1,2,4	5	2
2	<p>Unit-2-Measures of Central Tendency and Dispersion:</p>	1,2	10	4

	<p>Introduction, Objectives of statistical average, Requisites of a Good Average, Statistical Averages - Arithmetic mean - Properties of arithmetic mean - Merits and demerits of arithmetic mean ,Median - Merits and demerits of median , Mode - Merits and demerits of mode , Geometric Mean , Harmonic Mean , Appropriate Situations for the Use of Various Averages , Positional Averages , Dispersion – Range - Quartile deviations, Mean deviation ,Standard Deviation -Properties of standard deviation Coefficient of Variance</p>			
3	<p>Unit-3- Theory of Probability and Theoretical Probability Distributions:</p> <p>Introduction - Definition of probability - Basic terminology used in probability theory, Approaches to probability , Rules of Probability - Addition rule - Multiplication rule , Conditional Probability, Steps Involved in Solving Problems on Probability, Random Variables</p> <p>Probability Distributions - Discrete probability distributions - Continuous probability distributions , Bernoulli Distribution - Repetition of a Bernoulli experiment , Binomial Distribution - Assumptions for applying a binomial distribution - Examples of binomial variate - Recurrence formula in case of binomial distribution - Case study on binomial distribution Poisson Distribution - Assumptions for applying the Poisson distribution -Real life examples of Poisson variate - Recurrence relation -Case study on Poisson distribution, Normal Distribution - Standard Normal Distribution</p>	1,2	15	6
4	<p>Unit-4- Sampling, Sampling Distributions and Testing:</p> <p>Introduction , Population and Sample - Universe or Population - Types of Population – Sample , Advantages of Sampling, Sampling Theory - Law of Statistical Regularity - Principle of Inertia of Large Numbers - Principle of Persistence of Small Numbers - Principle of Validity - Principle of Optimization , Terms Used in Sampling Theory, Errors in Statistics, Measures of Statistical Errors, Types of Sampling - Probability Sampling - Non-Probability Sampling, Case let on Types of</p>	1,2,3,5	37.5	15

<p>Sampling, Determination of Sample Size, Central Limit Theorem</p> <p>Estimation:</p> <p>Introduction , Reasons for Making Estimates , Making Statistical Inference, Types of Estimates - Point estimate - Interval estimate , Criteria of a Good Estimator – Unbiasedness – Efficiency – Consistency – Sufficiency, Point Estimates ,Interval Estimates, Case study on calculating estimates - Making the interval estimate Interval Estimates and Confidence Intervals - Interval estimates of the mean of large samples - Interval estimates of the proportion of large samples - Interval estimates using the Student’s ‘t’ distribution, Determining the Sample Size in Estimation</p> <p>Testing of Hypothesis in Case of Large and Small Samples:</p> <p>Introduction – Large Samples – Assumptions , Testing Hypothesis - Null and alternate hypothesis - Interpreting the level of significance - Hypotheses are accepted and not proved , Selecting a Significance Level - Preference of type I error - Preference of type II error - Determine appropriate distribution, Two – Tailed Tests and One – Tailed Tests - Two – tailed tests - Case study on two – tailed and one-tailed tests, Classification of Test Statistics - Statistics used for testing of hypothesis - Test procedure - How to identify the right statistics for the test , Testing of Hypothesis in Case of Small Samples - Introduction – small samples, ‘t’ Distribution , Uses of ‘t’ test</p> <p>Chi – Square Test:</p> <p>Introduction , Chi-Square as a Test of Independence - Characteristics of χ^2 test - Degrees of freedom - Restrictions in applying χ^2 test - Practical applications of χ^2 test - Levels of significance - Steps in solving problems related to Chi-Square test -</p>			
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	<p>Interpretation of Chi-Square values , Chi-Square Distribution - Properties of χ^2 distribution - Conditions for applying the Chi-Square test - Uses of χ^2 test , Applications of Chi-Square test - Tests for independence of attributes - Test of goodness of fit - Test for specified variance</p> <p>Distribution and Analysis of Variance (ANOVA):</p> <p>Introduction, Analysis of Variance (ANOVA), Assumptions for F-test - Objectives of ANOVA - ANOVA table - Assumptions for study of ANOVA, Classification of ANOVA - ANOVA table in one-way ANOVA - Two way classifications</p>			
5	<p>Unit-5- Simple Correlation and Regression:</p> <p>Introduction , Correlation - Causation and Correlation - Types of Correlation - Measures of Correlation - Scatter diagram - Karl Pearson's correlation coefficient - Properties of Karl Pearson's correlation coefficient - Factors influencing the size of correlation coefficient , Probable Error - Conditions under which probable error can be used , Spearman's Rank Correlation Coefficient , Partial Correlations , Multiple Correlations , Regression - Regression analysis - Regression lines - Regression coefficient , Standard Error of Estimate , Multiple Regression Analysis , Reliability of Estimates , Application of Multiple Regressions</p>	1,2,3	12.5	5
6	<p>Unit-6- Forecasting and Time Series Analysis:</p> <p>Introduction, Types of forecasts, Timing of forecast, Forecast methods-Quantitative and Qualitative Forecasting Methods,</p> <p>Time Series Analysis -Introduction, Time Series Analysis , Utility of the Time Series , Components of Time Series - Long term trend or secular trend - Seasonal variations - Cyclic variations - Random variations, Methods of Measuring Trend - Free hand or graphic method - Semi-average method - Method of moving averages - Method of least squares,</p>	1,2	10	4

