Scheme & Syllabus
of
Master of Computer Applications (MCA)
(With effect from 2020-22)

Outcome Based Education
With
Choice Based Education

P.E.S. College of Engineering
Mandya - 571 401, Karnataka
(An Autonomous Institution Affiliated to VTU, Belagavi
Grant -in- Aid Institution (Government of Karnataka), World Bank Funded College (TEQIP)
Accredited by NBA & NAAC and Approved by AICTE, New Delhi.)

Ph : 08232- 220043, Fax : 08232 – 222075, Web : www.pescemandya.org
Preface

PES College of Engineering, Mandya, started in the year 1962, has become autonomous in the academic year 2008-09. Since, then it has been doing the academic and examination activities successfully. The college is running 6 Postgraduate programs. It consists of 4 M.Tech programs, which are affiliated to VTU. Other postgraduate programs are MBA and MCA.

India has become a Permanent Member by signing the Washington Accord. The accord was signed by the National Board of Accreditation (NBA) on behalf of India on 13th June 2014. It enables not only the mobility of our degree globally but also establishes equivalence to our degrees with that of the member nations such as Taiwan and Hong Kong, Ireland, Korea, Malaysia, New Zealand, Russia, Singapore, South Africa, Turkey, Australia, Canada and Japan are among 16 signatories to the international agreement besides the US and the UK. Implementation of Outcome Based Education (OBE), has been the core issue for enabling the equivalence and of Indian degrees and their mobility across the countries.

Our Higher Educational Institution has adopted Credit Based system (CBCS) based semester Structure with OBE Scheme and grading system which provides the flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. There lies a shift in thinking, teaching and learning process moving towards students Centric from Teachers Centric Education which enhances the knowledge, skills & moral values of each student.

Choice Based Credit System (CBCS) provides the options for the students to select from the number of prescribed courses. The CBCS provides a ‘cafeteria’ type approach in which the students can choose electives from a wide range of courses of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, adopt an interdisciplinary approach for learning which enables integration of concepts, theories, techniques. These are greatly enhances the skill/employability of students.

In order to increase the Industry Institute Interaction, Internship have been added to the existing curriculum of 2020-21. Further, Research Methodology & IPR and two Self Study Courses have been introduced to enhance their Research ability and Self Learning ability respectively. Lab Components are also included in I & II Semester.

Dr. Umesh D R
Deputy Dean (Academic)
Associate Professor,
Dept. of CS & Engg

Dr. Nagarathna
Dean (Academic)
Professor
Dept. of CS & Engg
Department of Master of Computer Applications (MCA)

ABOUT THE DEPARTMENT

The department of MCA started in 1992 in PES College of Engineering Mandya, one among the earliest institutes in Karnataka to start MCA Programme. The intake of the department is 60 students. The department is run by highly qualified teaching staff. The department has three different laboratories to address the programme of the revised syllabus. The department has received Rs. 25 lakhs funds from AICTE for modernization of labs. The Programme became autonomous in the year 2008 and is affiliated to Visvesvaraya Technological University and approved by AICTE. The department has published several papers in national and international conferences and journal. The department has been actively involved in conducting workshops, Technical Seminars from industry persons to provide a platform for sharing and spreading the latest developments in the field of Computer science and applications. The curriculum for the Master of Computer applications programme is designed to meet the need of IT industry. It includes the core computer science and computer application courses and in addition, the mathematics concepts required for modeling the domain of the software systems and solve them, and management principles. The core courses encompass the core concepts of computer science and the elective courses are designed to deliver the modern technologies and tools. The salient feature of the curriculum is, the laboratory component included as a part of most of the courses and adequate number of courses are having tutorial component. Several reputed companies offered placements to MCA students.

VISION AND MISSION

Vision of PESCE

PESCE shall be a leading institution imparting quality engineering and management education developing creative and socially responsible professionals.

Mission of PESCE

- Provide state of the art infrastructure, motivate the faculty to be proficient in their field of specialization and adopt best teaching-learning practices.
- Impart engineering and managerial skills through competent and committed faculty using outcome based educational curriculum.
- Inculcate professional ethics, leadership qualities and entrepreneurial skills to meet the societal needs.
- Promote research, product development and industry-institution interaction.

Vision of the Department

A Department of high repute imparting quality education to develop competent computer application software professionals and technocrats to serve the society.

Mission of the Department

Committed to

- To provide state-of-the-art facilities with supportive environment for teaching and learning.
- To prepare the students with curricula of industry expectation.
- Train the students to be competent to solve the real world problems in the field of computer Applications and nurturing the students with ethical values for well being in the society.
ACADEMIC PROGRAM

PROGRAM EDUCATIONAL OBJECTIVES (PEO)

PEO1. Deliver competence in a global environment as computer software professional with practice of software engineering principles.

PEO-2. Exhibit Technical and managerial skills to provide solutions for societal acceptable problems and manage projects.

PEO-3. Excel in profession with effective communication skills, ethical attitude, team work and ability to relate computer applications to broader societal context.

PROGRAMME OUTCOMES (PO)

PO-1. Apply knowledge of Computing fundamentals, mathematical principles and domain knowledge in the field of computer applications.

PO-2. Ability to analyze the literature of the domain, understands, identify and formulate problem definition and solve problems

PO-3. Design and develop solutions for small, medium and complex computing problems, and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public, cultural, societal, and economical considerations.

PO-4. Use research based knowledge and methods to analyze and design of unfamiliar problems to provide valid solutions and conclusions.

PO-5. Ability to use techniques, latest tools and skills necessary for development of Computer applications or real world problems.

PO-6. Work as professionals with ethical values, cyber regulations and moral behaviors.

PO-7. Engage in self learning the new technical concepts and domain for continual development as a computing professional to keep in pace with the changes in technologies.

PO-8. Apply the management principles for managing projects as a member in a team, leader in a team and as an individual for different domains considering financial factors.

PO-9. Communicate effectively about system development activities in both verbal and written form with the stake holders of the system and with society.

PO-10. Assess the local and global impact of software solutions on societal context, individuals and organizations.

PO-11. Perform effectively as individual, in team and in diverse environment.

PO-12. Identify innovative ideas to succeed as an employee or entrepreneur using timely opportunity to create value and wealth for the betterment of the individual and society at large.
CREDIT PATTERN

Core Courses

I Semester 18 Credits
II Semester 14 Credits
III Semester 12 Credits

Total credits for core courses are 44 credits

Elective Courses

II Semester 08 Credits
III Semester 08 Credits

Total credits for Elective courses are 16 credits

Laboratory Courses

I Semester 5 Credits
II Semester 3 Credits
III Semester 3 Credits

Total credits for Laboratory courses are 11 credits

Soft Skill Courses

I Semester 1 Credit
II Semester 1 Credit
III Semester 1 Credit

Total credits for Soft Skill Courses are 03 credits

Mini Project : 02 Credits (III Semester)
Technical Seminar : 02 Credits (IV Semester)
Industry Internship : 02 Credits (IV Semester)
Project work : 20 Credits (IV Semester)

A total of 100 credits for 2 years MCA Programme
## MASTER OF COMPUTER APPLICATIONS (MCA) SCHEME OF TEACHING AND EXAMINATION 2020-22

### I SEMESTER

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Course Code</th>
<th>Course Title</th>
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### II SEMESTER

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## ELECTIVES

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<td>Advance Java Programming</td>
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## III SEMESTER

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## ELECTIVES

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Scheme & Syllabus of MCA, PESCE, Mandya (2020 – 2022)
### IV SEMESTER

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Course Learning Objectives (CLOs)
The objectives of this course are to:

- Design an algorithm and flowchart for the given problems
- Understand the fundamental concepts of Operation of Computers, Memory Locations and Addresses and constructs of C programming language.
- Apply the concept of arrays, strings, structures, pointers in writing C programs.
- Recognize the use of different categories of functions in writing C programs.
- Illustrate the concepts of file management in C programming language.
- Compare structures and unions and different memory management techniques in C programming language.

UNIT-I
10 Hours

Algorithms, Flowcharts and their need, Writing algorithms and drawing flowcharts for simple exercises like finding biggest of three numbers, to find roots of given quadratic equation, to find the biggest and smallest of given set of numbers, To generate N Fibonacci numbers and such other simple examples, Character set, C tokens, keywords & identifiers, structure of C program, Constants, variables, data types, declaration of variables, declaration of storage classes, assigning values to variables defining symbolic constants, declaring a variable as constant, declaring a variable as volatile, overflow and underflow of data, Arithmetic operators, relational operators, logical operators, assignment operator, increment and decrement operator, conditional operator, bitwise operators, comma operator, special operators, arithmetic expressions, evaluation of expressions, precedence of arithmetic operators, type conversions in expressions, operator precedence and associatively, mathematical functions.

UNIT-II
10 Hours

The scanf() & printf() functions for input and output operations, reading a character, writing a character, (the getchar() & putchar() functions) , the address operator(&), formatted input and output using format specifiers, Decision making with if statement, simple if statement, the if..else statement, nesting of if..else statements, the else..if ladder, the switch statement, the ?: operator, the goto statement, the break statement, programming examples, The while statement, the do..while statement, the for statement, nested loops, jumps in loops, the continue statement, programming examples, The meaning of an array, one dimensional and two dimensional arrays, declaration and initialization of arrays, reading, writing and manipulation of above types of arrays, multidimensional arrays, dynamic arrays, programming examples.

UNIT-III
10 Hours

Declaring and initializing string variables, reading string from terminal, writing string to screen, arithmetic operations on characters, putting strings together, comparison of two strings, string handling functions, table of strings, programming examples, Need for user defined functions, a multi function program, elements of User defined functions, definition of functions, return values and their types, function calls, function declaration, category of functions, no arguments and no return values, arguments but no return values, arguments with return values, no arguments but returns a value, functions that return multiple values, nesting of functions, recursion, passing arrays to functions, passing string to functions,
programming examples. Defining a structure, declaring structure variables, accessing structure members, structure initialization, copying and comparing structure variables, operations on individual members, array of structures, structures within structures, structures and functions, Unions, size of structures, bit fields, programming examples,

**UNIT-IV**

10 Hours

Understanding pointers, accessing the address space of a variable, declaring and initialization pointer variables, accessing a variable through its pointer, pointers and arrays, pointer and character strings, pointers and structures, programming examples, Defining and opening a file, closing a file, input/output operations on files, error handling during I/O operations, random access files, command line arguments, programming examples, Dynamic memory allocation, allocating a block of memory: malloc, allocating multiple blocks of memory: calloc, releasing the used space: free, altering the size of a block: realloc, programming examples, Preprocessor- Definition, macro substitution, files inclusion, compiler control directives, programming exercises.

**UNIT-V**

12 Hours

Computer Types, Functional Units, Basic Operational Concepts, Bus Structures, Software, Performance, Multiprocessors and Multicomputer, Numbers, Arithmetic Operations, and Characters, Memory Locations and Addresses, Memory Locations and Addresses, Memory Operations, Addressing Modes, Basic Input/output Operations, Definition of Interrupt, Stack and Queues, Subroutines, Subroutines Nesting and the Processor stack, Additional Instructions, Logic Instructions, Shift and Rotate Instructions, Multiplication and Division.

**Text Books:**


**Reference Books:**

1. Programming with C, Byron Gottfried & Jithendra Kumar Chhabra, Third Edition

**Course outcomes:**

On completion of this course, the students should be able to:

**CO1:** Develop flowchart and algorithms and apply the fundamental concepts and Constructs of C to develop solutions for given programs

**CO2:** Identify the suitable decision making statements and different looping statements and implement the problems with appropriate input and output functions and arrays

**CO3:** Analyze different categories of function and develop programs on strings.

**CO4:** Create programs on structure and pointers.

**CO5:** Explain Operational Concepts of computers, Memory Locations and Addresses.
Mapping with Program Outcomes:

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<th>PO2</th>
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3-Strong; 2-Medium; 1-Low
Course Learning Objectives (CLOs)
The objectives of this course are to:

- Understand Java program syntax construct
- Summarize class, member, method and String class and Array concepts give problem statement
- Outline appropriate fundamental concepts inheritance, interface, Packages
- Understand Exception handling and multithreading programming concepts
- Analyze networking and collection frame work

UNIT-I

Java Programming Fundamentals 10 Hours

Introducing Data Types and Operators
Java’s Primitive Types, Literals, A Closer Look at Variables, The Scope and Lifetime of Variables, operators, Shorthand Assignments, Type conversion in Assignments, Operator Precedence.

Program Control Statements
Input characters from the Keyword, Use break, Use continue.

Introduction to Classes, Objects and Methods
Class Fundamentals, How Objects are Created, Reference Variables and Assignment, Methods, Constructors, Parameterized Constructors, The new operator Revisited, Garbage Collection and Finalizers, The this Keyword.

More Data Types and Operators
Arrays, Multidimensional Arrays, Alternative Array Declaration Syntax, Assigning Array References, Using the Length Member, the For-Each Style for Loop, Strings

UNIT-II

String Handling 10 Hours
String Fundamentals, The String Constructors, Three String-Related Language Features, The Length() Method, Obtaining the characters within a string, String comparison, using indexOf() and lastIndexOf(), Changing the case of characters within a string, StringBuffer and StringBuilder.

A Closer Look at Methods and Classes

UNIT-III

Inheritance 11 Hours
Inheritance Basics, Member Access and Inheritance, Constructors and Inheritance, Using super to Call Super class constructors, Using super to Access Super class Members, Creating a Multilevel Hierarchy, When are Constructors Executed, Superclass References and Subclass Objects, Method Overriding, Overridden Methods support polymorphism, Why Overridden Methods, Using Abstract Classes, Using final, The Object Class.

Interfaces
Interface Fundamentals, Creating an Interface, Implementing an Interface, Using Interface References,
Implementing Multiple Interfaces, Constants in Interfaces, Interfaces can be extended, Nested Interfaces

Packages
Package Fundamentals, Packages and Member Access, Importing Packages, Static Import

UNIT-IV

Exception Handling
The Exception Hierarchy, Exception Handling Fundamentals, The Consequences of an Uncaught Exception, using multiple catch clauses, Catching subclass Exceptions, try blocks can be nested, throwing an Exception, A Closer look at Throwable, using finally, using throws, Java’s Built-in Exceptions.

Multithreaded Programming
Multithreading fundamentals, The Thread Class and Runnable Interface, Creating Thread, Creating Multiple Threads, Determining When a Thread Ends, Thread Priorities, Synchronization, using Synchronization Methods, The Synchronized Statement, Thread Communication using notify(), wait() and notifyAll(), suspending, Resuming and stopping Threads.

UNIT-V

Enumerations, Auto boxing
Enumerations, Java Enumeration are class types, TheValues() and Valueof() Methods, Constructors, methods, instance variables and enumerations, Autoboxing, Annotations(metadata)

Networking with Java.net

Exploring Collection Framework
Collections Overview, The Collection Interfaces, The collection Classes. The Arrays Class

Text Books:

1. Java Fundamentals, A comprehensive Introduction by Herbert Schildt, Dale Skrien. Tata McGraw Hill Edition 2013. (Chapters:1,2,3,4,5,6,7,8,9,10,11,12,13,15,22,23,24,25,26)

Reference Books:

3. Java 2 Essentials, Cay Hortsmann, second edition, Wiley

Course outcomes:
On completion of this course, the students should be able to:

CO1: Understand the basic programming constructs of Java. Apply suitable OOP concepts to develop Java programs for a given scenario.
CO2: Illustrate the concepts of Sting handling and static polymorphism
CO3: Exemplify the usage of inheritance, Packages, and Interfaces Exceptions and Multithreading
CO4: Illustrate exception handling concepts and Multithreading using different problem statements
CO5: Demonstrate Enumerations, Wrappers, Auto boxing, implement the concepts of networking using Java network classes
Mapping with Program Outcomes:

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3-Strong; 2-Medium; 1-Low
Course Learning Objectives (CLOs)
The objectives of this course are to:

- Analyze to solve problems using simple techniques of counting theory, and set theory
- Learn the fundamentals of logic and Identify the Use of quantifiers, the nature of proof like direct or indirect, proof by contradiction, check the validity of a given argument.
- Learn the basic concepts of Recurrence relations, Relations and Identify the different ways of representing relations in matrix and digraph form with properties.
- Apply the concepts of relations and functions to solve given problem.
- Learn the concepts graph theory and applications.

UNIT-I
10 Hours

UNIT-II
12 Hours
The Use of Quantifiers: Quantifiers, Definitions, Argument representation using quantifiers, validity. Proofs of Theorems- Direct and Indirect method - contradiction and contrapositive method.

UNIT-III
10 Hours
Cartesian Products and Relations, Functions – Plain and One-to-One, Onto Functions – Stirling Numbers of the Second Kind, Special Functions, The Pigeon-hole Principle, Function Composition and Inverse Functions.

UNIT-IV
10 Hours
Partial Orders – Partially ordered relations and Hasse Diagrams, Equivalence Relations and Partitions induced by Equivalence relations

UNIT-V
10 Hours
An Introductions to Graph Theory: Definitions and examples Sub graphs, Complements, and Graph Isomorphism, Vertex Degree : Euler Trails and Circuits, Planar Graphs, Hamiltonian Paths and Cycles. Graph coloring and Chromatic Numbers.
Text Book:
   (Chapter 1.1 to 1.4 Chapter 3.1 to 3.4, Chapter 2, Chapter 4.1, 4.2, Chapter 5.1 to 5.6, Chapter 7.1 to 7.4, Chapter 11.1 to 11.6.)

Reference Books:

Course outcomes:
On completion of this course, the students should be able to:

CO1: Explain the principles of counting and set theory.
CO2: Identify the quantifiers and their uses and apply fundamentals of logic theory.
CO3: Apply the mathematical induction principle and different methods to solve the given problem.
CO4: Solve the problems using the concepts of relations and functions and identify the different ways of representing relations.
CO5: Apply basic concepts of graph theory and solve the given problem.

Mapping with Program Outcomes:

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3-Strong; 2-Medium; 1-Low
Course Learning Objectives (CLOs)
The objectives of this course are to:

- Understand the fundamental concepts of computer networking.
- Understand data transformation and data transmission.
- Discuss various inter networking devices and transmission of data in inter-networks using routing algorithms.
- Apply various error detection and correction techniques in transmission of data.
- Distinguish various LANs.

UNIT-I

**Computer Networks and the Internet**  
10 Hours

UNIT-II

**Application Layer**  
10 Hours

UNIT-III

**Transport Layer**  
10 Hours

UNIT-IV

**The Network Layer**  
10 Hours

UNIT-V

**The Link Layer : Links, Access, Networks and LANs**  
12 Hours

**Wireless and Mobile Networks**
Introduction, Wireless Links and Network Characteristics, Wi-Fi: 802.11 Wireless LANs.
Text Book:

Reference Books:

Course outcomes:
On completion of this course, the students should be able to:

CO1: Describe basic terminologies used for computer networking and data communication model with its components.

CO2: Classify various categories of networks and types of inter-networking devices with their functions

CO3: Explain the roles and functions of each layer of TCP/IP.

CO4: Analyse the routing table for a given subnet using various routing algorithm.

CO5: Identify how error free transmission held between two end nodes.

Mapping with Program Outcomes:

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3-S strong; 2-medium; 1-low
Course Learning Objectives (CLOs)
The objectives of this course are to:

- Understand the fundamental concept of www and Create XHTML documents using XHTML tags like images, hyperlink, lists, tables, Forms, Frames.
- Outline CSS style sheets and learn the fundamentals of javascript.
- Summarize static and dynamic XHTML documents using JavaScript.
- Understand cookies using PHP and implement session tracking using PHP
- Outline the concepts of XML and AngularJS to design the web pages.

UNIT-I

Fundamentals of Web and Introduction to XHTML

10 Hours

Internet, WWW, Web Browsers and Web Servers, URLs, MIME, HTTP, Security, the Web Programmers Toolbox.

