*Institute for Excellence in Higher Education (IEHE), Bhopal*

B.Sc. (HONOURS): **PART-I** Semester: **I**

**SUBJECT: COMPUTER SCIENCE** **PAPER: HONOURS-I**
**Maximum Marks: 100** **Time : 3 hours**

# TITLE: **Digital Computer Organization**

**Ojectives:-** Digital representation of data in a computer system. Understand the general concepts in digital logic design, including logic elements, and their use in combinational and sequential logic circuit design .The student will be able to Identify, understand and apply different number systems and codes.

**Course Learning Outcomes:-**Upon completion of the course, students should posses the following knowledge and skills:

- ˆAn understanding of a machine's instruction set architecture (ISA) including basic instruction fetch and execute cycles, instruction formats, control flow, and operand addressing modes.
- An understanding of the design and functioning of a machines central processing unit (CPU) including the data path components (ALU, register le) and the control unit.
- An understanding of basic input/output functioning including program controlled I/O and interrupt I/O.
- An understanding of organization of memory hierarchies including the basics of cache design and DRAM architectures.
- Analyze the performance of processors and caches

## SYLLABUS

**Data types and Number systems:**

Binary number system, Octal & Hexa-decimal number system,1's & 2's complement, Binary Fixed-Point Representation, Arithmetic operation on Binary numbers, Overflow & underflow, Floating Point Representation, Codes, ASCII, EBCDIC codes, Gray code, Excess-3 & BCD, Error detection & correcting codes.

**Logic Gate:**

AND, OR, NOT gates and their Truth tables; NOR, NAND & XOR gates, Boolean Algebra, Basic Boolean Law's, Demorgan's theorem, MAP Simplification, Minimization techniques, K-Map, Sum of Product & Product of Sum.

**Combinational & Sequential circuits:**

Half Adder & Full Adder, Full Substractor, Flip-flops - RS, D, JK & T Flip-flops, RAM and ROM, Multiplexer, Demultiplexer, Encoder & Decoder.

**Registers:**

Shift registers, serial-in, serial-out, parallel-in, parallel-out.

**Counters:**

Synchronous, Asynchronous, up, down counters, ring counters and ripple counters.

**I/O Interface:**

Properties of simple I/O devices and their controller, Isolated versus memory-mapped I/O, Modes of Data transfer, Synchronous & Asynchronous Data transfer, Handshaking, Asynchronous serial transfer, I/O Processor.

**Auxiliary memory:**

Magnetic Drum, Disk & Tape, Semi-conductor memories, Memory Hierarchy, Associative Memory, Virtual Memory, Address space & Memory Space, Address Mapping, Page table, Page Replacement, Cache Memory, Hit Ratio, Mapping Techniques, Writing into Cache.

TEXT BOOKS :

1. Computer Fundamentals : B. Ram – New Age International Publishers
2. BARTEE : *Digital Computer Fundamentals*

REFERENCE BOOKS:

1. MALVINO : *Digital Compute Electronics*
2. MORRIS MANO : *Computer System Architecture*
3. MALVINO : *Digital Principles & Applications*
4. R.P. JAIN : *Modern Digital Electronics*

# *Institute for Excellence in Higher Education (IEHE), Bhopal*

B.Sc. (HONOURS): **PART-I** Semester: **I**

**SUBJECT: COMPUTER SCIENCE** **PAPER: HONOURS-I**

**Maximum Marks :100** **Practical Time: 3 hours**

TITLE: Digital Computer Organization(Practical Syllabus)