	Mathematical Models for Time Series - Additive model - multiplicative model, Editing of Time Series, Measurement of Seasonal Variation - Seasonal average method - Seasonal variation through moving averages - Chain or link relative method - Ratio to trend method, Forecasting Methods Using Time Series - Mean forecast - Naive forecast - Linear trend forecast - Non-linear trend forecast - Forecasting with exponential smoothing			
7	<p>Unit-7- Index Numbers:</p> <p>Introduction, Definition of an Index Number – Relative - Classification of index numbers , Base year and current year - Chief characteristics of index numbers - Main steps in the construction of index numbers, Methods of Computation of Index Numbers – Un-weighted index numbers - Weighted index numbers, Tests for Adequacy of Index Number Formulae , Cost of Living Index Numbers of Consumer Price Index - Utility of consumer price index numbers - Assumptions of cost of living index number - Steps in construction of cost of living index numbers , Methods of Constructing Consumer Price Index - Aggregate expenditure method - Family budget method - Weight average of price relatives, Limitations of Index Numbers , Utility and Importance of Index Numbers</p>	1,2	10	4
	Reference Books			
	<p>1. Business Statistics, J. K. Sharma, Pearson Education-2nd Edition</p> <p>2. Business Statistics, Naval Bajpai, Pearson Education-2nd Edition</p> <p>3. The Art of Computer systems Performance Analysis, Raj Jain, Wiley India Pvt Ltd,</p> <p>4. Complete Business Statistics, Amir Aczel, Jayavel Sounderpandian, (Seventh Edition), <i>Tata McGraw-Hill</i> Education Pvt. Ltd - 2012</p> <p>5. Business Statistics Theory and Applications, by Jani P.N , PHI</p>			

Sr. No.	Subject Code	Subject Title	Internal	External
1	IT13	Essentials of Networking	30	70

Course Objectives:

1. To understand various computer networks and technologies behind networks
2. To study TCP/IP suite.
3. To study routing concept along with Routing protocols
4. To be familiar with wireless networking concepts and protocols
5. To understand cryptography

Course Outcome:

Student will able to

CO1: Understand the basic concepts of data communication including the key aspects of networking and their interrelationship

CO2: Understand various protocols such as HTTP, SMTP, POP3, IMAP, FTP, DNS, DHCP and the basic structure of IP V4 , IP V6 Address and concept of sub netting with numerical

CO3: Understand routing concept and working of routing protocols such as RIP, OSPF and BGP

CO4: Have basic understanding of wireless networks and protocols

CO5: Understand various encryption techniques

Sr. No	Topic Details	% Weightage	No. of Sessions
1	<p>Introduction to Data Communication and Computer Networks</p> <p>1.1 Overview of basic concepts and components. [Data communication characteristic, Data representation, data flow, Network Criteria, Physical structures and topologies, Network types, switching]</p> <p>1.2 Connection Oriented N/Ws Vs Connectionless N/Ws,</p> <p>1.3 Ethernet [goals, frame format, all types and implementations]</p> <p>1.4 Wireless LAN [Architectural Comparison, Characteristics, Access Control, 802.11 architecture, Frame format and its specifications]</p> <p>1.5 Protocol Layering (Principals, Logical connections)</p> <p>1.6 TCP/IP protocol suite</p> <p>1.7 The OSI model</p> <p>1.8 TCP/IP Model,</p> <p>1.9 OSI vs TCP/IP</p>	15	9
2	<p>Physical communication:</p> <p>2.1 Hardware Architecture</p> <p>2.2 Transmission Media (Guided and unguided i.e. Twisted pair, Coaxial cable, Fiber optics, Wireless Transmission etc.)</p>	10	3