UNIT-II

Cascading Style Sheets and Basics of JavaScript

10 Hours

Cascading Style Sheets: Introduction, Levels of style sheets, Style specification formats, Selector forms, Property value forms, Font properties, List properties, Color, Alignment of text, The box model, Background images, The <span> and <div> tags.
Basics of JavaScript and HTML Documents: Overview of JavaScript, Object orientation and JavaScript, Syntactic characteristics, Primitives, operations, and expressions, Screen output and keyboard input, Control statements, Object creation and modification, Arrays, Functions, Constructors, Pattern matching using regular expressions, Errors in scripts, Examples.

UNIT-III

JavaScript Execution Environment and Dynamic JavaScript

10 Hours

Introduction, Positioning Elements, Moving Elements, Element Visibility, Changing Colors and Fonts, Dynamic Content, Stacking Elements, Locating the Mouse Cursor, Reacting to a Mouse Click, Slow Movement of Elements, Dragging and Dropping Elements.

UNIT-IV

Introduction to PHP

11 Hours

Introduction to PHP: Origins and uses of PHP, Overview of PHP, General syntactic characteristics, Primitives, operations and expressions, Output, Control statements, Arrays, Functions, Pattern matching, Form handling, Files, Cookies; Session Tracking.
UNIT-V

XML and Angular JS

Introduction, Syntax, Document structure, Document Type definitions, Namespaces; XML schemas, Displaying raw XML documents, Displaying XML documents with CSS, XSLT style sheets, XML processors, Web services.

Angular JS: General Features, Core Features, Concepts, Advantages, Disadvantages, MVC Architecture, First application, Directives, Expressions, Controllers, Filters, Tables, HTML DOM, Modules, Forms, Includes, AJAX, Views, Scopes, Services.

Text Books:
2. AngularJS Up & Running- Shyam Seshadri, Brad Green, 1st Edition, 2014, O'Reilly,

Reference Books:

Reference links: https://www.tutorialspoint.com/angularjs

Course outcomes:
On completion of this course, the students should be able to:

CO1: Explain the fundamentals of web and Solve the problems using XHTML tags .
CO2: Develop presentation web page using CSS tags .
CO3: Implement static and dynamic JavaScript document.
CO4: Illustrate Web Applications using PHP scripts.
CO5: Develop Web applications using XML and AngularJS.

Mapping with Program Outcomes:

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3-Strong; 2-Medium; 1-Low
Course Learning Objectives (CLOs)
The objectives of this course are to:

- Describe the architecture and features of UNIX operating system.
- Demonstrate the fundamental and file handling UNIX command with and examples.
- Discuss the UNIX file system concepts, organization and setting permission on files.
- Use meta characters, filters and regular expressions to effectively describe desired search pattern.
- Describe the shell script with conditional and looping statements.
- Implement user interface programs for UNIX operating system.

Topics to be discussed in Tutorial

- Introduction to UNIX, UNIX Architecture, Features of UNIX.
- General-Purpose Utilities
- UNIX File System and Ordinary File Handling Commands
- Basic File Attributes
- Shell’s Interpretive Cycle, Pattern Matching
- Shell Programming
- Simple Filters and Filters using Regular Expression

Laboratory
- Programs supplementing the concepts covered in tutorials and given in the list.
- Students are expected to execute the program in the list and implement simple applications using shell scripts.

Topics to be covered for Self Study

- The vi Editor

Text Book:

Reference Books:

List of Programs

1. a) Write a shell script that accepts two integers as its arguments and compute the value of first number raised to the power of second number.
   b) Write a shell script that accepts a pathname and creates all the components in that path name as directories. For example, if the script is named mpc, then the command mpc a/b/c/d should create directories a,a/b,a/b/c,a/b/c/d.
2. Write a shell script that accepts two file name as arguments, checks if the permission for these files are identical and if the permissions are identical, output common permissions otherwise output each file name followed by its permissions.

3. Write a shell script to create a menu that displays the today’s date, present working directory, the number of current users, attributes of a particular file and process status of the system based on the user choice.

4. a) Write a shell script that accepts valid login-in names as arguments and prints there corresponding home directories, if no arguments are specified, print a suitable error message.
   b) Write a shell script that accept one or more file names as arguments and convert all of them to upper case, provided they exist in current directory.

5. Write a shell script to implement terminal locking (similar to the lock command). It should prompt the user for a password. After accepting the password entered by the user, it must prompt again for the matching password as confirmation and if match occurs, it must lock the keyboard until a matching password is entered again by the user, note that the script must be return to disregard BREAK, control –D. no time limit need be implemented for the lock duration.

6. Write a shell script that displays all the links to a file specified as the first argument to the script. The second argument, which is optional, can be used to specify in which the search is to begin, if this second argument is not present, the search is to begin in current working directory. In either case, the starting directory as well as all its subdirectories at all levels must be searched. The script need not include any error checking.

7. a) Write a shell script that accepts as file-name as argument and display its creation time if file exist and if it does not send output error message.
   b) Write a shell script using expr command to read in a string and display a suitable message if it does not have at least 10 characters.

8. Write a shell script that compute gross-salary for an employee, according to the conditions given below.
   If basic salary is < 15000 then HRA=10% of basic and DA=90% of basic.
   If basic salary is >=15000 then HRA=5% of basic and DA=98% of basic

9. Write a shell script that delete all lines containing a specific word in one or more file supplied as argument to it.

10. a) Write a shell script that gets executed display the message either “Good Morning” or “Good Afternoon” or “Good Evening” depending upon time at which the user logs-in.
    b) Write a shell script to find a file/s that matches a pattern given as command line argument in the home directory, display the contents of the file and copy the file into the directory ~/mydir

11. Write a shell script that accept a list of file names as its arguments, count and report occurrence of each word that is present in the first argument file on other argument files.

12. Write a shell script that accept the file name, starting and ending line number as arguments and display all the lines start with starting line number to ending line number.

**NOTE:** Students have to develop a simple application using shell scripts.
Course outcomes:
On completion of this course, the students should be able to:

CO: Identify and use UNIX/Linux utilities to Create and manage simple file processing operations, organize directory structures with appropriate security, Develop shell scripts to perform repetitive tasks and Create awk scripts using arrays, control and looping statements, and functions

Mapping with Program Outcomes:

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3-Strong; 2-Medium; 1-Low
Course Code : P20MCAL17 | Semester : I | L-T-P : 0 : 0 : 3  
Course Title : Java Programming Lab  
Credits : 1.5 | Contact Period : 32 Hrs, Exam : 3Hrs | Weightage : CIE : 50% SEE : 50%

Course Learning Objectives (CLOs)
The objectives of this course are to:

- Understand Constructor Overloading and Overriding for a given problem statement
- Familiarize Standard String class and Array Class methods
- Outline appropriate fundamental concepts interface for real time application
- Understand Exception handling and multithreading programming for given problem
- Outline the front end GUI tools applet, swing and develop client server programs

List of Programs
1. Write a java program to demonstrate reading data from keyboard and command line arguments.
2. Write a java program to demonstrate constructor overloading and method overloading.
3. Write a java Program to implement Inner class and demonstrate its Access Protections.
4. Write a Java Program to demonstrate the addition of two matrices in Java.
5. Write a program in Java for String handling which performs the following:
   i) Checks the capacity of StringBuffer objects.
   ii) Reverses the contents of a string given on console and converts the resultant string in upper case.
      Reads a string from console and appends it to the resultant string of ii
6. Write a java program to implement inheritance (Multilevel Inheritance).
7. Write a java program to create an interface and implement it in class.
8. Write a java program to implement Exception Handling (using Nested try catch and finally).
9. Write a java program to create a class (extending thread) and use methods thread class to change name, priority, --- of the current thread and display the same.
10. Write a JAVA program using Synchronized Threads, which demonstrates Producer Consumer concept.
11. Complete the following:
    1. Create a package named shape.
    2. Create some classes in the package representing some common shapes like Square, Triangle, and Circle.
    3. Import and compile these classes in other program.
12. Write a JAVA Program
    Create an enumeration Day of Week with seven values SUNDAY through SATURDAY. Add a method is Workday( ) to the DayofWeek class that returns true if the value on which it is called is MONDAY through FRIDAY.
    For example, the call DayOfWeek.SUNDAY.isWorkDay ( ) returns false.
13. Create an Applet to Scroll a Text Message from right to left across the applet window.

14. Write a Java Swing Applet which accepts a text from a JTextField and display the same text with selected font size and font colour using JLabel.

15. Write a Java Program to implement Client Server( Client requests a file, Server responds to client with contents of that file which is then display on the screen by Client – Socket Programming).

Course outcomes:
On completion of this course, the students should be able to:

CO: Design and implement OOPs concepts and Exception handling, Multithreading, Networking for given scenarios

Mapping with Program Outcomes:

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3-Strong; 2-Medium; 1-Low
Course Code : P20MCAL18 | Semester : I | L-T-P : 0 : 0 : 3  

Course Title : Web Technologies Lab  
Credits : 1.5 | Contact Period : 32 Hrs, Exam : 3Hrs | Weightage : CIE : 50% SEE : 50%

Course Learning Objectives (CLOs)  
The objectives of this course are to:

- Understand the fundamental concept of XHTML programs.
- Implement the CSS with XHTML to access user required information from the system.
- Execute programs on static and dynamic javascript.
- Write and implement programs on PHP.
- Develop programs on XML and angular JS to design the web pages.

List of Programs

1) To create a simple XHTML home page which consist of P.E.S.C.E College history to demonstrate the usage of different tags:
   a. Paragraph
   b. Line break
   c. Heading
   d. Hyperlink to web page which consist of
      I. List of departments in college
      II. List of staff names in M.C.A. dept
      III. List of subjects of all semester of M.C.A using nested list
      IV. Frames of all above webpages.

2) To create a simple XHTML page to demonstrate the usage of different tags:
   a. Image insertion
   b. Table-1st sem MCA marks card creation.

3) To create a simple XHTML page to demonstrate the usage of different tags:
   a. Forms which includes text box, check box, radio buttons…
   b. Audio and Video file insertion.

4) To create an XHTML with CSS script code to demonstrate the usage of:
   a. Border properties
   b. Margin and padding which includes all subject code followed by subject name followed by staff name.

5) Develop and demonstrate a XHTML file that includes JavaScript script for the following problems:
   a) Input: A number n obtained using prompt
      Output: The first n Fibonacci numbers
   b) Input: A number n obtained using prompt
      Output: A table of numbers from 1 to n and their squares using alert.

6) Develop and demonstrate, using JavaScript, an XHTML document that collects the customer name (the valid format is: Name(last name, first name, middle initial) and phone number(the valid format is: phone number(ddd-ddd-dddd)). Event handler must be included for the form element that collects this information to validate the input. Messages in the alert windows must be produced when errors are detected.

7) Develop and demonstrate different positioning element using JavaScript an XHTML document.
   a. Absolute positioning
   b. Relative positioning.
8) Develop and demonstrate using JavaScript script, a XHTML document that contains three images, stacked on top of each other, with only enough of each showing so that the mouse cursor can be placed over some part of them. When the cursor is placed over the exposed part of any paragraph, it should rise to the top to become completely visible.

9) Write dynamic JavaScript code that contains:
   a. Multi-Validating Registration Form
   b. To create a html page to create online exam paper format with 4 optional answer.

10) Write a PHP program to input previous reading and present reading and prepare an electricity bill

11) Using PHP and MySQL, develop a program to accept book information viz. Accession number, title, authors, edition and publisher from a web page and store the information in a database and to search for a book with the title specified by the user and to display the search results with proper headings.

12) a) Design an XML document to store information about a student in an engineering college affiliated to VTU. The information must include USN, Name, Name of the College, Brach, Year of Joining, and e-mail id. Make up sample data for 3 students. Create a CSS style sheet and use it to display the document.
   b) Create an XSLT style sheet for one student element of the above document and use it to create a display of that element.

13) Write angular js program to perform the following:
   a) arithmetic operations which will produce the result based on the type of operands
   b) Creation of Table.

14) Develop using angular js to create the form which contains Employee Information with submit and reset functionality.

Course Outcomes:
On completion of this course, the students should be able to:

CO: Construct and implement web page using XHTML, CSS, Java Script for a given problem

Mapping with Program Outcomes:

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3-Strong; 2-Medium; 1-Low
Course Learning Objectives (CLOs)
The objectives of this course are to:

- Understand the basic rules of sentence structure
- Summarize the usage of preposition and conjunctions
- Outline the importance of vocabulary builder
- Understand the individual writing skills
- Explain SWOT, Goal Setting and Resume Building

UNIT – I

6 hours

**Subject Verb Agreement:** Basic rules of sentence structure, Usage of singular and plural, Usage of appropriate verb, Introduction to phrases, Construction of Simple sentences and Compound Sentences, Introduction to parts of speech

**Tenses:** Identification of tenses, Past tense, Present tense, Future tense, Indicators of tenses, Introduction to verb tenses, Past perfect, Past progressive, Past perfect progressive, Present perfect progressive, Future perfect, Future progressive.

**Articles:** Introduction to articles, Exploring the usage of ‘a’, ‘an’ and ‘the’, Golden rules of articles, Differentiating between definite and indefinite articles, Understanding the exceptions of definite and indefinite articles.

UNIT – II

8 hours

**Preposition:** Introduction to prepositions, Importance of usage of positions, Rectifying common errors in context to using preposition, Right usage of common prepositions like in, on, under, behind, below etc.

**Conjunctions:** Introduction to conjunctions, Understanding the importance of usage of conjunctions, Usage of different conjunctions in a compound sentence, Understanding the meaning of conjunction like yet, since, until, however, but etc.

UNIT – III

6 hours

**Vocabulary builder - Getting off a good start:** How to test your present vocabulary, how to start building your vocabulary, how to talk about personality types, how to talk about doctors, how to talk about various practitioners, how to talk about science and scientists, how to talk about liars and liars. Each of these sessions includes origin of words and related words, Etymology, tools to assess and follow up the progress

UNIT – IV

6 hours

**Writing Skills 1:** Sentence Formation, Punctuation, Avoiding Cliché, Different Types of Writing Formats, Importance of Writing Skills, Formal and Informal Style of Writing

**Writing Skills 2:** Format for e-mail writing. Format for Letter Writing. Some common errors. Creative Writing. Blog Writing

UNIT – V

6 hours

**SWOT:** Identifying the individual’s Strengths, Weakness, Opportunities and Threats by using SWOT Matrix, Difference between internal and external factors, Aids on utilizing strengths to maximum effect for
both personal and professional growth, Aids to identify the origin of the weakness and take corrective
measures, Aids to use one’s strengths to identify and maximise both personal and professional
opportunities, Identifying the external factors/change in the external environment that can pose threats,
Tackling threats appropriately.

Goal Setting: Understanding of the meaning of ‘Goals’, Understanding the importance of goals, Necessity
of goals, 5 myths of goals, Long term and Short term goals, SMART goal setting technique.

Resume Building: Meaning of Resume, Difference between Resume, Curriculum Vitae and Bio-data,
Difference between creating a resume and building a resume, Importance of resume, Importance of
Academic achievements, Importance of extracurricular achievements, Importance of striking a balance
between curricular and co-curricular activities, Value of an all-rounder, Structure of a resume, Importance
of building resume from 1st Year Engineering.

Etiquettes: What are Etiquettes, Importance of Professional Etiquettes, Importance of First Impression,
Professional presence, Importance of Formal dressing, Decoding the formal dress code, Professional body
language, Importance of Microsoft Power point in professional circuits

Watch the Time: Organizing
Yourself, Time Saving Techniques, Understanding Priorities Based Time Roles, Procrastination, Different
Methods of Splitting Time, Efficient Time Utilization, Value of Time, Streamlining Daily Routine , Big
rock theory, Spent time matrix, Urgency vs Importance, Time bound goal management, 10 time
management mistakes, Essential habits for better time management.

Reference Books:
Publisher.
3. “The 7 habits of Highly Effective People” by Stephen R. Covey

Course outcomes:
On completion of this course, the students should be able to:

CO1: Rectify Indianism and have better ability to frame grammatically correct sentences and usage of
tenses and article
CO2: Exhibit knowledge of correct pronunciation of words
CO3: Increase the number of words in his/her day-to-day usage of vocabulary
CO4: Confidently attempt writing grammatically correct English paragraphs and express
themselves
CO5: Reflect elevated standard of learning through the implementation of creative cognitive technique

Mapping with Program Outcomes:

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</table>

3-Strong; 2-Medium; 1-Low
Course Code: P20MCAL110  |  Semester: I  |  L-T-P: 0 : 1 : 2

Course Title: Programming Lab

| Credits: NA | Contact Period: 52 Hrs, Exam: 3Hrs | Weightage: CIE: 50% SEE: 50% |

Course Learning Objectives (CLOs)
The objectives of this course are to

- Design basic programming construction in C so that they can easily switch over to any other language in future.
- Demonstrate the looping and decision making statements in C language.
- Analyze and interpret the concept of arrays, structures, pointers and their usage
- Recognize the use of various categories of functions.
- Illustrate the concepts of file management in C programming language.

Topics to be discussed in Tutorial with respect to C Programming Language

- Decision Making
- Control Structures
- Arrays
- Functions
- Structures
- Pointers
- Files

Laboratory

- Programs supplementing the concepts covered in tutorials are given in the list.
- Students are expected to execute the programs given in the list.

Text Books:

Reference Books:
1. Programming with C, Byron Gottfried & Jithendra Kumar Chhabra, Third Edition

List of Programs
1. Given the 3 digit register number along with marks of 5 subjects for 100 marks of a student, write a program to display the grade of the student according to the following condition.
   - Minimum passing marks is 35 in all subjects
   - Average Score >= 35 and < 50 no grade “Pass”
   - Average Score of 50 to 60 percent is grade ‘D’
   - Average Score > 60 and <= 70 percent is grade ‘C’
   - Average Score > 70 and <= 80 percent is grade ‘B’
   - Average Score > 80 and <= 90 percent is grade ‘A’
   - Average Score >90 grade ‘S’
2. A class of N students take an annual examination in M subjects. Write a C program to read the marks obtained by each student in various subjects and to compute and print the total marks obtained by each of them. The program should uses two for loops, one for controlling the number of students and the other for controlling the number of subjects. Since both the number of students and the number of subjects are requested by the program, the program may be used for a class of any size and any number of subjects. The outer loop includes three parts:
   • reading of roll-numbers of students, one after another,
   • inner loop, where the marks are read and totaled for each student, and
   • printing of total marks and declaration of grades.

3. An election is contested by 5 candidates. The candidates are numbered from 1 to 5 and the voting is done by marking the candidate number on the ballot paper. Write a c program to read the ballots and count the votes cast for each candidate using an array variable COUNT. In case, a number is read outside the range 1 to 5, the ballot should be considered as a ‘Spoilt Ballot’ and the program should also count the number of Spoilt Ballot.

4. Write a C program to generate N prime numbers using any of the loop construct.

5. Write a C program to compute and print a multiplication table for numbers 1 to 5 as shown below

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<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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</tbody>
</table>

6. Write a C program using a two-dimensional array to compute and print the following information from the table of data given below

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<tr>
<th></th>
<th>Item-1</th>
<th>Item-2</th>
<th>Item-3</th>
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</thead>
<tbody>
<tr>
<td>Salesgirl #1</td>
<td>310</td>
<td>275</td>
<td>365</td>
</tr>
<tr>
<td>Salesgirl #2</td>
<td>210</td>
<td>190</td>
<td>325</td>
</tr>
<tr>
<td>Salesgirl #3</td>
<td>405</td>
<td>235</td>
<td>240</td>
</tr>
<tr>
<td>Salesgirl #4</td>
<td>260</td>
<td>300</td>
<td>380</td>
</tr>
</tbody>
</table>

   • Total value of sales by each girl.
   • Total value of each item sold.
   • Grand total of sales of all item by all girls.

7. Write a C program to multiply two matrices considering the appropriate size of two matrices.

8. Write a C program to whether the two strings are equal or not without using string functions.

9. Write a C program to insert a Substring in a given string using string functions.
10. Write a C program to extract substring from a given string using string functions.

11. Write a C program to find factorial of a number using recursion.

12. Write a C program using structures to maintain information about N student list, Information consist of student name, register no, marks of 3 subjects and to display information of Name, marks of 3 subjects and average marks of given register number.

13. Write a C program to accept and display structure members such as roll no, name, class and attendance using pointers.