	2.3 Communication Devices (Switch, Router etc.) 2.3, Switching and its types (Circuit Switching, Message Switching, Packet Switching)		
3	Link Layer Communication 3.1 Error detection and correction techniques with numerical 3.2 Framing and its types 3.3 Flow and error control 3.4 HDLC protocol 3.5 P2P Protocol	15	7
4	IP Addressing & Routing 4.1 Internet Protocol and IPV4 Packet format, 4.2 Addressing, Physical Addresses, Logical Addresses Port Addresses, Specific Addresses 4.3 IP Address- Network Part and Host Part 4.4 Network Masks, Network Addresses and, Broadcast Addresses, Loop Back Address 4.5 Address Classes 4.6 Numerical based on IP addressing 4.7 Routing [IP routing concept, Routing tables and Routing protocols (all Interior and Exterior routing protocols)] 4.8 TCP connections 4.9 IPV6 [Introduction, IPV6 packet format, Addressing schemes, Applications and limitations, IPV4 Vs IPV6]	15	6
5	Domain Name System (DNS) 5.1 Domain Name Space 5.2 DNS in the internet 5.3 DNS Resolution and caching 5.4 Resource Records, DNS message and DNS security 5.5 DHCP & Scope Resolution	10	3
6	Network Applications (HTTP, Email, etc) 6.1 Hyper Text Transfer Protocol (HTTP) 6.2 HTTP communications –HTTP request, Request Headers, Responses, Status Code, Error Status Code 6.3 Email- Sending & Receiving Email, Email, Addressing Message Structure 6.4 MIME- Multipurpose Internet Mail Extensions 6.5 SMTP – Simple Mail Transfer Protocol 6.6 POP – Post Office Protocol 6.7 IMAP- Internet Message Access Protocol 6.8 FTP- File Transfer Protocol 6.9 Telnet – Remote Communication Protocol 6.10 Proxy Servers and its types	15	8
7	Network Security 7.1 Threat: Active attack, Passive Attack	10	2

	7.2 Cryptography: Symmetric and Asymmetric Key Cryptography, Digital signature 7.3 VPN and VPN Protocols 7.4 Firewall: Packet filter, application gateway		
8	Advance Network Technologies 8.1 WiMax, LTE, VOIP, Unified Communication 8.2 Introduction to IoT and Sensor networks	10	2

Text Books :

- | | |
|--------------------------------------|--------------------------------|
| 1. Computer Networks | Abndrew S. Tanenbaum 4e |
| 2. Data Communication and Networking | Behroz A.Forouzan, TMH, 4th Ed |
| 3. Cryptography and Network Security | Atul Kahate, TMH 2nd Ed. |

Reference Books:

- | | |
|---|----------------------|
| 1. Network Essential Notes | GSW MCSE Study Notes |
| 2. Internetworking Technology Handbook | CISCO System |
| 3. Computer Networks and Internets with Internet Applications | Douglas Comer |

Sr. No.	Subject Code	Subject Title	Internal	External
5	BM21	Principles and Practices of Management and Organizational Behavior	30	70
<p>Objective: This course aims to improve students understanding of Management & human behavior in organization and the ability to lead people to achieve more effectively toward increased organizational performance. After completing this course, students should be able to:</p> <ul style="list-style-type: none"> • Understand individual behavior in organizations, including diversity, attitudes, job satisfaction, emotions, moods, personality, values, perception, decision making, and motivational theories. • Understand group behavior in organizations, including communication, leadership, power and politics, conflict, and negotiations. • Understand the organizational system, including organizational structures, culture, human resources, and change. 				
<p>Course Outcomes:</p> <p>CO1. Describe various aspects of management.</p> <p>CO 2. Analyze the interactions between multiple aspects of management.</p> <p>CO 3. Justify the role of leadership qualities.</p> <p>CO 4. Evaluate the impact of changing external factors.</p> <p>CO 5. Analyze the role of planning and decision making.</p> <p>CO 6. Compare and contrast the controlling process.</p>				