14. Write a C program to illustrate the use of pointers in arithmetic operations.

15. Write a C program to read data from the keyboard, write it to a file called INPUT, again read the same data from the INPUT file, and display it on the screen.

**Course outcomes:**

**On completion of this course, the students should be able to:**

**CO1:** Develop solutions for given problem using C programming language.

**Mapping with Program Outcomes:**

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3-Strong; 2-Medium; 1-Low
Course Learning Objectives (CLOs)
The objectives of this course are to:

- Understand different types of process models used in Software Engineering, the Agile method and Extreme programming of Software Engineering.
- Explain different types of software requirements and dependability issues.
- Apply system models, Architectural Design, System organization and object oriented design using UML.
- Understand the concept of Component-based, Distributed Software engineering and Risk management, Managing people, Teamwork.
- Explain the concept of Project scheduling, Estimation Techniques and Software Testing in Project management.

UNIT-I

Overview, Software Process and Agile Software Development 10 Hours

UNIT-II

Requirement Engineering, Dependability and security 10 Hours
Requirements Engineering: Functional and non-functional requirements, the software requirements document, Requirements specification, Requirements engineering processes, Requirement elicitation and analysis, Requirements validation, Requirements management.
Dependability and security: Dependability properties, availability and reliability, safety and security.

UNIT-III

System Modeling, Architectural Design, Design and implementation 10 Hours
System Modeling: Context models, Interaction models, Structural models, Behavioral models, Model-driven Engineering.
Design and implementation: object oriented design using UML, design patterns, implementation issues.

UNIT-IV

Component-based, Distributed software engineering and project management 12 Hours
**Component-based software engineering:** Components and component model, CBSE process, Component composition.

**Distributed Software engineering:** Distributed system issues, Client-server computing, Architectural patterns for distributed systems.

**Project Management:** Risk Management, managing people, Team work.

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**UNIT-V**

**Project planning and software testing**

**Project Planning:** software pricing, plan driven development, Project scheduling, Estimation Techniques, project duration and staffing.

**Software Testing:** Unit testing, component testing, system testing, user testing.

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**Text Book:**
   (Chapters: 1, 2, 3, 4, 5, 6, 7, 8, 11, 17, 18, 22, 23)

**Reference Books:**

**Course outcomes:**

**On completion of this course, the students should be able to:**

**CO1:** Identify various types of software process and significance of software process activities.

**CO2:** Distinguish between different types of software requirements.

**CO3:** Analyze different system models and architectural models.

**CO4:** Describe concept of Component-based, Distributed Software engineering and team work

**CO5:** Analyze and design software engineering concepts to solve the problems

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**Mapping with Program Outcomes:**

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3-Strong; 2-Medium; 1-Low
Course Learning Objectives (CLOs)
The objectives of this course are to:

- Determine the impact of structuring data to achieve efficiency of a solution to a problem.
- Analyse and develop programs to implement standard data structures such as stacks, queues, lists.
- Apply important algorithmic design paradigms and methods of analysis (Brute-Force, Divide-and-conquer, greedy, dynamic etc.)
- Explain the importance of designing efficient algorithms by comparing different complexity classes.
- Possess the ability to design simple algorithms for solving computing problems

UNIT-I
Introduction to Data Structures
Definition, Classification of Data Structures.
The Stack and Recursion
Definition and examples: Primitive operations, Example, Representing stacks: Implementing the pop operation, Testing for exceptional conditions, Implementing the push operations, Examples for infix, postfix, and prefix expressions, Basic definition and Examples, Program to evaluate a postfix expression, Converting an expression from infix to postfix, Program to convert an expression from infix to postfix, Applications of Stacks: Expression evaluations, Recursion. Recursive definition and processes: Factorial function, Fibonacci sequence, Binary search, Tower of Hanoi problem.

UNIT-II
Queues and Linked Lists
Queue: The queue and its sequential representation: operation of queue, Priority queue, Array implementation of a priority queue. Linked lists: Inserting and removing nodes from a list, Linked implementations of stacks, get node and free node operations, Linked implementation of queues, Linked list as a data structure, Example of list operations, Header nodes, Array implementation of lists, Limitations of array implementation, allocating and freeing dynamic variables, Linked lists using dynamic variables, Circular lists, operations on circular list

UNIT-III
Introduction and fundamentals of Algorithm Efficiency

Brute Force, Divide and Conquer
Selection Sort and Bubble Sort, String Matching, Merge-sort, Binary tree Traversals and related properties.

UNIT-IV
Decrease-and-Conquer
Insertion Sort, Depth First search and Breadth First Search, Topological sorting, Algorithms for Generating Combinatorial Objects.

Transform and-Conquer, Space and Time Tradeoffs

UNIT-V
Dynamic Programming
Computing a binomial coefficient, Warshall’s and Floyd’s Algorithms, The Knapsack Problem and Memory Functions

Greedy Technique
Prim’s Algorithm, Kruskal’s Algorithm, Dijkstra’s Algorithm, Huffman Trees.

Text Book:

Reference Books:

Course outcomes:
On completion of this course, the students should be able to:

CO1: Apply the stack data structures for suitable real time applications.
CO2: Choose and implement the appropriate data structures to solve computational problems.
CO3: Discuss the basic concepts of algorithms.
CO4: Design and develop efficient algorithm for a given problem.
CO5: Analyze complexity of algorithms for different types of problems.

Mapping with Program Outcomes:

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S-Strong; M-Medium; L-Low
Course Learning Objectives (CLOs)
The objectives of this course are to:

- Define what operating systems are and its concepts.
- Identify the services provided by the operating system and learning different operating structure.
- Understand process management and coordination with classic synchronization problems.
- Evaluate various CPU scheduling algorithm problems and analyze methods for handling deadlocks.
- Discuss different memory management techniques such as contiguous, paging, segmentation and virtual memory.
- Explain file system and its implementation, mass storage and its scheduling

UNIT-I
10 Hours
What operating systems do, Computer System organization, Computer System architecture, Operating System structure, Operating System operations, Process management, Memory management, Storage management, Protection and security, Distributed system, Special-purpose systems, Computing environments, Open source Operating systems-Linux, Operating System Services, User-Operating System interface, System calls, Types of system calls, System programs, Operating System design and implementation, Operating System structure, Virtual machines, Operating system debugging – Failure Analysis, Performance Tuning, Operating System generation, System boot.

UNIT-II
10 Hours

UNIT-III
12 Hours
Synchronization: The Critical section problem; Peterson’s solution; Synchronization hardware, Semaphores, Classical problems of synchronization, Deadlocks: System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection and recovery from deadlock.

UNIT-IV
10 Hours
Memory Management Strategies: Background; Swapping; Contiguous memory allocation; Paging; Segmentation. Virtual Memory Management: Background; Demand paging; Page replacement; Allocation of frames; Thrashing.

UNIT-V
10 Hours
Case Study: The Linux Operating System
Linux history; Design Principles; Kernel modules; Process management; Scheduling; Memory management; File systems, Input and output; Inter-process communication.

Text Book:

Reference Books:

Course outcomes:
On completion of this course, the students should be able to:

CO1: Define operating system goals, utilities, services and structures.
CO2: Explain process concepts, communication and evaluate various CPU scheduling algorithm Problems
CO3: Understand process synchronization and Identify methods for handling deadlocks
CO4: Analyze and Explain different memory management techniques.
CO5: Explain how files are organized, manipulated data on disk is organized scheduled and Linux Operating System.

Mapping with Program Outcomes:

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3-Strong; 2-Medium; 1-Low
Course Learning Objectives (CLOs)

The objectives of this course are to:

- Define DBMS terms and illustrate the components of DBMS.
- Design a relational Database schema, ER-Model for real time database applications.
- Understand the relational data model concepts.
- Illustrate queries using SQL for a DBMS application.
- Apply the Normalization concepts to normalize the database and Describe the concepts of DBMS transactions, concurrency control and crash recovery.

UNIT-I

Introduction 08 Hours
Introduction, An example, Characteristics of Database approach, Actors on the screen, Workers behind the scene, Advantages of using DBMS approach, A brief history of database applications, when not to use a DBMS. Data models, schemas and instances, Three-schema architecture and data independence, Database languages and interfaces, The database system environment; Centralized and client-server architectures; Classification of Database Management systems.

UNIT-II

Entity-Relationship Model 10 Hours
Using High-Level Conceptual Data Models for Database Design; An Example Database Application, Entity Types, Entity Sets, Attributes and Keys, Relationship types, Relationship Sets, Roles and Structural Constraints, Weak Entity Types, Refining the ER Design; ER Diagrams, Naming Conventions and Design Issues; Relationship types of degree higher than two.

UNIT-III

Relational Model and Relational Algebra 10 Hours
Relational Model Concepts; Relational Model Constraints and Relational Database Schemas; Update Operations, Transactions and dealing with constraint violations; Unary Relational Operations: SELECT and PROJECT; Relational Algebra Operations from Set Theory; Binary Relational Operations: JOIN and DIVISION; Additional Relational Operations; Examples of Queries in Relational Algebra; Relational Database Design Using ER- to-Relational Mapping.

UNIT-IV

SQL 12 Hours
SQL Data Definition and Data Types; Specifying basic constraints in SQL; Schema change statements in SQL, Basic queries in SQL, More complex SQL Queries. Insert, Delete and Update statements in SQL; Specifying constraints as Assertion and Trigger; Views (Virtual Tables) in SQL; Additional features of SQL: Database programming issues and techniques; Embedded SQL, Dynamic SQL; Database stored procedures and SQL / PSM.

UNIT-V

Database Design and Transaction Management 12 Hours
Informal Design Guidelines for Relation Schemas; Functional Dependencies; Normal Forms Based on Primary Keys; General Definitions of Second and Third Normal Forms; Boyce-Codd Normal Form.
Transaction: The ACID Properties; Transactions and Schedules; Concurrent Execution of Transactions; Lock-Based Concurrency Control; Performance of locking; Transaction Support in SQL; Introduction to Crash Recovery.

Text Books:


Reference Book:


Laboratory

- Programs given in the list need to executed in the laboratory.

**List of Programs**

1. Construct an ER-model and Database schema for the following database for a Banking Enterprise
   BRANCH(branch-name:string, branch-city:string, assets:real)
   ACCOUNT(accno:int, branch-name:string, balance:real)
   DEPOSITOR(customer-name:string, accno:int)
   CUSTOMER(customer-name:string, customer-street:string, customer-city:string)
   LOAN(loan-number:int, branch-name:string, amount:real)
   BORROWER(customer-name:string, loan-number:int)

   a. Create the above tables by properly specifying the primary keys and the foreign keys
   b. Enter at least five tuples for each relation
   c. Find all the customers who have at least two accounts at the Main branch.
   d. Find all the customers who have an account at all the branches located in a specific city.
   e. Demonstrate how you delete all account tuples at every branch located in a specific city.

2. Construct an ER-model and Database Schema for a Video Library scenario
   CUSTOMER(cust_no: integer, cust_name: string)
   MEMBERSHIP(Mem_no: integer, cust_no: integer)
   CASSETTE(cass_no:integer, cass_name:string, Language: String)
   ISS_REC(iss_no: integer, iss_date: date, mem_no: integer, cass_no: integer)

   a. Create the above tables by properly specifying the primary keys and the foreign keys.
   b. Enter at least five tuples for each relation.
   c. List all the customer names with their membership numbers.
   d. List all the issues for the current date with the customer names and cassette names.
   e. Create a view which lists outs the iss_no, iss_date, cust_name, cass_name

3. Construct an ER-model and Database Schema for a student-Lab scenario.
   STUDENT(stud_no: integer, stud_name: string, class: string)
   CLASS(class: string, descrip: string)
   LAB(mach_no: integer, Lab_no: integer, description: String)
ALLOTMENT(Stud_no: Integer, mach_no: integer, dayof week: string)
a. Create the above tables by properly specifying the primary keys and the foreign keys.
b. Enter at least five tuples for each relation.
c. List all the machine allotments with the student names, lab and machine numbers
d. How many students class wise have allocated machines in the labs
e. Create a view which lists out the stud_no, stud_name, mach_no, lab_no, dayofweek

4. Construct an ER-model and Relation schema for a airline flight information
   Flights (no: integer, from: string, to: string, distance: integer, Departs: time, arrives:time, price:real)
   Aircraft (aid: integer, aname: string, cruisingrange: integer)
   Certified (eid: integer, aid: integer)
   Employees (eid: integer, ename: string, salary: integer)

   **Note:** That the Employees relation describes pilots and other kinds of employees as well, every pilot is certified for some aircraft, and only pilots are certified to fly.

   a. Create the above tables by properly specifying the primary keys and the foreign keys.
   b. Enter at least five tuples for each relation.
   c. Find the names of aircraft such that all pilots certified to operate them have salaries more than Rs.80,000.
   d. For each pilot who is certified for more than three aircrafts, find the eid and the maximum cruisingrange of the aircraft for which she or he is certified.
   e. Find the names of pilots whose salary is less than the price of the cheapest route from Bengaluru to Frankfurt.

5. Construct an ER-model and Database schema for a Album song Information.
   MUSICIAN(ssn:integer, name:string, address:string, phone:integer)
   PLAYS(id:integer, ssn:integer)
   INSTRUMENT(id:integer, iname:string, m_key:integer)
   PERFORMS(ssn:integer, title:string)
   SONG(title:string, Author,aid:integer)
   ALBUM(aid:integer, title:string , c_date:date, format:string, producer_ssn:integer)

   a. Create the above tables by properly specifying the primary keys and the foreign keys.
   b. Enter at least five tuples for each relation.
   c. List musician name,title of the song which he has played the album in which song has occulted.
   d. List the details of songs which are performed by more than 3 musicians.
   e. List the different instruments played by the musicians and the average number of musicians who play the instrument.

**Course outcomes:**
**On completion of this course, the students should be able to:**

**CO1: Demonstrate** the basic concepts of DBMS with Data model.
**CO2: Construct** an ER-diagram for a given problem description.
**CO3: Identify** appropriate Primary key and foreign key in an ER model, specify structural constraints on each relationship.
**CO4: Formulate** data retrieval queries in SQL based on assumption and requirements.
**CO5: Design** and Develop a database application using relation schema with the help of normalization and Explain transaction processing, concurrency control and crash recovery.
Mapping with Program Outcomes:

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3-Strong; 2-Medium; 1-Low
ELECTIVE GROUP-I

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<td>Contact Period : 52 Hrs, Exam : 3Hrs</td>
<td>Weightage : CIE : 50% SEE : 50%</td>
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Course Learning Objectives (CLOs)
The objectives of this course are to:

- Understand the concepts of Data warehousing Architecture and Implementation.
- Describe the Conceptual, Logical, and Physical design of Data Warehouses OLAP applications and OLAP deployment.
- Understand Data mining principles and techniques and Introduce DM as a cutting edge business intelligence.
- Discuss the use association rule mining for handling large data to extract patterns.
- Illustrate the concept of classification for the retrieval purposes.
- Describe Clustering algorithms and Outlier Analysis.

UNIT-I
Data Warehousing and OLAP 12 Hours
Introduction, Operational Data Stores (ODS), Extraction Transformation Loading (ETL), Data Warehouses, Data Warehouse Design, and Guidelines for Data Warehouse Implementation, Data Warehouse Metadata.
OLAP : Introduction, Characteristics of OLAP systems, Multidimensional view and Data Cube, Data Cube Implementations, Data Cube Operations, Guidelines for OLAP Implementation, and Overview on OLAP Software.

UNIT-II
Data Mining 08 Hours
Introduction, Challenges, Data Mining Tasks, Types of Data, Data Preprocessing, Measures of Similarity and Dissimilarity, Data Mining Applications.

UNIT-III
Association Analysis: Basic Concepts and Algorithms 12 Hours
Frequent Item set Generation, Rule Generation, Compact Representation of Frequent Item sets, Alternative methods for Generating Frequent Item sets, FP-Growth Algorithm, Evaluation of Association Patterns.

UNIT-IV
Classification 08 Hours
Basics, General Approach to Solve Classification Problem, Decision Tree Induction, Rule Based Classifier, Nearest-Neighbor Classifiers, and Bayesian Classifiers.

UNIT-V
Clustering Techniques and Outlier Analysis 12 Hours
Overview, Features of Cluster Analysis, Types of Data and Computing Distance, Types of Cluster Analysis Methods, Partitional Methods, Hierarchical Methods, Density Based Methods, Quality and Validity of Cluster Analysis Methods.
Outlier Analysis: Outlier Detection Methods, Statistical Approaches, Clustering based Approaches, Classification based Approaches.
Text Books:

Reference Books:
1. Jiawei Han and Micheline Kamber, Data Mining - Concepts and Techniques, 3rd Edition, Morgan Kaufmann Publisher.

Note: At the end of the course students should come out with case study, It carries a weightage of 20% of CIE.

Course outcomes:
On completion of this course, the students should be able to:

CO1: Understand the basic concepts of Data Warehousing and OLAP Implementation.
CO2: Discuss the basic concepts, techniques, and applications of data mining.
CO3: Illustrate the association rules to extract appropriate pattern in massive data.
CO4: Describe the different classification techniques
CO5: Illustrate the clustering techniques and outlier analysis in detail for better organization and retrieval of data

Mapping with Program Outcomes:

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3-Strong; 2-Medium; 1-Low
Course Learning Objectives (CLOs)
The objectives of this course are to

- Understand and Discuss different Model View Controller design pattern techniques in various application areas
- Summarise knowledge of frameworks in the development of Web application
- Analyze the performance of Web frameworks
- Understand MVC based applications using MEAN

UNIT-I
10 Hours
Introduction to MEAN (MongoDB, ExpressJS, AngularJS, NodeJS) Three-tier web application development, Introduction to JavaScript and MEAN, Introduction to Node.js, JavaScript event-driven programming Node.js - event-driven programming, JavaScript closures Node modules, Common JS modules, Node.js core modules, Node.js third-party modules, Node.js file modules. Introduction to AngularJS - Key concepts of AngularJS, the core module of AngularJS, The angular global object, AngularJS modules Two-way data binding

UNIT-II
12 Hours
Building Express Web Application - Introduction to Express, Installing Express, Creating your first Express application, The application, request and response objects- The application object, The request object, The response object, External middleware, Implementing the MVC pattern-Application folder structure, Horizontal folder structure, Vertical folder structure, File-naming, conventions, Implementing the horizontal folder structure, Configuring an Express application-Environment configuration files Rendering views, Configuring the view system Rendering EJS views-Configuring the view system 71, Rendering EJS views.

UNIT-III
10 Hours
Creating a MEAN CRUD Module Implementing the AngularJS MVC module-Creating the AngularJS module service, Setting up the AngularJS module controller, Implementing the AngularJS module views, The create() method of the AngularJS controller, The find( ) and find One() methods of the AngularJS controller, The update() method of the AngularJS controller, The delete() method of the AngularJS controller Implementing the AngularJS module views- The create-article view, The view-article view, The edit-article view, The list-articles view

UNIT-IV
8 Hours
UNIT-V

12 Hours

Introduction to Mongoose-Introducing Mongoose , Connecting to MongoDB, Understanding Mongoose schemas, Creating the user schema and model, Registering the User model, Creating new users using save(), Finding multiple user documents using find(), Reading a single user document using find One(), Updating an existing user document Deleting an existing user document, Extending your Mongoose schema- Defining default values, Using schema modifiers, Predefined modifiers, Custom setter modifiers, Custom getter modifiers.

Text Books:

Reference Book:
1. Angular JS for .NET Developers by Sheppard/Miller/Liptak SAMS 2016

Note: At the end of the course students should come out with case study, It carries a weightage of 20% of CIE.

Course outcomes:
On completion of this course, the students should be able to:

CO1: Summarize the concepts of Model view controller
CO2: Apply Model, view and controller for developing applications using MEAN
CO3: Design Web entities for developing web applications using MEAN framework
CO4: Implement MVC framework for enterprise applications.
CO5: Apply MongoDB CRUD operations.

Mapping with Program Outcome

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3-Strong; 2-Medium; 1-Low
Course Code : P20MCA253  
Semester : II  
L-T-P : 3 : 2 : 0

Course Title : System Simulation and Modelling

Credits : 4  
Contact Period : 52 Hrs, Exam : 3Hrs  
Weightage : CIE : 50% SEE : 50%

Course Learning Objectives (CLOs)
The objectives of this course are to

- Understand whether the simulation is a useful tool for analysis of behavior of the system.
- Ability to understand different types of systems.
- Determine the capabilities and limitations of a system that undergoes simulation study.
- Discuss generators for random number generation for simulation study of a system.
- Analyze the system behaviour based on Input and Output modelling.
- Describe the verification and validation of the system.

UNIT-I
Introduction  
10 Hours
When simulation is the appropriate tool and when it is not appropriate; Advantages and disadvantages of Simulation; Areas of application; Systems and system environment; Components of a system; Discrete and continuous systems; Model of a system; Types of Models; Discrete-Event System Simulation; Steps in a Simulation Study.

UNIT-II
Random-Number Generation  
12 Hours
Properties of random numbers; Generation of pseudo-random numbers; Techniques for generating random numbers; Tests for Random Numbers.
Random-Variate Generation
Inverse transform technique; Acceptance-Rejection technique.

UNIT-III
Queuing Models  
10 Hours
Characteristics of queuing systems; Queuing notation Simulation Examples: Queuing, Inventory System

UNIT-IV
General Principles  
10 Hours
Input Modeling
Data Collection; Identifying the distribution with data; Parameter estimation; Goodness of Fit Tests; Chi-Square test, K-S Test.

UNIT-V
Verification and Validation  
10 Hours
Model building, verification and validation; Verification of simulation models; Calibration and validation of models.

Output analysis
Types of simulations with respect to output analysis; Stochastic nature of output data; Measures of performance and their estimation; Output analysis for terminating simulations.
Text Book:

Reference Books:
3. Simulation 5ed Ross Elsevier
4. Theory of modeling and simulation, Zeiglar, Elsevier

Note: At the end of the course students should come out with case study, It carries a Weightage of 20% of CIE.

Course outcomes:
On completion of this course, the students should be able to:

CO1: Define the basic concepts in simulation and modelling with respect to real time system.
CO2: Identify various simulation models for a given system. And understand the manual Simulation using simulation algorithm.
CO3: Illustrate various random number generators.
CO4: Analyze the input and output modelling for a given system.
CO5: Illustrate verification and validation of a given simulation model.

Mapping with Program Outcomes:

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3-Strong; 2-Medium; 1-Low
Course Code: P20MCA254  
Semester: II  
L-T-P: 3:2:0

Course Title: Optimization Techniques

Credits: 4  
Contact Period: 52 Hrs, Exam: 3 Hrs  
Weightage: CIE: 50% SEE: 50%

Course Learning Objectives (CLOs)
The objectives of this course are to:

- Understand the origin nature and applications of OR study.
- Identify the general model of a LPP and learn to Formulate a mathematical model of a LPP for the given data. Learn to solve the given LPP by different techniques.
- Understand the role of duality in sensitivity analysis
- Analyze different methods to minimize the total transportation and assignment cost in the given problem.
- Learn the concepts of game theory and Metahueristics

UNIT-I  
10 Hours

Introduction and Overview of the OR Modeling Approach: The origin of OR, the nature of OR, the impact of OR, defining the problem and gathering data, Formulating a mathematical model, deriving solutions from the model, testing the model, preparing to apply the model, implementation.

Introduction to Linear Programming: Formulation of linear programming problem (LPP), examples, Graphical solution, the LP Model, Special cases of Graphical method, assumptions of Linear Programming (LP), additional example.

UNIT-II  
10 Hours

Solving LPP - the Simplex Method: The essence of the simplex method, setting up the simplex method, algebra of the simplex method, the simplex method in tabular form, special cases in the simplex method, tie breaking in the simplex method.

Adopting to other model forms (Two Phase method, Big-M method), Post optimality analysis.

UNIT-III  
10 Hours


Adapting to other primal forms, the role of duality in sensitive analysis- all types of changes, the dual simplex method. (Problems)

UNIT-IV  
12 Hours


Assignment problem: General model a special algorithm for the assignment problem Unbalanced Assignment problems, Hungarian method, Maximization problems.
UNIT-V

10 Hours

Game Theory: The formulation of two persons, zero sum games, solving simple games- a prototype example, Games with Mixed Strategies, Using Dominance property, graphical solution procedure.

Metaheuristics: The nature of Metaheuristics, Tabu Search, Simulated Annealing, Generating Algorithms.

Text Books:
   (Chapters 1.1 to 1.3, 2.1 to 2.6, 3.2 to 3.4, 4.1 to 4.7, 6.1 to 6.6, 7.1,8.1 to 8.4, 13.1 to 13.4, 14.1 to 14.4)

Reference Books:

Note: At the end of the course students should come out with case study, It carries a Weightage of 20% of CIE.

Course outcomes:
On completion of this course, the students should be able to:

CO1: Learn quantitative methods and techniques for model formulation and applications that are used in solving business decision problems.

CO2: Analyze and Solve linear programming problems using graphical method and simplex method in different forms Identify different methods of solving a LPP.

CO3: Identify the role of duality and sensitivity analysis in OR study.

CO4: Apply different methods to solve transportation and assignment problems for minimum cost.

CO5: Analyze the competitive situations by game theory approach.

Mapping with Program Outcomes:

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3-Strong; 2-Medium; 1-Low
Course Learning Objectives (CLOs)
The objectives of this course are to:

- Understand the concept of Servlet and its services.
- Understand the concept of Servlet and its services.
- Familiarize how to create packages and interfaces.
- Outline Database connection with any front end.
- Outline to use various beans in different applications.

UNIT-I
Servlet
10 Hours

UNIT-II
Introduction to JSP
10 Hours

UNIT-III
12 Hours
Controlling the structure, Structure of generated Servlets and Java Beans, Controlling the structure of generated Servlets: The JSP Page directive, Import Attribute, Session Attribute, isElignore attribute, Buffer and Autoflush Attribute, Info Attribute, errorPage, and iserrorPage Attributes, isThreadSafe Attribute, extends Attribute, language Attribute, Including Files and Applets in JSP Pages using Java Beans components in JSP documents. JAR File, Manifest file, Working with Java Beans. Introspection, Customizers, Bean Properties: Simple properties, Design pattern events, Creating bound properties, Bean Methods, Beaninfo class, Persistence.

UNIT-IV
Annotations and JDBC
10 Hours
Annotations: Built-in Annotations with examples, Custom Annotation. Talking to Database, Immediate Solutions, Essentials JDBC program, using prepared statement object, and Interactive SQL tool. JDBC in Action Result sets, Batch updates, Mapping, Basic JDBC datat ypes, Advanced JDBC data types, immediate solutions

UNIT-V
EJB and Server Side Components Models
10 Hours
TextBooks:
1. Marty Hall, Larry Brown Core Servlets and Java server pages. Vol 1: Core Technologies. 2nd Edition. (Chapter 3,4,5,6,7,8,9,10,11,12,13,14)
2. Java 6 Programming Black Book, Dreamtech press 2012 (Chapter 17,18,19,20,21,22,27,28,29,30)
3. Andrew LeeRubinger, Bill Burke. Development Enterprise Java Components. Enterprise JavaBeans 3.1. O’reilly (Chapters 1,2,3,4,5,6,7,8,9,10,11)

Reference Books:

Note: At the end of the course students should come out with case study, It carries a weightage of 20% of CIE.

Course outcomes:
On completion of this course, the students should be able to:

CO1: Choose the Servlet technology for server side web application
CO2: Identify the JSP technology for server side web application
CO3: Develop Java Bean Program using Java bean rules
CO4: Develop application using JDBC Concepts
CO5: Develop Enterprise Java Bean Applications

Mapping with Program Outcomes:

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3-Strong; 2-Medium; 1-Low
Course Learning Objectives (CLOs)
The objectives of this course are to

• Understand the basic concepts of cloud computing
• Identify the challenges of cloud Computing
• Classify various service models of cloud
• Understand virtualization in various levels of cloud computing
• Identify the resource management policies, its mechanism, various storage systems and security issues

UNIT-I

Introduction
10 Hours
Network centric computing and network centric content, Peer-to-peer systems, Cloud Computing: an old idea, whose time has come, Cloud Computing delivery models & Services, Ethical issues, Cloud vulnerabilities, Challenges,

Cloud Infrastructure
Amazon, Google, Azure & online services, open source private clouds. Storage diversity and vendor lock-in, intercloud, Energy use & ecological impact of data centers, service level and compliance level agreement, Responsibility sharing, user experience, Software licensing.

UNIT-II

Cloud Computing
10 Hours
Applications & Paradigms, Challenges, existing and new application opportunities, Architectural styles of cloud applications, Workflows coordination of multiple activities, Coordination based on a state machine model -the Zoo Keeper, The Map Reduce programming model, Apache Hadoop, High performance computing on a cloud.

UNIT-III

Cloud Resource Virtualization
10 Hours

UNIT-IV

Cloud Resource Management and Scheduling
10 Hours
Policies and mechanisms for resource management, Applications of control theory to task scheduling on a cloud, Stability of a two level resource allocation architecture, Feedback control based on dynamic thresholds, Coordination of specialized autonomic performance managers, A utility-based model for cloud-based web services, Resource bundling, combinatorial auctions for cloud resources, Scheduling algorithms for computing clouds, fair queuing, Start time fair queuing.
UNIT-V

Networking Support
Storage Area Networks, Content Delivery Networks.

Storage systems
Storage models, file systems, databases, DFS, General parallel File system, GFS, Apache Hadoop, Locks & Chubby, TPS & NOSQL databases, Bigdata, Mega store.

Cloud security
Risks, Security, privacy and privacy impacts assessments, Trust.

Text Book:

Reference Books:

Course outcomes:
On completion of this course, the students should be able to:

CO1: Identify basic concepts and terminologies of cloud computing
CO2: Identify the appropriate cloud services for a given application.
CO3: Analyze the comparative advantages and disadvantages of Virtualization technology.
CO4: Describe resource management policies and its implementation in cloud
CO5: Discuss various storage systems and security issues with case studies

Mapping with Program Outcomes:

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3-Strong; 2-Medium; 1-Low
Course Learning Objectives (CLOs)
The objectives of this course are to

- Define Artificial intelligence and identify problems for AI. Characterize the search techniques to solve problems and recognize the scope of classical search techniques
- Define knowledge and its role in AI. Demonstrate the use of Logic in solving AI problems.
- Demonstrate handling of uncertain knowledge and reasoning in probability theory.
- Explain Learning methods in AI
- Explain Knowledge Learning, probabilistic models and reinforcement learning in AI

UNIT-I

Intelligent Agents And Searching Methods 12 Hours
Artificial Intelligence: Introduction : What is AI; Foundations of Artificial Intelligence; History of Artificial Intelligence; The state of Art;
Intelligent Agents: Agent and Environments; Good Behavior; The Nature of Environments; The Structure of Agents;
Problem-solving: Problem-solving agent; searching for solution; Uniformed search strategies;
Informed Search and Exploration: Informed search strategies; Heuristic functions; Online Search agents and unknown environment;
Constraint Satisfaction problems: Constraint satisfaction problems; Backtracking search for CSPs;
Adversarial search: Games; optimal decisions in Games; Alpha-Beta pruning;

UNIT-II

Logic 10 Hours
Logical Agents: Knowledge-based agents; The wumpus world; Logic; propositional logic; Reasoning patterns propositional logic; Effective propositional interference; Agent based on propositional logic;
First-Order Logic: Representation revisited; Syntax and semantics of first order logic; Knowledge engineering in first order logic;
Interference in First-Order Logic: Propositional verses first-order interference; Unification and lifting.

UNIT-III

Knowledge Representation and Planning 10 Hours
Knowledge Representation: Ontological engineering; Categories and object; Action, situations and events; Mental events and mental objects; The internet shopping world; Reasoning system for categories; Reasoning with default information; Truth maintenance system;
Planning: The planning problems; Planning with state-space search; Planning graphs; Planning with propositional logic
UNIT-IV

10 Hours

**Uncertainty**: Acting under uncertainty; Interference using full joint distributions; Independence; Bayes’s rule and its use;

**Probabilistic Reasoning**: Representing knowledge in an uncertain domain; The semantic of Bayesian networks; Efficient representation of conditional distribution; Exact interference in Bayesian network

UNIT-V

10 Hours

**Learning**: Forms of learning; Inductive learning; Learning decision tree; Ensemble learning; Computational learning theory

**Text Book**:

**References Books**:

**Course outcomes**:
On completion of this course, the students should be able to:

**CO1**: **Analyze** the modern view of AI as the study of agents that receive precepts from the environment and perform actions.

**CO2**: **Demonstrate** awareness of informed search and exploration methods.

**CO3**: **Demonstrate** about AI techniques for knowledge representation, planning and uncertainty management.

**CO4**: **Create** knowledgebase for decision making and learning methods.

**CO5**: **Illustrate** the use of AI to solve English Communication problems.

**Mapping with Program Outcomes**:

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3-Strong; 2-Medium; 1-Low
## Course Learning Objectives (CLOs)
The objectives of this course are to:

- Explain Objective, Types and defining a research problem
- Discuss searching, review of literature and Writing about the literature reviewed
- Demonstrate Research surveys and Research design
- Illustrate of Data Collection and Data Preparations
- Outline Statistics concept and Report Writing

### UNIT-I

**Research Methodology**

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<td>Introduction, Meaning of Research, Objectives of Research, and Motivation in Research, Types of Research, Research Approaches, Significance of Research, and Research Methods versus Methodology, Research and Scientific Method, Importance of Knowing How Research is Done, Research Process, Criteria of Good Research, and Problems Encountered by Researchers in India.</td>
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**Defining the Research Problem**

Research Problem, Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem, an Illustration.

### UNIT-II

**Reviewing the literature**

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<td>Place of the literature review in research, Bringing clarity and focus to your research problem, Improving research methodology, Broadening knowledge base in research area, Enabling contextual findings, How to review the literature, searching the existing literature, reviewing the selected literature, Developing a theoretical framework, Developing a conceptual framework, Writing about the literature reviewed.</td>
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### UNIT-III

**Design of Sample Surveys**

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<td>Introduction, Sample Design, Sampling and Non-sampling Errors, Sample Survey versus Census Survey, Types of Sampling Designs</td>
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**Research Design**


### UNIT-IV

**Data Collection**

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<td>Experimental and Surveys, Collection of Primary Data, Collection of Secondary Data, Selection of Appropriate Method for Data Collection, Case Study Method.</td>
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Data Preparation
Data preparation process, Questionnaire checking, Editing, Coding, Classification, Tabulation, Graphical Representation, Data Cleaning, Data Adjusting, Some Problems in Preparation Process, Missing Values and Outliers, Types of Analysis, Statistics in Research

UNIT-V
Descriptive Statistics 11 Hours
Measures of Central Tendency, mean, Median, Mode, Other Averages, Measures of Dispersion, Range, Mean Deviation, Standard Deviation, Measures of Relationship Covariance
Interpretation and Report Writing: Meaning of Interpretation, Technique of Interpretation, Precaution in Interpretation, Significance of Report Writing, Different Steps in Writing Report, Layout. Types of Reports, Oral Presentation, Mechanics of Writing a Research Report, Precautions for Writing Research Reports.

Text Book:

Reference Books:

Course outcomes:
On completion of this course, the students should be able to:

CO1: Identify the types, methods of the given research problem
CO2: Explain searching and writing reviewed literature
CO3: Illustrate Research surveys and Research design
CO4: Demonstrate Data Collection and Data Preparations with examples.
CO5: Understand the Statistics concept and Report Writing

Mapping with Program Outcomes:

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3-Strong; 2-Medium; 1-Low
Course Learning Objectives (CLOs)

The objectives of this course are to:

- Demonstrate the basic definitions, test case, defect management, execution history, fault taxonomies and levels of testing.
- Discuss the scenario and select the proper testing technique like Boundary Value Testing, Equivalence Class Testing and Decision Table-Based testing.
- Compare Traditional view, Alternative life - cycle models.
- Illustrate the approaches for Test Execution: from test case specifications to test cases, Scaffolding, Generic versus specific scaffolding.
- Outline the test strategies to test design specifications document.

UNIT-I

**Basics of Software Testing**  
10 Hours
Humans, Errors and Testing, Software Quality; Requirements, Behavior and Correctness, Correctness Vs Reliability; Testing and Debugging; Test Metrics; Software and Hardware Testing; Testing and verification; Defect Management; Execution History; Test Generation Strategies; Static Testing; Test Generation from Predicates.

UNIT-II

**A Perspective on Testing, Examples, Boundary Value, Equivalence Class, Decision Table-Based Testing**  
11 Hours
Basic definitions, Test cases, Insights from a Venn diagram, Identifying test cases, Error and fault taxonomies, Levels of testing.
Boundary value analysis, Robustness testing, Worst-case testing, Special value testing, Examples, Random testing.
Equivalence classes, Equivalence test cases for the triangle problem, Next Date function, and the commission problem, Guidelines and observations. Decision tables, Test cases for the triangle problem. A case study.

UNIT-III

**Path Testing, Data Flow Testing, Levels of Testing, Integration Testing**  
10 Hours
DD paths, Test coverage metrics, Basis path testing, guidelines and observations.
Definition-Use testing, Slice-based testing, Guidelines and observations.
Traditional view of testing levels, Alternative life-cycle models, The SATM system, Separating integration and system testing. A case study.

UNIT-IV

**Basic principles, Fault-Based Testing**  
11 Hours
Sensitivity, redundancy, restriction, partition, visibility, Feedback.
Assumptions in fault-based testing, Mutation analysis, Fault-based adequacy criteria, Variations on mutation analysis.
From test case specifications to test cases, Scaffolding, Generic versus specific scaffolding, Test oracles, Self-checks as oracles, Capture and replay.

UNIT-V

Test Case Selection and Adequacy, Planning and Monitoring the Process, Documenting Analysis and Test 10 Hours
Test Specification and cases, Adequacy Criteria, Comparing Criteria. Quality and process, Test and analysis strategies and plans, Risk planning, Monitoring the process, Improving the process, the quality team. Organizing documents, Test strategy document, Analysis and test plan, Test design specifications documents, Test and analysis reports.

Text Books:

Reference Book:

Course outcomes:
On completion of this course, the students should be able to:

CO1: Explain Test cases, Error and fault taxonomies, Levels of testing.
CO2: Classify different types of testing.
CO3: Illustrate traditional view, Alternative life - cycle models
CO4: Choose approaches for Test Execution: from test case specifications to test cases, Scaffolding, Generic versus specific scaffolding.
CO5: Identify and plan strategies to test design specifications document.

Mapping with Program Outcomes:

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3-Strong; 2-Medium; 1-Low
Course Learning Objectives (CLOs)
The objectives of this course are to:

- Demonstrate the cybercrime and how criminals plan the attacks.
- Discuss tools and methods used in Cybercrime.
- Explain Security Challenges and Attacks on Mobile/Cell Phones.
- Illustrate complete information about Computer Forensics.
- Outline Social, Political Ethical and Psychological Dimensions on Cybercrime.

UNIT-I

Introduction to Cybercrime

Cyberoffenses: How Criminals Plan the Attacks

UNIT-II

Tools and Methods used in Cybercrime
Introduction, Proxy Server and Anonymizers, Phishing, Password Cracking, Keyloggers and Spyware, Virus and Worms, Trojan Horses and backdoors, Steganography, DOS and DDOS attack, SQL Injection, Buffer Overflow, Attacks on Wireless Networks.