Sr. No.	Topic Details	% Weightage	No. of Sessions (Ref. Book)	Reference Book
1	Management: 1.1 Meaning and Definition 1.2 The need, scope and process of Management 1.3 Managerial levels/Hierarchy 1.4 Managerial functions : Planning , Organizing , Staffing , Directing, Controlling 1.5 Types of managers & its Skill : Functional, Specialize, Generalize 1.6 Social responsibility of management	10	4	1,2,3
2	Nature & Development of Management Thought: 2.1 Historical perspective 2.2 Evolution of Management: Introduction to Scientific Management by Taylor, Administrative Management by Fayol, Contribution of Peter Drucker 2.3 System approach-with reference to management, organization and MIS 2.4 Contingency approach	10	4	1,2
3	Decision making: 3.1 Introduction 3.2 Decision making environment- Decision making under certainty, under uncertainty, under risk 3.3 Types of Decision, decision making processes & Tools 3.4 Individual Vs Group decision making 3.5 Information Technology & Decision Making 3.6 Herbert Simon's Model & Principle of Rationality	10	4	1,2,3,4
4	Organization, Organizational Behaviour & Organizational Culture: 4.1 Definition and Need for Organization 4.2 Introduction to OB, Organizing Process 4.3 Organizational structure (Functional organization, Product Organization, Territorial Organization) 4.4 Introduction- Development and Levels of Organizational Culture 4.5 Types of Corporate Culture	10	4	5,6
5	Organizational Dynamics: 5.1 Organizational Change and Learning Organizations Leadership skills and techniques for effective organizations 5.2 Behaviouristic and Strategic leadership styles in organization 5.3 Organization Development Techniques – Background and historical perspective	7	3	5,6,7
6	Motivation:	7	3	7,8,9,10

	6.1 Concept of Motivation, Benefits to organization and Manager 6.2 Maslow's need Hierarchy theory 6.3 Herzberg's Motivation- Hygiene Theory 6.4 McClelland's Need Theory 6.5 Theory X and Y, Theory Z			
7	Leadership: 7.1 Definition, Nature, Qualities of Leader, Leader V/s Manager 7.2 Leadership Theories (Great Man Theory, Trait Theory, Behavioral Theories, The Contingency or Situational Theory, Path-Goal Theory of Leadership) 7.3 Leadership Styles(Autocratic, Participative, Laissez faire or subordinate-centered ,Bureaucratic leadership, Transformational leadership, Transactional leadership)	10	4	8,9,10
8	Group and Group Dynamics: 8.1 Concept of Group, Effect & Characteristics of group, Types of groups 8.2 The Five-Stage Model of Group Development 8.3 Group Properties (Roles, Norms, Status, Size, and Cohesiveness)	10	4	5,6,8,9,10
9	Team Building: 9.1 Concept of Team, Nature, Benefits from team, 9.2 Types of Teams 9.3 Creating Effective Teams, Turning Individuals into Team Player.	10	4	10
10	Stress Management and Conflict management: 10.1 Work stress: Meaning of stress, Stressors, Sources of Stress, Types of stress 10.2 Stress Management strategies 10.3 Concept of Conflict, Functional versus Dysfunctional Conflict 10.4 Five stage Conflict Process, Types of Conflict (Task Conflict, Relationship Conflict, Process Conflict, Personality Conflict, Intergroup Conflict) 10.5 Managing Conflict (Styles for Handling Dysfunctional Conflict, Third-Party Interventions)	8	3	10,11,12,13
11	Personality and Understanding Individual Behavior: 11.1 Introduction, Definition of Personality - Determinants of Personality 11.2 Personality Theories -Personality and Organisation 11.3 Personality Structure -Personality and Behavior 11.4 Ego State, Johari window- Transactional Analysis	8	3	11,12,13

Reference Books:

1. Principles and Practices of Management- Shejwalkar
2. Essential of management- 7th edition Koontz H & Weirich H TMH
3. Management Today Principles And Practices - Burton & Thakur
4. Mgmt. Principles and Functions - Ivancevich & Gibson, Donnelly
5. Organizational behavior Keith Davis
6. Organizational behavior Fred Luthans TMH 10th edition
7. Organizational behavior Dr. Ashwatthapa THI 7th edition
8. Organizational Behaviour - Fred Luthans
9. Organizational Behaviour - Stephen Robbins
10. Organizational Behaviour - K. Aswathappa (8th revised edition)
11. Business psychology and Organizational Behaviour – Eugene McKenna
12. Understanding Organizational Behaviour - Udai Pareek
13. Organization Development – Wendell L. French and Cecil H. Bell Jr.