UNIT-III

Cybercrime: Mobile and Wireless Devices

Phishing and Identity Theft

UNIT-IV

Understanding Computer Forensics

Forensics of Hand-Held devices
UNIT-V

Cybercrime and Cyberterrorism: Social, Political Ethical and Psychological Dimensions  10 Hours


Text Book:

Reference Books:

Course outcomes:
On completion of this course, the students should be able to:

CO1: **Explain** cybercrime and how criminals plan the attacks.
CO2: **Discuss** tools and methods used in Cybercrime
CO3: **Illustrate** Security Challenges and Attacks on Mobile/Cell Phones
CO4: **Summarize** complete information about Computer Forensics
CO5: **Explain** Social, Political Ethical and Psychological Dimensions on Cybercrime

Mapping with Program Outcomes:

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3-Strong; 2-Medium; 1-Low
Course Learning Objectives (CLOs)
The objectives of this course are to:

- Demonstrate the basic concepts of algorithms and data structures.
- Apply important algorithmic design paradigms and methods of analysis.
- Implement efficient algorithms in common engineering design situations.
- Understand specific algorithms for a number of important computational problems like sorting, searching, and graphs etc.
- Illustrate the concept of greedy techniques.

**List of Programs**

1. Write a C Program to construct a stack of integers and to perform the following operations on it:
   a. Push
   b. Pop
   c. Display
   The program should print appropriate messages for stack overflow, stack underflow, and stack empty.

2. Write a C Program to convert and print a given valid parenthesized infix arithmetic expression to postfix expression. The expression consists of single character operands and the binary operators + (plus), - (minus), * (multiply) and / (divide).

3. Write a C Program to evaluate a valid suffix/postfix expression using stack. Assume that the suffix/postfix expression is read as a single line consisting of non-negative single digit operands and binary arithmetic operators. The arithmetic operators are + (add), - (subtract), * (multiply) and / (divide).

4. Write C program using recursive function
   a. To find the nth factorial
   b. To print the nth Fibonacci number
   c. To solve Towers of Hanoi problem.

5. Write C Program to simulate the working of a queue of integers using arrays. Provide the following operations:
   a. Insert
   b. Delete
   c. Display

6. Implement a C Program to simulate the working of a circular queue of integers using an array. Provide the following operations:
   a. Insert
   b. Delete
   c. Display
7. Implement a menu driven program in c for the following operation on Singly Linked List (SLL) of student Data with the fields: USN, Name, Branch, Sem
   a. Create a SLL of N students Data.
   b. Display the status of SLL and count the number of nodes
   c. perform insertion at the beginning/end of SLL.
   d. perform Deletion at the beginning/end of SLL.
   e. Exit

8. Implement Recursive Binary search and Linear search and determine the time required to search an element. Repeat the experiment for different values of n, the number of elements in the list to be searched.

9. a. Sort a given set of elements using Selection sort method and determine the time required to sort the elements.
   b. Implement Pattern-Matching using Brute Force technique.

10. a. Print all the nodes reachable from a given starting node in a digraph using BFS method.
    b. Check whether a given graph is connected or not using DFS method.

    b. Compute the transitive closure of a given directed graph using Warshall’s algorithm.

12. Implement Floyd’s algorithm for the All-Pairs- Shortest-Paths Problem.

13. Find Minimum Cost Spanning Tree of a given undirected graph using Prim’s algorithm.

14. Find Minimum Cost Spanning Tree of a given undirected graph using Kruskal’s algorithm.

15. From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.

**Course outcomes:**
**On completion of this course, the students should be able to:**

**CO: Design** algorithm using various technique with appropriate data structures for a given problem.

**Mapping with Program Outcomes:**

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3-Strong; 2-Medium; 1-Low
Course Learning Objectives (CLOs)
The objectives of this course are to:

- Understanding of Computer components and working of its components.
- Outline program based on C syntax and understand the debugging procedure
- Understand the organization of data using Data Structures concepts.

UNIT – I
5 hours

Working of Computer:

UNIT – II
16 hours

C Programming Language:
Understanding basic syntax, If - else statement, Switch case, Struct, For loop, While and do - while loop, Array, Strings, Pointers, Function, String, File handling Preprocessing

UNIT – III
5 hours

Introduction to Data Structures:
Data Structures Basics: Structure and Problem Solving, Data structures, Data structure Operations, Algorithm: complexity, Time- space tradeoff, Linked List, Stack and Queue, Searching and Sorting Techniques

Course outcomes:
On completion of this course, the students should be able to:

CO: Understand computer operation process and implement C programming language and Data Structures

Mapping with Program Outcomes:

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3-Strong; 2-Medium; 1-Low
Course Code : P20MHU29  
Semester : II  
L – T – P : 0 : 2 : 0

Course Title: Professional Communication Development (PCD)

Credit: NA  
Contact Period : 32 Hrs, Exam: 3Hrs  
Weightage : CIE:100% - [P/NP] 

Course Learning Objectives (CLOs)
The objectives of this course are to:

- Recognize common mistakes done by an individual in the course of his/her communication
- Enable the individual to build his/her creative thinking (thinking in English)
- Understand the correct usage of Preposition and conjunctions
- Effective Email writing skill and Blogs
- Explain the concept of root words and the related words

UNIT–I  
6 hours

Sentences: Introduction to simple and compound sentences, Techniques to build simple and compound sentences, Rules for constructing a complex sentence, Introduction to punctuation, Introduction to active and passive voice

UNIT–II  
8 hours

Vocabulary builder - Gaining increased momentum How to talk about actions – Verbs that accurately describe human activities, excursions into expressive terms good and evil, doing saying, wishing and pleasing. how to talk about various speech habits—words that explore in depth all the degrees and kinds of talk and silence, how to insult your enemies— terms for describing a disciplinarian, toady, dabbler, provocative woman, flag-waver, possessor of a one track mind, free thinker, sufferer from imaginary ailments, various manias and phobias, how to flatter your friends— terms for describing friendliness, energy, honesty, mental keenness, bravery, charm, sophistication, etc.

Vocabulary builder - Finishing with a feeling of complete success.

How to talk about common phenomena and occurrences– Words for poverty and wealth, direct and indirect emotions, not calling spade a spade, banter and other light talk, animal like contentment, homesickness and different kind of secrecy. Excursions into terms expressive of goodness, of hackneyed phraseology, of human similarity to various animals, of kinds of sound, etc. How to react to the new words you meet in your reading.

How to talk about what goes on - Verbs that show exhaustion, criticism, self-sacrifice, repetition, mental stagnation, hinting, soothing, sympathizing, indecision, etc. How you can increase your vocabulary by picking your friends brains.

How to talk about a variety of personal characteristics: Adjectives that describe insincere humility, dissatisfaction, snobbery, courtesy to women, financial embarrassment, sadness, etc. How increasing your vocabulary has begun to change the intellectual climate of life.

UNIT–III  
8 hours

Sharpen your axe!!

Vedic mathematics:
Vinculum and de- vinculum, subtractions using vinculum. Nihilism multiplication: For numbers close to base values, multiplication of any two digit numbers or three digits number using crises cross method.
Finding the square, square root, cubes, cube root of two digit and three digit numbers quickly. Approximation in multiplication and division. Checking the answer using digital sum method.

**SSC**- Get hands on multiplication tables, increasing the speed in basic arithmetic operations. Classification of numbers.

**Percentage calculations and ratio comparison:**
**Percentage calculations:** Percentage rule for calculating, percentage values through additions, percentage – fraction table, approximation in calculating percentages. Application based problems

**Ratio comparison:** calculations method for ratio compressions: 1. the cross multiplication method, 2. percentage value compression method 3. numerator and denominator percentage change method. Method for calculating the value of percentage change in the ratio. Application based problems.

**SSC**- Thorough with fractions and decimal values. Applications of tabulated fractions. Product of means and extremes.

**UNIT–IV**

### Analytical Reasoning 1: series

**Number series:** Standard patterns of number series, pure series: perfect square, square cube, prime, combination of this series. Difference series, ratio series, mixed series, geometric series, two-tier arithmetic series, three-tier arithmetic series, change in the order for difference series, change in the order for ratio series, sample company questions.

**Letter series:** Alphabet and Alphanumeric series, finding the missing term based on logic learnt in number series module, continuous pattern series, correspondence series. sample company questions.

**Picture series:** image analysis, addition deletion rotation or modification of lines or shapes. Understanding the symmetry of the image. Mirror image analysis. Sample company questions.

**SSC:** Basic knowledge of letter positions, Different number series for example–even, odd, prime, opposite etc.

**UNIT–V**

### Number system:

Introduction. **Integers:** Remainder zero concept, Odd and Even Integers, Negative and positive integers, power number a^n, properties of a perfect square number. **Prime number:** General method to identify the prime number, properties of prime numbers. Euler’s number. **Factorial number:** Wilson’s theorem, important results on factorial. **Divisor:** number of divisors, sum of divisors, number expressed as the product of two factors.

**Divisibility rules:** divisibility of a whole number by a whole number, divisibility of an expression by an expression. **Modulus concept:** divisibility rules in modulus, rules of operations in modulus. **Finding one remainder:** One divisor, remainder of (a^n–b^n), remainder for more than one divisor.

**UNIT digit:** Concept of power cycle, finding last two digits. Number of trailing zeroes.

**SSC:** Basic arithmetic operations, knowledge about quotient and remainders, multiples and factors.

**Reference Books:**

Course outcomes:
On completion of this course, the students should be able to:

**CO1**: Amplified level of confidence to express themselves in English.
**CO2**: Elevated standard of learning through the implementation of creative cognitive techniques.
**CO3**: Understand the correct usage of Prepositions and Conjunctions.
**CO4**: Write Emails, Letters and Creative passages.
**CO5**: Apply the knowledge of vocabulary in his speaking and writing.

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3-Strong; 2-Medium; 1-Low
Course Learning Objectives (CLOs)
The objectives of this course are to:

- Discuss the basic concepts of python programming language
- Demonstrate the use of data frames in python
- Analyse the process of model building and evaluation
- Comprehend various classification problems
- Discuss the libraries required to implement the techniques of Machine Learning.

UNIT – I

11 Hours

Introduction to Machine Learning

UNIT – II

10 Hours

Descriptive Analytics
Working with DataFrames in Python, Handling Missing Values, Exploration of Data using Visualization

UNIT – III

10 Hours

Linear Regression
Simple Linear Regression, Steps in Building a Regression Model, Building Simple Linear, Regression Model, Model Diagnostics, Multiple Linear Regression.

UNIT – IV

11 Hours

Classification Problems
Classification Overview, Binary Logistic Regression, Credit Classification, Gain Chart and Lift Chart, Classification Tree (Decision Tree Learning).

UNIT – V

10 Hours

Advanced Machine Learning

Clustering

Text Book:
1. Machine Learning using Python, Manaranjan Pradhan, U Dinesh Kumar, Wiley India Pvt. Ltd., 2019
   (Chapters: 1, 2, 4, 5, 6.3, 6.5, 7)
Reference Books:
2. Learning with Python: How to Think Like a Computer Scientist Paperback – Allen Downey , Jeffrey Elkner, 2015.

Course outcomes:
On completion of this course, the students should be able to:

CO1: Analyze the basic concepts of the python programming
CO2: Apply the pandas, matplotlib and seaborn modules operations on given data set
CO3: Apply knowledge on building, diagnose and validate the linear regression models
CO4: Distinguish between different classification techniques
CO5: Implement various learning algorithms for the given dataset.

Mapping with Program Outcomes:

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3-Strong; 2-Medium; 1-Low
Course Learning Objectives (CLOs)
The objectives of this course are to:

• Familiarize IOT concepts and its domain
• Analyze the concepts M2M and IOT system management
• Understand the concepts IOT platforms and design methodology
• Outline Raspberry Pi Interfaces
• Understand various applications of IOT

UNIT-I
Introduction & Concepts 10 Hours
Introduction of IoT; Physical Design of IoT; Logical Design of IoT; IoT Enabling Technologies; IoT Levels & Deployment Templates.

Domain Specific IOTs- Introduction, Home Automation; Cities; Environment; Energy; Retail; Logistics; Agriculture; Industry; Health & Lifestyle

UNIT-II
IoT and M2M 11 Hours
Introduction: M2M; Difference between IoT and M2M; SDN and NFV for IoT; IoT System management with NETCONF-YANG- Need for IoT Systems management; SNMP; Network Operator Requirements; NETCONF; YANG; IoT Systems management with NETCONFYANF; NETOPEER

UNIT-III
IoT Platforms Design Methodology 11 Hours
Introduction; IoT Design Methodology; Case Study on IoT System for Weather Monitoring; Motivating for using Python.

IoT Systems- Logical Design using Python- Introduction; Installing Python; Python Data Types & Data structures; Control Flow; Functions; Modules; Packages; File Handling; Date/Time Operations; Classes

UNIT-IV
10 Hours
What is an IoT Device; Exemplary Device: Raspberry Pi; About the Board; Linux on Raspberry Pi; Raspberry Pi Interfaces; Programming Raspberry Pi with Python;

UNIT-V
10 Hours
Case Studies Illustrating IoT: Introduction ;Home Automation; Cities; Environment Case Studies Illustrating IoT(Continued..): Environment; Agriculture; Productivity Applications

Text Book

Reference Books
Note: At the end of the course students should come out with various Case study Report which covers the concept of IOT that is discussed in Tutorial class. It carries a weightage of 15 marks of CIE.

Course outcomes:
On completion of this course, the students should be able to:

**CO1: Recognize** the basic concepts of IOT and the vision of IOT from a global context.
**CO2: Explain** the application areas of IOT.
**CO3: Acquire** knowledge on M2M Technology and IOT system management.
**CO4: Develop** design methodologies and develop IOT system using Python.
**CO5: Implement** IOT application.

Mapping with Program Outcomes:

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3-Strong; 2-Medium; 1-Low
Course Learning Objectives (CLOs)
The objectives of this course are to

- Familiarize .NET Framework components and OOPs concepts in c#
- Analyze the concepts of Delegates, Events
- Understand the concepts of ADO.NET
- Outline Windows applications using C#.NET
- Understand web applications using ASP.NET

UNIT-I

Getting started with .NET Framework 4.5


Introducing C#

Need of C#, C# Pre-processor Directives, Creating a Simple C# Console Application, Identifiers and Keywords. Data Types, Variables and Constants: Value Types, Reference Types, Type Conversions, Boxing and unboxing, Variables and Constants. Expression and Operators: Operator Precedence, Using the ?? (Null Coalescing) Operator, Using the :: (Scope Resolution) Operator and Using the is and as Operators. Control Flow statements: Selection Statements, Iteration Statements and Jump Statements.

UNIT-II

Namespaces, Classes, Objects and Structures


UNIT-III

Object- Oriented Programming


Delegates and Events and Exception Handling

UNIT-IV

Graphical User Interface with Windows Forms  
10 Hours

UNIT-V

Data Access with ADO.NET  
07 Hours

Web App Development with ASP.NET  
06 Hours
Case study: Database-Driven ASP.NET Guestbook, Building a Web Form that Displays Data from a Database, Modifying the Code-Behind File for the Guestbook Application

Text Books:
1. .NET 4.5 Programming (6-in-1), Black Book, Kogent Learning Solutions Inc., Dreamtech Press.  
   (Chapters: 1,3, 4, 5, 6, 7, 12)

References Books:
2. Bart De Smet: C# 4.0 Unleashed, Pearson Education- SAMS Series.
3. Hebert Shildt: Programming in C# 4.0, Tata Mcgraw Hill.

Course outcomes:
On completion of this course, the students should be able to:

CO1: Describe the components of .NET technologies
CO2: Apply the object-oriented concepts of C# for applications development
CO3: Select relevant exception handling types to handle errors in applications
CO4: Implement windows exception forms and process events in response to user interaction with GUI controls
CO5: Create database driven ASP.NET web application and web services
Mapping with Program Outcomes:

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3-Strong; 2-Medium; 1-Low
ELECTIVE GROUP - III

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Course Learning Objectives (CLOs)
The objectives of this course are to:
- Explore the significance of Big Data analytics and Analyze Technologies for Handling Big Data and Hadoop Ecosystem.
- Understand the applications using Map Reduce Concepts.
- Outline the management of NoSQL data.
- Summarise different types of analytics.
- Understand the various data visualization techniques.

UNIT-I

Getting an Overview of Big Data and Hadoop Ecosystem


UNIT-II

Understanding MapReduce Fundamentals and HBase


UNIT-III

NoSQL Data Management

Introduction to NoSQL, Characteristics of NoSQL, Evolution of Databases, Aggregate Data Models, Key Value Data Model, Document Databases, Relationships, Graph Databases, SchemaLess Databases, Materialized Views, Distribution Models, Sharding, MapReduce Partitioning and Combining, Composing MapReduce Calculations, CAP Theorem

UNIT-IV

Understanding Analytics and Big Data

Comparing Reporting and Analysis, Reporting, Analysis, The Analytic Process, Types of Analytics, Basic Analytics, Advanced Analytics, Operationalized Analytics, Monetized Analytics, Characteristics of Big Data Analysis, Points to Consider during Analysis, Frame
the Problem Correctly, Statistical Significance or Business Importance?, Making Inferences versus Computing Statistics, Developing an Analytic Team, Convergence of IT and Analytics, Understanding Text Analytics, Skills required for an Analyst.

**UNIT-V**

**Data Visualization**

10 Hours

Introducing Data Visualization, Techniques Used for Visual Data Representation, Types of Data Visualization, Applications of Data Visualization, Visualizing Big Data, Deriving Business Solutions, Turning Data into Information, Tools Used in Data Visualization, Proprietary Data Visualization Tools, Open-Source Data Visualization Tools, Analytical Techniques Used in Big Data Visualization, Tableau Products. Relevant Case Studies related to Automation and other Industries: Product Design and Development, Use of Big Data in Preventing Fraudulent Activities, Preventing Fraud Using Big Data Analytics, Use of Big Data in Detecting Fraudulent Activities in Insurance Sector, Fraud Detection Methods, Use of Big Data in Retail Industry, Use of RFID Data in Retail.

**Text book:**


**Reference Books:**

1. Big Data and Analytics – Seema Acharya and Subhashini C – Wiley India.

**Course outcomes:**

On completion of this course, the students should be able to:

CO1: Describe the significance and importance of Big Data and Analytics

CO2: Analyze the HADOOP and Map Reduce technologies associated with Big Data analytics

CO3: Understand the impact of big data for business decisions and strategy.

CO4: Formulate and use appropriate models of data analysis to solve hidden solutions to business-related challenges.

CO5: Interpret data findings effectively to any audience visually and in written formats.

**Mapping with Program Outcomes:**

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3-Strong; 2-Medium; 1-Low
Course Learning Objectives (CLOs)
The objectives of this course are to:

- To understand the basic concepts of distributed computing on which Blockchain technology
- To Illustrate concept of Decentralization and its relationship with blockchain technology.
- To understand that how various security services in Cryptography
- Outline the technical concepts related to Bitcoin cryptocurrency
- Explain the underlying principles, features, and components of Ethereum blockchain

UNIT-I
Blockchain
10 Hours
Distributed systems, CAP theorem, Byzantine Generals problems, Consensus. The history of blockchain, Introduction to blockchain, various technical definitions of blockchains, Generic elements of a blockchain, Features of a blockchain, Applications of blockchain technology, Tiers of blockchain technology, Consensus in blockchain, CAP theorem and blockchain,

UNIT-II
Decentralization
10 Hours
Decentralization using blockchain, Methods of decentralization, Blockchain and full ecosystem decentralization, Smart contract, Decentralized organizations, Decentralized autonomous organizations, Decentralized autonomous corporations, Decentralized autonomous societies, Platforms for decentralization

UNIT-III
Cryptographic primitives
10 Hours
Symmetric cryptography, Asymmetric cryptography, Public and private keys, Hash functions: Compression of arbitrary messages into fixed length digest. Easy to compute, Pre-image resistance, Second pre-image resistance, Collision resistance, Message Digest(MD), Secure Hash Algorithms (SHAs), Merkle trees, Patricia trees, Distributed hash tables(DHTs), Digital signatures, Elliptic Curve Digital signature algorithm(ECDSA)

UNIT-IV
Bitcoin
10 Hours

UNIT-V
Ethereum
12 Hours
Text Book:
1. Imran Bashir "Mastering BlockChain", Packt.

Reference Books:
1. Mastering Bitcoin: Programming the Open Blockchain Paperback-2017 by Andreas M O'rielly
2. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder. and
   cryptocurrency technologies: a comprehensive introduction. Princeton

Course outcomes:
On completion of this course, the students should be able to:

CO1: Understand the blockchain terminologies with its applications.
CO2: Analyze the process of Decentralize in various methods.
CO3: Illustrate the Public and private keys, Digital signature that are provided in
       Cryptography.
CO4: Describe the methodologies used in Bitcoin.
CO5: Describe the Ethereum Virtual machine, wallets, Nodes, Smart contract.

Mapping with Program Outcomes:

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3-Strong; 2-Medium; 1-Low
Course Learning Objectives (CLOs)
The objectives of this course are to:

- Demonstrate the Role of information system in the Today’s Global Business
- Discuss business intelligence of software industry & IT infrastructure
- Illustrate the digital marketing and managing knowledge in Industry
- Analyse the decision making concepts for building and managing information systems in an organization
- Outline the project management principles for managing the system

UNIT-I
Information Systems in Global Business Today  10 Hours

UNIT-II
Information Technology Infrastructure  10 Hours
IT Infrastructure, Infrastructure Components, Contemporary Hardware Platform Trends, Contemporary Software Platform Trends.

Foundation of Business Intelligence: Databases and Information Management
Organizing Data in a Traditional File Environment, the Database Approach to Data Management, Using Database to Improve Business Performance and Decision Making.

UNIT-III
Key system Applications for the Digital Age  11 Hours

E-Commerce: Digital Markets, Digital Goods
Electronic Commerce and the Internet, M-Commerce, Electronic Commerce, Electronic Commerce payment systems.

UNIT-IV
Managing Knowledge  11 Hours
The Knowledge Management Landscape, Enterprises-Wide Knowledge Management Systems, Knowledge Work Systems Enhancing Decision Making Decision Making and Information Systems, Systems for Decision support, Executive support systems (ESS) and the Balanced Scorecard.

UNIT-V
Building and Managing Systems  10 Hours
Systems as Planned Organizational Change, Overview of Systems Development, Alternative Systems-Building Approaches, Application Development for the digital firm. Managing Projects The Importance

**Text Book:**

**Reference Books:**

**Course outcomes:**
**On completion of this course, the students should be able to:**

CO1: **Explain** the importance and role of information in present global business

CO2: **Outlines** the information in business intelligence and IT infrastructure

CO3: **Understands** digital marketing and how to manage knowledge

CO4: **Analyses** the role of information in decision support systems in an organization

CO5: **Understands** the principles for project management and system management

**Mapping with Program Outcomes:**

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3-Strong; 2-Medium; 1-Low
Course Learning Objectives (CLOs)
The objectives of this course are to

• Understand various security attacks and security services
• Analyze data encryption standard and its policies
• Identify various authentication functions and its applications
• Determine security architecture and management of Internet Protocol
• Comprehend relevant protocol like SSL, TLS etc.,

UNIT-I
Introduction

Classical Encryption Technique
Symmetric Cipher Model, Substitution Techniques, Transposition Techniques.

UNIT-II
Block Ciphers, Data Encryption Standard and Advanced Encryption Standard

Public Key Cryptography and Key Management
Principles of Public Key Cryptosystem, RSA algorithm, Key management, Diffie Hellman Key exchange

UNIT-III
Message Authentication and Hash Function
Authentication Requirement, Authentication Functions, Message Authentication Code, Hash Functions, Digital Signatures, Digital Signature Standard

Authentication Applications
Kerberos, X.509 Authentication Service.

UNIT-IV
Electronic Mail Security
Pretty Good Privacy (PGP), S/MIME.

IP Security
IP Security Overview; IP Security Architecture; Authentication Header; Encapsulating Security Payload; Combining Security Associations; Key Management.

UNIT-V
Web Security
Web security Considerations; Secure Socket layer (SSL) and Transport layer Security (TLS); Secure Electronic Transaction (SET).
System Security
Intruders, Intrusion Detection, Firewall Design Principles- Characteristics, Types of Firewall and Firewall Configuration.

Text Book:

Reference Books:

Course outcomes:
On completion of this course, the students should be able to:

CO1: Define security services for a given network model
CO2: Describe various data encryption schemes and apply on a network model
CO3: Discuss various authentication functions and its applications
CO4: Describe a security management of a given IP network model
CO5: Identify characteristics of firewall, and configure a firewall

Mapping with Program Outcomes:

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3-Strong; 2-Medium; 1-Low
Course Learning Objectives (CLOs)
The objectives of this course are to:

- Discuss the definition of BI, BI terminologies and framework
- Understand basics of data integration [ETL] in context of data warehousing and multidimensional data modelling
- Analyze the multidimensional data modelling
- Identify the metrics, KPIs and make recommendation to achieve the business goal in a given business scenario
- Generate enterprise reports and design enterprise dashboard

UNIT-I
Introduction to Business Intelligence 
10 Hours

UNIT-II
Basics of Data Integration (Extraction Transformation Loading) 
10 Hours
Concepts of data integration, needs and advantages of using data integration, introduction to common data integration approaches, Meta data - types and sources, Introduction to data quality, data profiling concepts and applications, introduction to ETL using Pentaho data Integration (formerly Kettle)

UNIT-III
Introduction to Multi-Dimensional Data Modeling 
12 Hours
Introduction to data and dimension modeling, multidimensional data model, ER Modeling vs. multi dimensional modeling, concepts of dimensions, facts, cubes, attribute, hierarchies, star and snowflake schema, Step-by-step lab guide to analyze data using MS Excel

UNIT-IV
Measures, metrics, KPIs, and Performance management 
10 Hours
Understanding measures and performance, Measurement system terminology, Navigating a business enterprise, role of metrics, and metrics supply chain, —Fact-Based Decision Makingl and KPIs, KPI Usage in companies, business metrics and KPIs, Connecting the dots: Measures to business decisions and beyond.

UNIT-V
Basics of enterprise reporting 
10 Hours
A typical enterprise, Reporting perspectives common to all levels enterprise, Report standardization and presentation practices, Enterprise reporting characteristics in OLAP world, Malcolm Baldrige - quality performance framework, balanced scorecard, enterprise dashboard, balanced scorecard vs. enterprise
dashboard, enterprise reporting using MS Access / MS Excel, best practices in the design of enterprise dashboards.

**Text Book:**

**Reference Books:**
1. David Loshin - Business Intelligence: The Savvy Manager’s Guide, Publisher: Morgan Kaufmann
2. Larissa T Moss and Shaku Atre – Business Intelligence Roadmap: The Complete Project Lifecycle for Decision Support Applications, Addison Wesley Information Technology Series

**Course outcomes:**
*On completion of this course, the students should be able to:*

**CO1:** Understand process associated with BI framework and apply best practices in BI/Data warehousing

**CO2:** Discuss technology and processes associated with Business Intelligence framework for data integration.

**CO3:** Design data models and prototypes needed to achieve business objectives.

**CO4:** Illustrate how effectively a company is achieving key business objectives using KPIs at multiple levels

**CO5:** Design an enterprise dashboard that depicts the key performance indicators which helps in decision making.

**Mapping with Program Outcomes:**

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3-Strong; 2-Medium; 1-Low
ELECTIVE GROUP-IV

Course Code : P20MCA351  Semester : III  L-T-P : 3 : 2 : 0

Course Title : Mobile Application Development

Credits : 4  Contact Period : 52 Hrs, Exam : 3Hrs  Weightage : CIE : 50% SEE : 50%

Course Learning Objectives (CLOs)
The objectives of this course are to:

- Understand mobile architecture and OS.
- Illustrate effective user interfaces that leverage evolving mobile device capabilities
- Design mobile apps for Android devices.
- Learn about Android Databases such as SQLite
- Explain the sensors, maps and location based services

UNIT-I
Hello, Android 10 Hours

UNIT-II
Getting Started 10 Hours

Creating Applications and Activities

UNIT-III
Building User Interfaces 10 Hours

Intents And Broadcast Receivers: Introducing Intents, Using Intents to Launch Activities, using Intents to Broadcast Events, Broadcasting Events with Intents.

UNIT-IV
Databases Content Providers 10 Hours
Introducing Android Databases, Introducing SQLite, Content Values and Cursors, Working with SQLite Databases, Creating Content Providers: registering content providers, storing Files in a content Provider.

UNIT-V
Maps, Geocoding, And Location-Based Services 12 Hours
Using Location-Based Services, Using the Emulator with Location-Based Services, Selecting a Location Provider, Finding Your Current Location, Best Practice for Location Updates, Using Proximity Alerts, Using the Geocoder, Creating Map-Based Activities.


Note: In tutorial, some of the Programs based on the above concepts are developed and executed, to get practical knowledge on Mobile Application development.

Text Book:

Reference Book:

Note: At the end of the course students should come out with case study, It carries a weightage of 20% of CIE.

Course outcomes:
On completion of this course, the students should be able to:

CO1: Understand the Fundamentals of Mobile Application Development.
CO2: Describe simple android applications.
CO3: Describe the user interface that leverage evolving mobile device capabilities
CO4: Illustrate of mobile application using android SQlite and content providers and categorize the mobile sensors
CO5: Describe the mobile applications based on maps, location based, audio, video and camera

Mapping with Program Outcomes:

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3-Strong; 2-Medium; 1-Low
Course Learning Objective (CLO)
The objectives of this course are to:

- Demonstrate the basic of object oriented concepts
- Identify various relationship like association, aggregation, composition and generalization
- Construct various UML models including use case diagrams, sequence diagrams, class diagrams, state diagrams and activity diagrams based on Rumbaugh approach
- Discuss properties and functions of system design and class design for the ATM as a case study
- Illustrate properties, function and standard categories of patterns along with case studies

UNIT-I

Introduction, Modeling Concepts, Class Modeling and Advanced Class Modeling 10 Hours
What is Object Orientation? What is OO development? OO themes; Evidence for usefulness of OO development; OO modeling history.
Modeling as Design Technique: Modeling; abstraction; the three models.
Object and class concepts; Link and associations concepts; Generalization and inheritance; A sample class model; Navigation of class models; Practical tips.
Advanced object and class concepts; Association ends; N-array associations; Aggregation; Abstract classes; Multiple inheritance; Metadata; Reification; Constraints; Derived data; Packages; Practical tips.

UNIT-II

State Modeling and Advanced State Modeling 10 Hours
State Modeling: Events, States, Transitions and Conditions; State diagrams; State diagram behavior; Practical tips.
Advanced State Modeling: Nested state diagrams; Nested states; Signal generalization; Concurrency; A sample state model; Relation of class and state models; Practical tips.

UNIT-III

Interaction Modeling, Advanced Interaction Modeling, Process Overview, System Conception and Domain and Application analysis 10 Hours
Interaction Modeling: Use case models; Sequence models; Activity models. Use case relationships Procedural sequence models; Special constructs for activity models. Process Overview: Development stages; Development life cycle. System Conception: Devising a system concept; elaborating a concept; preparing a problem statement. Overview of analysis; Domain class model; Domain state model; Domain interaction model model iterating the analysis. Application Analysis. Application interaction model; Application class model; Application state model; adding operations.

UNIT-IV

System Design and Class Design 12 Hours
Overview of system design; Estimating performance; Making a reuse plan; Breaking a system into sub-systems; Identifying concurrency; Allocation of sub-systems; Management of data storage; Handling
global resources; Choosing a software control strategy; Handling boundary conditions; Setting the trade-off priorities; Common architectural styles; Architecture of the ATM system as the example.
Class Design: Overview of class design; Bridging the gap; Realizing use cases; Designing algorithms; Recursing downwards, Refactoring; Design optimization; Reification of behavior; Adjustment of inheritance; Organizing a class design; ATM example.

UNIT-V

Patterns and Design Patterns
10 Hours
What is a pattern and what makes a pattern? Pattern categories; Relationships between patterns; Pattern description. Introduction, structural decomposition, Organization of work, Model View Controller; Communication Patterns: Forwarder-Receiver; Client-Dispatcher-Server; Publisher-Subscriber; Management Patterns: Command processor; Whole Part, Master Slave, View Handler;

Text Books:
2. Frank Buschmann, Regine Meunier, Hans Rohnert, Peter Sommerlad, Michael Stal: Pattern-Oriented Software Architecture, A System of Patterns, Volume 1, John Wiley and Sons, 2006. (Chapters 1, 3)

Reference Book:

Note: At the end of the course students should come out with case study, It carries a weightage of 20% of CIE.

Course outcomes:
On completion of this course, the students should be able to:

CO1: Understand the fundamentals of object oriented concepts
CO2: Illustrate the importance of object oriented modelling and object oriented system is developed based on unified modelling language(UML)
CO3: Design class diagram, state diagram and interaction diagram for the real time problems
CO4: Apply the properties and functions of system design and class design
CO5: Discuss standard suitable patterns for the particular problems

Mapping with Program Outcomes:

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3-Strong; 2-Medium; 1-Low
Course Learning Objectives (CLOs)
The objectives of this course are to:

- Recall the concepts of machine learning.
- Understand fundamental principles of deep networks.
- Demonstrate various deep learning networks.
- Analyze various layers in deep networks.
- Examine training, debugging, evaluating a Deep network architecture.

UNIT-I

Review of Machine learning and Foundations of Neural Networks and Deep Learning 10 Hours
The math behind Machine learning-Linear algebra and Statistics, evaluating models, Neural Networks, Training Neural Networks, Activation Functions, Loss Functions, Hyperparameters.

UNIT-II

Fundamentals of Deep Networks 10 Hours

UNIT-III

Major architectures of Deep Networks 12 Hours
Convolutional Neural Networks-Biological inspiration, Intuition, CNN architecture overview, Input Layers, Convolutional layers, Pooling layers, Fully Connected layers, Recurrent Neural Networks-Modelling the time dimension, 3D Volumetric input, General RNN architecture, LSTM networks, Domain specific Applications, When do I need deep learning?

UNIT-IV

Tuning Deep Networks 10 Hours
Basic concepts, Matching Input data and Network architectures, Relating Model Goal and Output layer, Working with layer count, Parameter count, and memory, Weight initialization strategies, Using activation functions, Understanding learning rates, Controlling epochs and Mini-batch size, How to use regularization, using network statistics from the tuning.

UNIT-V

Tuning Specific Deep Network Architectures 10 Hours
CNN-Common Convolutional Architectural patterns, Configuring Convolutional layers, Configuring Pooling layers, Transfer learning, Recurrent Neural Networks (RNN)-Network Input data and input layers, Output Layers, Training the network, Debugging common issues with LSTMs, Padding and Masking, Evaluation and Scoring with masking.
Text Book:

Reference Books:
2. Ian Goodfellow and Yoshua Bengio and Aaron Courville, Deep Learning, MIT Press, Jan 2017

Note: At the end of the course students should come out with various Case study Report which covers the concept of Deep Learning Networks that is discussed in Tutorial class. It carries a weightage of 20% marks of CIE.

Course outcomes:
On completion of this course, the students should be able to:

CO 1: Outline the machine learning techniques along with knowledge base.
CO2: Understand the applications deep neural networks.
CO3: Apply various deep networks.
CO4: Illustrate the various deep learning models.
CO5: Demonstrate a specific deep network architecture.

Mapping with Program Outcomes:

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3-Strong; 2-Medium; 1-Low
Course Learning Objectives (CLOs)
The objectives of this course are to:

- Understand fundamentals concepts of NOSQL, Storing data in NOSQL and Accessing data in NOSQL.
- Outline the CRUD operations.
- Understand how Hive provides a SQL for Hadoop Map Reduce tasks.
- Choose the right database to facilitate ease of application development.
- Apply the actions to perform with the PHP driver and few functions to execute in the MongoDB shell.

UNIT I
Introduction to NOSQL 10 Hours
Definition of NOSQL, History of NOSQL and Different NOSQL products, Exploring MongoDB Java/Ruby/Python, Interfacing and Interacting with NOSQL

UNIT II
NOSQL Basics 10 Hours
NOSQL Storage Architecture, CRUD operations with MongoDB, Querying, Modifying and Managing NOSQL Data stores, Indexing and ordering datasets (MongoDB/CouchDB/Cassandra)

UNIT III
Advanced NOSQL 10 Hours
NOSQL in CLOUD, Parallel Processing with Map Reduce, BigData with Hive

UNIT IV
Working with NOSQL 12 Hours
Surveying Database Internals, Migrating from RDBMS to NOSQL, Web Frameworks and NOSQL, using MySQL as a NOSQL

UNIT V
Developing Web Application with NOSQL and NOSQL Administration 10 Hours
PHP and MongoDB, Python and MongoDB, Creating Blog Application with PHP,NOSQL Database Administration

Text Book:
1. Professional NOSQL, Shashank Tiwari, WROX Press.

Reference Books:

Note: At the end of the course students should come out with case study, It carries a weightage of 20% of CIE.
Course outcomes:
On completion of this course, the students should be able to:

- **CO1:** Explain the concepts of unstructured data
- **CO2:** Analyze and Manage the Data using CRUD operations
- **CO3:** Develop the applications using NoSQL
- **CO4:** Apply the concept of Map Reduce in the real world application development
- **CO5:** Develop web application using PHP and MangoDB in the NOSQL framework

Mapping with Program Outcomes:

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3-Strong; 2-Medium; 1-Low
Course Learning Objectives (CLOs)
The objectives of this course are to:

- Understand the block schematic of a digital image processing system
- Outline the areas of applications of image processing.
- Outline the knowledge of image enhancement and basic FFT and their applications for image processing.
- Understand the image segmentation, noise models and image restoration.
- Summarize filters for colour image processing, exposure to image compression concepts and algorithms

UNIT-I
Digital Image Fundamentals 10 Hours
Digital Image Restoration, fundamental Steps in Image Processing, Image processing Application, Overview of Digital Imaging Processing, Physical Aspects of Image Acquisition, Biological Aspects of Image Acquisition, Sampling and Quantization.

UNIT-II
Image Enhancement 11 Hours
Image Enhancement in Frequency Domain: Image smoothing frequency domain filtering, Image sharpening frequency domain filtering.

UNIT-III
Image Restoration 11 Hours

UNIT-IV
Image Segmentation 10 Hours
Detection of discontinuities, Edge Detection, Principle of Region Growing.
Morphological Image Processing: Morphological Operators (Dilation and Erosion), opening and closing, Basic Morphological algorithms.

UNIT-V
Colour Image Processing 10 Hours
Introduction, colour models, pseudo colour image processing, Full colour processing, colour transformations.
Image Compression: Image Compression Models, Compression Algorithm and its types.
Text Books:

Reference Books:

Note: At the end of the course students should come out with case study, it carries a weightage of 20% of CIE.

Course outcomes:
On completion of this course, the students should be able to:

CO1: Describe different image processing stages for given problem statement
CO2: Discuss spatial/frequency domain using various methods
CO3: Implement image enhancement & segmentation technique for a given image
CO4: Illustrate image restoration algorithms
CO5: Identify and apply Image Compression Models for given application

Mapping with Program Outcomes:

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3-Strong; 2-Medium; 1-Low
Course Learning Objectives (CLOs)
The objectives of this course are to:

- Demonstrate the IoT architecture and design for a given problem
- Apply IoT architecture for a given problem Analyse the application protocol
- Transport layer methods for the given business case.
- Design and develop an application for the given problem
- Develop python program for the given problem and verify the output

List of Programms

1. Run some python programs on Pi like: Read your name and print Hello message with name Read two numbers and print their sum, difference, product and division. Word and character count of a given string
   Area of a given shape (rectangle, triangle and circle) reading shape and appropriate values from standard input
   Print a name ‘n’ times, where name and n are read from standard input, using for and while loops.
   Handle Divided by Zero Exception. Print current time for 10 times with an interval of 10 seconds. Read a file line by line and print the word count of each line.

2. Get input from two switches and switch on corresponding LEDs

3. Flash an LED at a given on time and off time cycle, where the two times are taken from a file.

4. Switch on a relay at a given time using cron, where the relay’s contact terminals are connected to a load.

5. Access an image through a Pi web cam

6. Control a light source using web page.

7. Implement an intruder system that sends an alert to the given email.

8. Get the status of a bulb at a remote place (on the LAN) through web

9. Get an alarm from a remote area (through LAN) if smoke is detected.
   The student should have hands on experience in using various sensors like temperature, humidity, smoke, light, etc. and should be able to use control web camera, network, and relays connected to the Pi.

Course outcomes:
On completion of this course, the students should be able to:

CO: Design and develop IoT applications using Rasbery Pi and Supported components

Mapping with Program Outcomes:

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3-Strong; 2-Medium; 1-Low
Course Learning Objectives (CLOs)

The objectives of this course are to:

- Understand the Visual Studio IDE to create and debug Console applications, Windows Forms Application and ASP.NET Web applications.
- Familiarize C# code to demonstrate the concepts Command Line Arguments, Operator Overloading, Object Oriented Techniques,
- Outline the C# concepts of Interfaces, Delegates and Exception handling
- Understand windows applications using C#.NET
- Outline data driven web applications using ADO.NET and ASP.NET

PART A

1. Write a Program in C# to demonstrate Command line arguments processing.
2. Write a Program in C# to demonstrate boxing and Unboxing.
3. Write a program to demonstrate the static members.
4. Find the sum of all the elements present in a jagged array of 3 inner arrays.
5. Using Try, Catch and Finally blocks write a program in C# to demonstrate error Handling.
6. Demonstrate use of virtual and override key words in C# with a simple program.
7. Write a program to demonstrate delegates.
8. Write a program to demonstrate abstract class and abstract methods in C#.
9. Write a program to illustrate the use of different properties in C#.
10. Write a Program in C# to build a class which implements an interface.

PART – B

1. Consider the Database STUDENT consisting of following tables: tbl_Course (CourseID: int, CourseName: string) tbl_Student (USN: string, StudName: string, Address: string, CourseID: int, YrOfAdmsn: int)
   Develop suitable windows application using C#.NET having following options:
   1. Entering new course details.
   2. Entering new student details.
   3. Display the details of students (in a Grid) who belong to a particular course.
   4. Display the details the students who have taken admission in a particular year.

2. Consider the Database BLOODBANK consisting of following tables: tbl_BloodGroup (BloodID: int, BloodGroup: string) tbl_Donor (DonorID: int, DonorName: string, Address:string, ContactNo: int, DOB: date, Gender: string, Weight: int, BloodID: int)
   Develop suitable windows application using C#.NET having following options:
1. Entering Blood group details.
2. Entering new donor details.
3. Display the details of donors (in a Grid) having particular blood group.
4. Display the details of donors (in a Grid) based on gender.
5. Display the details of donors (in a Grid) based on age (above 18), weight (above 45KG) and Gender(user’s choice).

3. Consider the Database STUDENT consisting of following tables: 

   tbl_Course (CourseID:int, CourseName: string) 
   tbl_Book (BookID :int, BookTitle: string, Author: string,CourseID: int) 
   tbl_Student (USN: string, StudName: string, CourseID: int) 
   tbl_BookIssue(USN: string, BookID: int, IssueDate: Date)

   Develop suitable windows application using C#.NET having following options:
   1. New Course Entry.
   2. New Book Entry
   3. New Student Entry
   4. Issue of books to a student.
   5. Generate report (display in a grid) showing all the books belonging to particular course.
   6. Generate report (display in a grid) showing all the books issued on a particular date.
   7. Generate report (display in a grid) showing all the books issued to a particular student.

4. Develop a Web Application using C#.NET and ASP.NET for an educational institution.
   The master page should consist of Institution Name, Logo and Address. Also, it should provide hyperlinks to Departments, Facilities Available and Feedback. Each department page and facilities page should be designed as static pages. The hyperlinks should navigate to these static pages in the form of Content Pages associated with Master Page designed. The Feedback page should have fields to enter Name, Email and Message with Submit and Cancel Buttons. Database should be created to store these three data.

5. Develop a Web Application using C#.NET and ASP.NET for a Bank. The BANK Database should consist of following tables: 

   tbl_Bank (BankID: int, BankName: string) 
   tbl_Branch (BranchID: int, BankID: int, BranchName: string) 
   tbl_Account (AccountNo: int, BankID: int, BranchID: int, CustomerName: string, Address: string, ContactNo: int, Balance: real) (Note: AccountNo and BankID together is a composite primary key).

   The master page of this web application should contain hyperlinks to New Bank Entry, New Branch Entry (of selected Bank), New Customer Entry (based on branch and bank) and Report Generation.
   The hyperlinks should navigate to respective content pages. These content pages provide the fields for respective data entry. The reports should be generated (display in grid) as below:
   1. Display all records of particular bank.
   2. Display all records of a branch of particular bank.
   3. The balance should be displayed for the entered account number (Bank and Branch are input through ComboBox controls and Account number is input through TextBox).

Note: Students are required to execute one program from Part A and one from Part B.
Course outcomes:
On completion of this course, the students should be able to:

CO: Design and develop small C# applications using basic concepts and Object Oriented techniques. Design user interactive windows applications and Create web application to Implement, debug and deploy using ASP.NET Web applications.

Mapping with Program Outcomes:

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3-Strong; 2-Medium; 1-Low
Mini Project Guidelines:

- A team of TWO students must develop the mini project. However, during the examination, each student must demonstrate the project individually.
- The team may implement a mini project of their choice based on emerging trends.
- The team must submit a Brief Project Report (25 to 30 Pages) that must include the following:
  - Introduction
  - Requirements
  - Software Development Process Model Adopted
  - Analysis and Design Models
  - Implementation
  - Testing
  - References

Course outcomes:
On completion of this course, the students should be able to:

CO1: Identify, discuss and justify the technical aspects of the chosen project with a comprehensive and systematic approach.
CO2: Analyze and design the project.
CO3: Apply acquired knowledge for project development using modern tools and technology
CO4: Apply debugging tools for testing the project
CO5: Demonstrate the mini project work.

Mapping with Program Outcomes:

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3-Strong; 2-Medium; 1-Low

Scheme of Evaluation:

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<th>Course code</th>
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<th>External (SEE)</th>
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<td>Mini Project Work: 30, Report: 10, Viva-Voce: 10</td>
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## Mini Project (P20MCA38)

### Rubrics for Mini Project Assessment (CIE)

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<th>Identification of problem domain and detailed analysis</th>
<th>Excellent (10)</th>
<th>Good (8)</th>
<th>Satisfactory (5)</th>
<th>Poor (2)</th>
<th>Final Score</th>
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<tr>
<td>Detailed and extensive explanation of the purpose and need of the project</td>
<td>Good explanation of the purpose and need of the project</td>
<td>Average explanation of the purpose and need of the project</td>
<td>Minimal explanation of the purpose and need of the project</td>
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<th>Study of the existing system and feasibility of project proposed</th>
<th>Excellent (10)</th>
<th>Good (8)</th>
<th>Satisfactory (5)</th>
<th>Poor (2)</th>
<th>Final Score</th>
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<td>Detailed and extensive explanation of the specifications and the limitations of the existing systems</td>
<td>Collects a great deal of information and good study of the existing systems</td>
<td>Moderate study of the existing systems collects some basic information</td>
<td>Explanation of the specifications and the limitations of the existing systems not very satisfactory; limited information</td>
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<th>Design &amp; Implementation Methodology</th>
<th>Excellent (10)</th>
<th>Good (8)</th>
<th>Satisfactory (5)</th>
<th>Poor (2)</th>
<th>Final Score</th>
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<tr>
<td>Division of problem into modules and good selection of computing framework; Appropriate design methodology and properly justified</td>
<td>Division of problem into modules and good selection of computing framework; Design methodology not properly justified</td>
<td>Division of problem into modules but inappropriate selection of computing framework; Design methodology not defined properly</td>
<td>Partial division of problem into modules and inappropriate selection of computing framework; Design methodology not defined properly</td>
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<th>Project Demonstration &amp; Presentation</th>
<th>Excellent (10)</th>
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<td>All defined objectives are achieved as per time; All modules of project are well integrated and system working is accurate; Contents of presentations are appropriate and well delivered; Proper eye contact with audience and clear voice with good spoken language</td>
<td>All defined objectives are achieved; Integration of all modules not done and system working is not very satisfactory; Contents of presentations are appropriate and well delivered; Clear voice with good spoken language but less eye contact with</td>
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Scheme & Syllabus of MCA, PESCE, Mandya (2020 – 2022)  
Page 100
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<td>Key elements of the report are not provided. Overall presentation of the document is not to a professional standard</td>
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**Total Score**
Prerequisites: Basics of mathematics.

Course Learning Objectives (CLOs)
This course aims to

- Solve the mathematical calculations easily and quickly using the methods of Vedic mathematics.
- Compare the different types of series such as A.P., G.P., H.P.
- Explain divisibility rules, properties of different types of numbers.
- Analyze the concept of power cycle, and find last digit and last two digits.
- Explain the concepts behind the logical reasoning modules such as arrangement, ratio, proportion blood relations and Directions.

UNIT - I

6 hours

Time, Speed and Distance:
Concept of motion and mathematical representation of motion, The rule of proportionality, Conversion between kmph to m/s, Concept of average speed and its application in different scenarios, Relative speed– Importance, application and observation in day to day life, same direction and opposite direction, An application of allegation in Time speed and distance, Trains– Different scenarios. Boats and streams– resultant speed, upstream and downstream concept. Circular motion– Two or three bodies meeting at the starting point or anywhere in the track. Races– Concept of head start, solving problems under different constraints. Application of solving problems under Clocks.

SSC: Basic relation between the 3 different quantities. Conversions between different UNITs of measurement. Speed and velocity.

UNIT - II

4 hours

Simple equations, Ratio Proportions and Variations:

Simple equations: Linear equations-Linear equations in one variable, linear equation in two variables, Different methods of solving linear equations in two variables– Method of elimination, Method of substitution, Method of cross multiplication. Format of equations that can be converted to linear equations, Linear equations of three variables, Inequalities and its properties. Advanced problems on Simple equations. Age problems.

Ratio Proportions and Variations: Understanding the meaning and difference between ratio, proportion and variation. Properties of ratio, Comparison of more than two quantities, Proportion, Properties of proportion - Componendo, Dividendo, Invertendo, Alternendo. Continued proportion, Mean proportion. Variation - Direct variation, Indirect variation, Joint variation, Short cut methods to solve problems on variation. **SSC**-Knowledge about factors, types of factors. Splitting the middle term rule, formula rule.

UNIT - III

8 hours

Time and Work:
Relationship between time and work. Importance of efficiency, Conventional method of solving problems, L.C.M method, Negative work, The specific case of building a wall, Group work, Constant product rule, When work is not constant, Pipes and cistern– Similarity of logic.
SSC: LCM methods, basic arithmetic. Fractions and efficiency.

Geometry and Mensuration:
Theory, straight lines, triangles– theorems, area, lines inside triangle and geometric centre, Special property of an equilateral triangle, Application of Pythagoras theorem, Congruency and similarity of triangles, Basic proportionality theorem, Polygons, Quadrilaterals, Trapezium, Parallelogram, Rectangle, Rhombus, Square, Division of polygons, Circumscribed and Inscribed polygons, Concyclic points concept, Cyclic quadrilateral, Circle– Radius, Area and perimeter, Arc, Chord, Sector, Segment, Tangent, Secant, Area of common region Solid figures– Introduction, Classification of a solid, Net of a solid, Cuboid, Cube, Right cylinder, Pyramid– right pyramid, triangular pyramid, Cone– frustum of a cone, Sphere, Combination of solid.

Co-ordinate geometry:
Cartesian coordinate geometry– rectangular coordinate axis, distance formula, Section formula, Area of a triangle, Centre of gravity or Centroid of a triangle, In-centre of a triangle, Circumcentre of a triangle, Orthocentre of a triangle, Collinearity of three points, Slope of a line, Different forms of equations of a straight line, Perpendicularity and parallelism, Length of perpendicular.

Self-study Component- Basics of geometry, formula, dimensions, shapes. Different types of lines.
Example – parallel, intersecting etc..

UNIT - IV

Building the fundamentals of logical reasoning:

Arrangement: Approach to tackle questions, Different types of arrangement– Linear arrangement, Circular arrangement. Selection, Double line map. Possible ways of arrangement– Words or numbers, left side only, right side only, left right alternate, increasing or decreasing order, interchange vs push, Strategy for solutions– some tips for quick answers, general strategy.

Directions: Basics. Pythagorean theorem, Pythagorean triplets, Solving problems for practice.

Blood relations: Some typical relations that we come across, family tree, Structuring the given problem step by step. Suggested methods– Backtracking, drawing family tree. Problems on blood relations and professions.

SSC-Basic knowledge of directions, Pythagoras theorem. Logical reasoning skills, Relations, Family tree.

UNIT - V

Cubes, Clocks & Calendars:
Cubes: Number of faces, vertices and edges. Colored cubes. Number of colored faces and the formulae to find-out the same. Problems on cubes.


Self-study Component- Knowledge about shapes and dimensions, Area and volume. Leap year, number of days. Important dates.

Set theory and Venn diagram: Set builder form, Tabular form, Venn diagram, Types of sets, Operation of sets using venn diagram, Important properties, Algebraic laws of sets, Maxima and minima in set operation, Venn diagram for four sets.
Syllogism: Meaning of syllogisms, Format of problems and standard qualifiers, Concept of distribution, Standard question pattern, Application of venn diagram to solve problems. Logical Venn diagrams: Analysis of the given problem and solve it. Self-study Component- Basics about sets, operations using venn diagram. Basic applications.

Reference Books:
1. The Trachtenberg speed system of basic mathematics, published by Rupa publications.
2. CAT Mathematics by AbhijithGuha. Published by PHI learning private limited.
3. Quantitative aptitude by Dr. R. S Agarwal, published by S.Chand private limited.
4. Verbal reasoning by Dr. R. S Agarwal, published by S. Chand private limited.
6. Analytical reasoning by M.K Pandey BSC PUBLISHING.CO.PVT.LTD

Course outcomes:
On completion of this course, the students should be able to:

CO1: Solve mathematical calculations in less duration compared to the conventional method.
CO2: Demonstrate AP, GP and HP
CO3: Apply divisibility rules, power cycle method and evaluate the significance of the number system module.
CO4: Identify the errors in the problems concerning inequalities and solve simple equations and problems based on ratio, proportion and variation.
CO5: Solve the problems based on blood relations, directions and arrangement.

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<td>1</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>CO5</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>-</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>-</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>-</td>
</tr>
</tbody>
</table>

3-Strong; 2-Medium; 1-Low
Evaluation Scheme for I, II & III Semesters

<table>
<thead>
<tr>
<th>Scheme</th>
<th>Weightage</th>
<th>Marks</th>
<th>Event Break UP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>CIE I</td>
</tr>
<tr>
<td>CIE</td>
<td>50%</td>
<td>50</td>
<td>40</td>
</tr>
<tr>
<td>SEE</td>
<td>50%</td>
<td>50*</td>
<td>Questions to Set : 5</td>
</tr>
</tbody>
</table>

Note: * The SEE will be conducted for 100 Marks.

Scheme of SEE Question Paper(100 Marks)

<table>
<thead>
<tr>
<th>Duration : 3hrs</th>
<th>Marks : 100</th>
<th>Weightage : 50%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• The question paper should cover the entire contents of the syllabus.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Total questions to be set are FIVE, which have internal choice for any THREE units and remaining TWO units’ questions are compulsory.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• The students should answer 5 full questions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Each unit carries equal marks of 20.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SEMESTER-IV

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Hrs/Week</th>
<th>Credits</th>
<th>Examination Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>L : T : P : H</td>
<td></td>
<td>CIE</td>
</tr>
<tr>
<td>1</td>
<td>P20MCA41</td>
<td>Technical Seminar</td>
<td>---------</td>
<td>2</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>P20MCA42</td>
<td>Industry Internship (4 weeks)</td>
<td>---------</td>
<td>2</td>
<td>100</td>
</tr>
<tr>
<td>3</td>
<td>P20MCA43</td>
<td>Project Work</td>
<td>---------</td>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>4</td>
<td>P20MCA44</td>
<td>Project Dissertation Evaluation</td>
<td>---------</td>
<td>6</td>
<td>100</td>
</tr>
<tr>
<td>5</td>
<td>P20MCA45</td>
<td>Project Viva - Voce</td>
<td>---------</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td>---------</td>
<td>24</td>
<td>200</td>
</tr>
</tbody>
</table>

L: Lecture, T: Tutorial, P: Practical, C: Credits ; CIE: Continuous Internal Evaluation; SEE: Semester End Examinations

Technical Seminar (P20MCA41)
Guidelines for Technical Seminar:

- The Student has to choose minimum 8 weeks NPTEL online course recommended by the Department.
- The student can undergo NPTEL course registration during III / IV Semester and the credit will be considered in IV Semester.
- The CIE marks awarded for Technical Seminar, shall be based on the evaluation of final NPTEL score (i.e. with NPTEL Certification Only), Seminar Report, Presentation skill with Question and Answer session in the ratio 40:20:40 respectively.

Industry Internship (P20MCA42)
Guidelines for Industry Internship:

- The students shall undergo internship in the industry for a period of 4 weeks during the vacation immediately after the 3rd semester examination.
- The internship shall be carried out in industry / R&D labs or institutions.
- The same should be presented by the student along with the report at the end of 4th week and will be evaluated by the internal panel for 100 marks.
- The student should present the progress about the internship to the panel of members constituted by the Head of the Department (HOD) and the presentation will be evaluated for 50 marks.
- The student shall prepare a report and submit the same to the guide allotted by the institute. The report is evaluated for 50 marks.
- The report format for the internship shall be as equivalent as the Project Report as prescribed by the Department.
Project Work

Guidelines for Project:

- This is an individual project for duration of minimum of 4 months.
- The candidate should carry out the project in any industry or R&D institution or educational institution under a guide/co-guide.
- The candidate has to present the work carried out before the examiners during the final examination.
- The work out carried out should be free from plagiarism.
- The literature study may be clearly written which may be summary of existing project and highlight of what are the functionalities that are proposed to this project.
- Student shall indicate the different research papers, documents refereed as a part of the literature study.
- Students are encouraged and appreciated to do paper publication in an indexed Journal / journal with impact factor / conference in leading avenues like IEEE, Springer etc. during their project work as an added advantage.
- The student shall present the progress about the internship to the panel of members constituted by the Head of the Department (HOD).

Paper publication:

10% Weightage is given in Project Dissertation Evaluation (P20MCA44), for students who have published the research paper in indexed Journal / journal with impact factor / conference in leading avenues like IEEE, Springer etc.

Rubrics / Scheme of Evaluation:

<table>
<thead>
<tr>
<th>Course code</th>
<th>Title</th>
<th>Internal (CIE)</th>
<th>External (SEE)</th>
<th>Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>P20MCA41</td>
<td>Technical Seminar</td>
<td>40 20 40 --</td>
<td>-- -- --</td>
<td>100</td>
</tr>
<tr>
<td>P20MCA42</td>
<td>Industry Internship</td>
<td>-- 50 50 --</td>
<td>-- -- --</td>
<td>100</td>
</tr>
<tr>
<td>P20MCA43</td>
<td>Project Work</td>
<td>100 -- --</td>
<td>-- --</td>
<td>100</td>
</tr>
<tr>
<td>P20MCA44</td>
<td>Project Dissertation Evaluation</td>
<td>10 90 --</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>P20MCA45</td>
<td>Project Viva Voce</td>
<td>-- -- --</td>
<td>100 100</td>
<td>100</td>
</tr>
</tbody>
</table>

Rubrics: Department can have its own rubrics as per the scheme mentioned above for the evaluation of internship, technical seminar and project work.
## Technical Seminar (P20MCA41)

### Rubrics for Technical Seminar Presentation Assessment

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Excellent (8)</th>
<th>Good (6)</th>
<th>Satisfactory (4)</th>
<th>Poor (2)</th>
<th>Final Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Knowledge of the topic at analyze level</strong></td>
<td>Demonstrates in depth knowledge; answered all questions with elaboration</td>
<td>Adequate knowledge on most of the topics. Answered all questions but failed to elaborate</td>
<td>Superficial knowledge of topic; only able to answer basic questions</td>
<td>Does not have any knowledge; Unable to answer questions</td>
<td></td>
</tr>
<tr>
<td><strong>Organization of the presentation</strong></td>
<td>Presented in logical sequence; introduction and background give proper context key points and conclusions are clear and well presented</td>
<td>Most information presented in logical sequence; clear introduction; adequate background; some irrelevant information</td>
<td>Problems with sequencing, lacks clear transitions; incomplete or overly detailed introduction, emphasis given to less important information</td>
<td>Little or no organization, difficult to follow; missing or ineffective introduction; confusing background; key points unclear</td>
<td></td>
</tr>
<tr>
<td><strong>Level of Understanding</strong></td>
<td>Sufficient for understanding and presented very effectively</td>
<td>Sufficient for understanding and presented well</td>
<td>Sufficient for understanding but not clearly presented</td>
<td>Too brief or insufficient for understanding or too detailed</td>
<td></td>
</tr>
<tr>
<td><strong>Presentation Skills</strong></td>
<td>Clear articulation, steady delivery rate, good posture and eye contact, confident and appropriately dressed</td>
<td>Clear articulation but not very polished. Able to recover from minor mistakes. Appropriately dressed</td>
<td>Occasional eye contact, incorrect pronunciations, and Voice fluctuation.</td>
<td>Inaudible or too loud, no eye contact, delivery rate is too slow or too fast, not in formal attire</td>
<td></td>
</tr>
<tr>
<td><strong>Visuals</strong></td>
<td>Visually pleasing and easy to read; good use of white space, colour, backgrounds; images and Graphics support.</td>
<td>Adequate layout, but with some fonts, colours, backgrounds difficult to read</td>
<td>Difficult to read, cluttered appearance; images improperly sized; some distracting graphics or animations</td>
<td>Confusing layout, text extremely difficult to read; many graphics, sounds, animations distract from the presentation</td>
<td></td>
</tr>
</tbody>
</table>

### Total Score
### Rubrics for Seminar Report Assessment

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Excellent (4)</th>
<th>Good (3)</th>
<th>Satisfactory (2)</th>
<th>Poor(1)</th>
<th>Final Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective, relevance, impact and conclusion</strong></td>
<td>The purpose and objective, relevance and impact of the topic is made clear, and the report addresses them in a focused and logical manner.</td>
<td>The purpose and objective, relevance and impact of the topic is made clear, and the report addresses them.</td>
<td>Purpose and objectives are stated ambiguously</td>
<td>The report does not clearly address any of them.</td>
<td></td>
</tr>
<tr>
<td><strong>Grammar &amp; Spelling</strong></td>
<td>Very few spelling errors, correct punctuation, grammatically correct, complete sentences.</td>
<td>Occasional lapses in spelling, punctuation, grammar, but not enough to seriously distract the reader.</td>
<td>Less technical details, sentences are not framed properly and with a few spelling mistakes</td>
<td>Numerous spelling errors, non-existent or incorrect punctuation, and/or severe errors in grammar that interfere with understanding.</td>
<td></td>
</tr>
<tr>
<td><strong>References</strong></td>
<td>Sources are Acknowledged with full reference details.</td>
<td>Sources are acknowledged with bare reference details.</td>
<td>Sources are acknowledged with partial reference details.</td>
<td>Sources are not acknowledged.</td>
<td></td>
</tr>
<tr>
<td><strong>Report Format</strong></td>
<td>All required elements of the report are present and completed efficiency.</td>
<td>All required elements of the report are present and completed to a satisfactory standard.</td>
<td>All required elements are provided but in a haphazard way</td>
<td>Key elements of the report are not provided. Overall presentation of the document is not to a professional standard.</td>
<td></td>
</tr>
<tr>
<td><strong>Plagiarism Check</strong></td>
<td>Uniqueness 90% and above</td>
<td>Uniqueness between 85% to 89%</td>
<td>Uniqueness between 80% to 84%</td>
<td>Uniqueness less than 75% to 79%</td>
<td></td>
</tr>
</tbody>
</table>

**Total Score**
Course outcomes:
On completion of this course, the students should be able to:

CO1: Analyze relevant topic in computer science/ research based knowledge.
CO2: Enhance self-learning skills.
CO3: Compilation of information with effective presentation & report writing.

Mapping with Program Outcomes:

<table>
<thead>
<tr>
<th>CO's</th>
<th>PO1</th>
<th>PO2</th>
<th>PO3</th>
<th>PO4</th>
<th>PO5</th>
<th>PO6</th>
<th>PO7</th>
<th>PO8</th>
<th>PO9</th>
<th>PO10</th>
<th>PO11</th>
<th>PO12</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO1</td>
<td>3</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>-</td>
<td>2</td>
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</tr>
<tr>
<td>CO2</td>
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<td>3</td>
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<td>2</td>
<td>-</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>CO3</td>
<td>-</td>
<td>-</td>
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<td>-</td>
<td>3</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

3-Strong; 2-Medium; 1-Low

NPTEL Score (out of 40 marks) =
Rubrics for Seminar Presentation Assessment (out of 40 marks) =
Rubrics for Seminar Report Assessment (out of 20 marks) =
Total Marks (Out of 100 marks) =

Signature of the Guide / Coordinator

Name:

Signature of HOD
### Industry Internship (P20MCA42)

#### Rubrics for Internship Presentation Assessment

<table>
<thead>
<tr>
<th></th>
<th>Excellent (10)</th>
<th>Good (8)</th>
<th>Satisfactory (5)</th>
<th>Poor (2)</th>
<th>Final Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge on Industry experience /Research work</td>
<td>Demonstrates in depth knowledge about Industry / Research processes; answered all questions with elaboration</td>
<td>Knowledge to a limited extent on major processes. Able to answer most of the questions though not elaborate</td>
<td>Superficial knowledge of topic; only able to answer basic questions</td>
<td>Does not have any knowledge; Unable to answer questions</td>
<td></td>
</tr>
<tr>
<td>Organization of the presentation</td>
<td>Presented in logical sequence; Introduction and background given in proper context; Key points and conclusions are clear and less references and citations</td>
<td>Presented in logical sequence; Introduction and background given in proper context; Key points and conclusions are not clear and well presented most citationed and references</td>
<td>Emphasis given to less important information</td>
<td>Little or no organization, difficult to follow; missing or ineffective introduction; confusing background; key points unclear</td>
<td></td>
</tr>
<tr>
<td>Usage of Modern tools and technologies</td>
<td>Effectively utilized appropriate tools and technologies for implementation.</td>
<td>Developed applications, though not very effectively. Fair enough.</td>
<td>Sufficient for understanding but not clearly elaborated about usage of tools and technologies</td>
<td>Too brief or insufficient for understanding or too detailed</td>
<td></td>
</tr>
<tr>
<td>Presentation Skills</td>
<td>Clear articulation about tools/technology, steady delivery rate, good posture and eye contact, confident and appropriately dressed</td>
<td>Good Articulation about tools/technology and not very polished. Not able to realize minor mistakes. Presentable attire</td>
<td>Refers to slides to make points, occasional eye contact, incorrect pronunciations, and Voice fluctuation.</td>
<td>No clarity in sentence, Inaudible or too loud, no eye contact, delivery rate is too slow or too fast, not in formal attire</td>
<td></td>
</tr>
<tr>
<td>Visuals</td>
<td>Visually pleasing and easy to read; good use of white space, colour, backgrounds; images and Graphics support.</td>
<td>Good visuals but can be improved largely.</td>
<td>Difficult to read, cluttered appearance; images improperly sized; some distracting graphics or animations</td>
<td>Confusing layout, text extremely difficult to read; many graphics, sounds, animations distract from the presentation</td>
<td></td>
</tr>
</tbody>
</table>

**Total Score**
Rubrics for Internship Report Assessment

<table>
<thead>
<tr>
<th></th>
<th>Excellent (10)</th>
<th>Good (8)</th>
<th>Satisfactory (5)</th>
<th>Poor (2)</th>
<th>Final Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose and Objective of Internship</td>
<td>The purpose and objective of the Internship report is made clear, and the report addresses the objective(s) in a focused and logical manner.</td>
<td>Documented well but with slight ambiguity in analyzing the problems</td>
<td>Purpose and objectives are stated ambiguously</td>
<td>The report does not clearly address the objective(s) of Internship.</td>
<td></td>
</tr>
<tr>
<td>Documenting the essence of Tools / Technology used, Grammar &amp; Spelling</td>
<td>Complete information is provided about tools/technology, Very few spelling errors, correct punctuation, grammatically correct, complete sentences.</td>
<td>Average technical details on tools / technology usage, Grammatical mistakes not corrected.</td>
<td>Less technical details, sentences are not framed properly and with a few spelling mistakes</td>
<td>No details about tools/technology, Numerous spelling errors, non-existent or incorrect punctuation, and/or severe errors in grammar that interfere with understanding.</td>
<td></td>
</tr>
<tr>
<td>Code Development / self learning</td>
<td>Design and Code is self-developed wherever applicable</td>
<td>Design and Code is partially self-developed wherever applicable</td>
<td>Major part of the implementation is copied.</td>
<td>No details about design and development</td>
<td></td>
</tr>
<tr>
<td>Report Format</td>
<td>All required elements of the report are present and completed efficiently.</td>
<td>All required elements are present but some of them are not given completely</td>
<td>All required elements are provided but in a haphazard way</td>
<td>Key elements of the report are not provided. Overall presentation of the document is not to a professional standard.</td>
<td></td>
</tr>
<tr>
<td>Plagiarism Check</td>
<td>Uniqueness 90% and above</td>
<td>Uniqueness between 85% to 89%</td>
<td>Uniqueness between 80% to 84%</td>
<td>Uniqueness less than 75% to 79%</td>
<td></td>
</tr>
</tbody>
</table>

Total Score

Course outcomes:

On completion of this course, the students should be able to:

CO1: Analyse the real-time industry/research work environment with emphasis on organizational structure/job process/different departments and functions / tools /technology.

CO2: Explore modern tools and technologies.

CO3: Demonstrate the industry study through self-learning capabilities with presentation and detailed report.
Mapping with Program Outcomes:

<table>
<thead>
<tr>
<th>CO/PO</th>
<th>PO1</th>
<th>PO2</th>
<th>PO3</th>
<th>PO4</th>
<th>PO5</th>
<th>PO6</th>
<th>PO7</th>
<th>PO8</th>
<th>PO9</th>
<th>PO10</th>
<th>PO11</th>
<th>PO12</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO1</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
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</tr>
<tr>
<td>CO2</td>
<td>-</td>
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<tr>
<td>CO3</td>
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<td>-</td>
<td>3</td>
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</tr>
</tbody>
</table>

3-Strong; 2-Medium; 1-Low

Rubrics for Seminar Presentation Assessment (out of 50 marks) =

Rubrics for Seminar Report Assessment (out of 50 marks) =

Total Marks (Out of 100 marks) =

Signature of the Guide

Name:

Signature of HOD
<table>
<thead>
<tr>
<th><strong>Identification of problem domain and detailed analysis</strong></th>
<th><strong>Excellent (20)</strong></th>
<th><strong>Good (16)</strong></th>
<th><strong>Satisfactory (12)</strong></th>
<th><strong>Poor (8)</strong></th>
<th><strong>Final Score</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Detailed and extensive explanation of the purpose and need of the project</td>
<td>Good explanation of the purpose and need of the project</td>
<td>Average explanation of the purpose and need of the project</td>
<td>Minimal explanation of the purpose and need of the project</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Study of the existing system and feasibility of project proposed</strong></th>
<th><strong>Excellent (20)</strong></th>
<th><strong>Good (16)</strong></th>
<th><strong>Satisfactory (12)</strong></th>
<th><strong>Poor (8)</strong></th>
<th><strong>Final Score</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Detailed and extensive explanation of the specifications and the limitations of the existing systems</td>
<td>Collects a great deal of information and good study of the existing systems</td>
<td>Moderate study of the existing systems collects some basic information</td>
<td>Explanation of the specifications and the limitations of the existing systems not very satisfactory; limited information</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Objectives and methodology of the proposed work</strong></th>
<th><strong>Excellent (20)</strong></th>
<th><strong>Good (16)</strong></th>
<th><strong>Satisfactory (12)</strong></th>
<th><strong>Poor (8)</strong></th>
<th><strong>Final Score</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>All objectives of the proposed work are well defined; Steps to be followed to solve the defined problem are clearly specified</td>
<td>Good justification to the objectives; Methodology to be followed is specified but detailing is not done</td>
<td>Only some objectives of the proposed work are well defined; Steps to be followed to solve the defined problem are not specified properly</td>
<td>Incomplete justification to the objectives proposed; Steps are mentioned but unclear; Without justification to objectives</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Design &amp; Implementation Methodology</strong></th>
<th><strong>Excellent (20)</strong></th>
<th><strong>Good (16)</strong></th>
<th><strong>Satisfactory (12)</strong></th>
<th><strong>Poor (8)</strong></th>
<th><strong>Final Score</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Division of problem into modules and good selection of computing framework; Appropriate design methodology and properly justified</td>
<td>Division of problem into modules and good selection of computing framework; Design methodology not properly justified</td>
<td>Division of problem into modules but inappropriate selection of computing framework; Design methodology not defined properly</td>
<td>Partial division of problem into modules and inappropriate selection of computing framework; Design methodology not defined properly</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Project Demonstration &amp; Presentation</strong></th>
<th><strong>Excellent (20)</strong></th>
<th><strong>Good (16)</strong></th>
<th><strong>Satisfactory (12)</strong></th>
<th><strong>Poor (8)</strong></th>
<th><strong>Final Score</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>All defined objectives are achieved as per time; All modules of project are well integrated and system working is accurate; Contents of</td>
<td>All defined objectives are achieved; Integration of all modules not done and system working is not very satisfactory; Contents of</td>
<td>All defined objectives are achieved; Modules of project are not properly integrated; Contents of presentations are appropriate but</td>
<td>Only some of the defined objectives are achieved; Modules are not in proper working form that further leads to failure of integrated</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Project Work (P20MCA43)**

**Rubrics for Project Work Assessment**
Presentations are appropriate and well delivered; Proper eye contact with audience and clear voice with good spoken language. 

Presentations are appropriate and well delivered; Clear voice with good spoken language but less eye contact with audience.

Not well delivered; Eye contact with only few people and unclear voice.

System; Contents of presentations are not appropriate and not well delivered; Poor eye contact with audience and unclear voice.
## Rubrics for Project Dissertation Evaluation

<table>
<thead>
<tr>
<th>Area of Evaluation</th>
<th>Excellent (15)</th>
<th>Good (12)</th>
<th>Satisfactory (10)</th>
<th>Poor (8)</th>
<th>Final Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective, relevance, impact</strong></td>
<td>The purpose and objective, relevance and impact of the project is made clear, and the report addresses them in a focused and logical manner</td>
<td>The purpose and objective, relevance and impact of the project is made clear, and the report addresses them</td>
<td>Purpose and objectives are stated ambiguously</td>
<td>The report does not clearly address any of them</td>
<td></td>
</tr>
<tr>
<td><strong>Study of the existing system and feasibility of project proposed</strong></td>
<td>Detailed and extensive explanation of the specifications and the limitations of the existing systems</td>
<td>Collects a great deal of information and good study of the existing systems</td>
<td>Moderate study of the existing systems collects some basic information</td>
<td>Explanation of the specifications and the limitations of the existing systems not very satisfactory; limited information</td>
<td></td>
</tr>
<tr>
<td><strong>Experimental observation / Theoretical modeling and Results presentation and discussion</strong></td>
<td>Complete explanation of the key concepts and strong description of the technical requirements of the project; Results are presented in very appropriate manner</td>
<td>Complete explanation of the key concepts but insufficient description of the technical requirements of the project; Results are presented in good manner</td>
<td>Incomplete explanation of the key concepts and insufficient description of the technical requirements of the project; Results presented are not much satisfactory</td>
<td>Inappropriate explanation of the key concepts and poor description of the technical requirements of the project; Results presented are not much satisfactory</td>
<td></td>
</tr>
<tr>
<td><strong>Conclusion, future work and references</strong></td>
<td>Project work is well summarized and concluded; Future enhancement in the project are well specified; Sources are acknowledged with full reference</td>
<td>Project work summary and conclusion not very appropriate; Future enhancement in the project are specified; Sources are acknowledged with bare reference details</td>
<td>Project work summary and conclusion not very appropriate; Future enhancement in the project are specified; Sources are acknowledged with partial reference details</td>
<td>Project work summary and conclusion not very appropriate; Future enhancement in the project are not specified; Sources are not acknowledged</td>
<td></td>
</tr>
<tr>
<td>Overall presentation of the Thesis</td>
<td>details</td>
<td>Overall presentation of the Thesis</td>
<td>details</td>
<td>Overall presentation of the Thesis</td>
<td>details</td>
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</tr>
<tr>
<td>All required elements of the report are present and completed efficiency</td>
<td>All required elements of the report are present and completed to a satisfactory standard</td>
<td>Key elements of the report are not provided. Overall presentation of the document is not to a professional standard</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Plagiarism Check</th>
<th>Uniqueness</th>
<th>Uniqueness</th>
<th>Uniqueness</th>
<th>Uniqueness</th>
</tr>
</thead>
<tbody>
<tr>
<td>90% and above</td>
<td>between 85% to 89%</td>
<td>between 80% to 84%</td>
<td>less than 75% to 79%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Score</th>
</tr>
</thead>
</table>

Rubrics for Project Dissertation Assessment (out of 90 marks) =

Paper Publication (out of 10 marks) =

Total Marks (Out of 100 marks) =

Signature of the Internal / External Examiner

Name:
### Rubrics for Viva-Voce

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Excellent (20)</th>
<th>Good (16)</th>
<th>Satisfactory (12)</th>
<th>Poor (8)</th>
<th>Final Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Identification of problem domain</strong></td>
<td>Detailed and extensive explanation of the purpose and need of the project</td>
<td>Good explanation of the purpose and need of the project</td>
<td>Average explanation of the purpose and need of the project</td>
<td>Minimal explanation of the purpose and need of the project</td>
<td>--------------</td>
</tr>
<tr>
<td><strong>Study of the existing system and feasibility of project proposed</strong></td>
<td>Detailed and extensive explanation of the specifications and the limitations of the existing systems</td>
<td>Collects a great deal of information and good study of the existing systems</td>
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<td>Explanation of the specifications and the limitations of the existing systems not very satisfactory; limited information</td>
<td>--------------</td>
</tr>
<tr>
<td><strong>Design &amp; Implementation Methodology</strong></td>
<td>Division of problem into modules and good selection of computing framework; Appropriate design methodology and properly justified</td>
<td>Division of problem into modules and good selection of computing framework; Design methodology not properly justified</td>
<td>Division of problem into modules but inappropriate selection of computing framework; Design methodology not defined properly</td>
<td>Partial division of problem into modules and inappropriate selection of computing framework; Design methodology not defined properly</td>
<td>--------------</td>
</tr>
<tr>
<td><strong>Experimental results, Conclusion, future work and references</strong></td>
<td>Project work is well summarized and concluded; Future enhancement in the project are well specified; Sources are Acknowledged with full reference details</td>
<td>Project work is well concluded; Future enhancement in the project are Specified; Sources are acknowledged with bare reference details</td>
<td>Project work summary and conclusion not very appropriate; Future enhancement in the project are specified; Sources are acknowledged with partial reference details</td>
<td>Project work summary and conclusion not very appropriate; Future enhancement in the project are not specified; Sources are not acknowledged</td>
<td>--------------</td>
</tr>
<tr>
<td><strong>Organization of the presentation / Questionnaire</strong></td>
<td>Contents of presentations are appropriate and well delivered; Proper eye contact with audience and clear voice with</td>
<td>Contents of presentations are appropriate and well delivered; Clear voice</td>
<td>Contents of presentations are appropriate but not well delivered; Eye contact with only few people and unclear</td>
<td>Contents of presentations are not appropriate and not well delivered; Poor eye contact with audience and unclear voice</td>
<td>--------------</td>
</tr>
<tr>
<td>good spoken language</td>
<td>with good spoken language but less eye contact with Audience</td>
<td>voice</td>
<td></td>
<td></td>
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<tr>
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**Total Score**

Total Marks for Viva-Voce Assessment (out of 100 marks) =

<table>
<thead>
<tr>
<th>Signature of the Internal Examiner</th>
<th>Signature of the External Examiner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name:</td>
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</tr>
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</table>