1. Design Circuit diagram for Basic Gate using NOR Gate
2. Design Circuit diagram for Basic Gate using NAND Gate
3. Design Circuit diagram for XOR and XNOR Gate using Basic Gates
4. Design Circuit diagram for XOR and XNOR Gate using NOR Gate
5. Design Circuit diagram for XOR and XNOR Gate using NAND Gate
6. Design Circuit diagram for Implement of Boolean expression
7. Design Circuit diagram for De Morgan's Theorem
8. Design Circuit diagram for Half Adder
9. Design Circuit diagram for Half Adder using Universal Gate
10. Design Circuit diagram for Full Adder
11. Design Circuit diagram for Full Adder using Universal Gate
12. Design Circuit diagram for Half Subtractor
13. Design Circuit diagram for Half Subtractor using Universal Gate
14. Design Circuit diagram for Full Subtractor
15. Design Circuit diagram for Full Subtractor using Universal Gate
16. Design Circuit diagram for Multiplexer
17. Design Circuit diagram for Multiplexer(8×1 , 16×1)
18. Design Circuit diagram for Demultiplexer
19. Design Circuit diagram for Demultiplexer(1×8 , 1×16)
20. Design Circuit diagram for Decoder
21. Design Circuit diagram for 3 to 8 Decoder
22. Design Circuit diagram for Encoder
23. Design Circuit diagram for Octal to Binary Encoder
24. Design Circuit diagram for Decimal to Binary(BCD) Encoder
25. Design Circuit diagram for Hexadecimal to Binary Encoder

**26.** Design Circuit diagram for Parity Bit Checker

**27.** Design Circuit diagram for Parity Bit Generator S-173(R-19)

**Schemes of Marks :**

| | |
|---|---|
| Design Circuit diagram for any Gate. | 20 Marks |
| Design Circuit diagram for Combinational & Sequential circuits | 20 Marks |
| Design Circuit diagram for Registers and Counters | 20 Marks |
| Practical Record | 20 Marks |
| Viva | 20 Marks |

# Institute for Excellence in Higher Education (IEHE), Bhopal

B.Sc. Honours: **PART-I** Semester: **I**

SUBJECT: **COMPUTER SCIENCE** PAPER: **HONOURS-II/SUBSIDIARY**

**Maximum Marks: 100** **Time : 3:00 Hours**

TITLE: **PROGRAMMING FUNDAMENTALS USING 'C' LANGUAGE**

**Objective of the course:** The course will enable the students to develop basic understanding of computer programming fundamentals. Clear understanding of the basic terminology required for programming.

**Learning Outcome:** - On completion of this course students will be able to:

- Understand various constructs of the C Language along with proper syntax.
- Develop programs on various topics.

## SYLLABUS

**Introduction:** Preliminary concept of Software, Hardware, High & Low level language; Types of Compiler and Interpreter, C Standards, Various types of IDE (Integrated Development Environment) for Programming Languages, Structured programming, Principles of good programming, Flowcharts & Algorithms.

**Overview of C Language:** History of C, Importance of C, Basic structure of C Programming style, Constant, Variables and Data types, declaration of variables, storage class, defining symbolic constants, declaring a variable as constant, volatile, overflow and underflow of data.

**Operator and expressions:** Unary, Binary and Ternary Operator, arithmetic, relational, logical, assignment operators, increment and decrement operators, conditional operators, bitwise operators, special operators, arithmetic expression, evaluation of expressions, type conversions in expression, operator precedence and associativity, mathematical functions, Managing I/O Operations (**printf(), scanf(), getchar(), putchar(), getc(), getch(), gets(), puts()**) Expressions. Formatting Input and Output.

**Conditional statements:** if, else if, nested if, else if ladder, switch.

**Iterative statements:** do loop, while loop, for loop, Jump statements (break, continue and goto).

**Arrays:** 1-D Array, 2-D Array & Multi- Dimensional Array, declaration, initialization,

**Strings:** declaration, initialization of string variables, reading and writing string, string manipulations(**strln(), strcpy(), strcat(), strcmp(), strlwr(), strupr()**).

**User defined functions:** need, multi-function program, elements of user defined functions, definition, return values and their types, arguments and parameters, command line arguments. function declaration and calling (call by value and call by reference), nesting of functions, recursion, passing arrays, strings to functions, scope visibility and life time of variables, multi file programs.

**structure and unions:** defining a structure, declaring structure variables, accessing structure members, initialization, copying and comparing, operations on individual members, arrays of structures, arrays within structures, structure within structures, structures and functions, unions, size of structures, bit fields.

**Pointers & Memory Allocation in C:** pointers in C, declaring, initialization of pointer variable, accessing the address of variable, accessing a variable through its pointer, chain of pointers, pointer expressions, pointer increment, pointer to pointer, pointers to structures, Problems with pointers, passing pointers as function arguments, returning a pointer from a function, using arrays with pointers, Passing arrays to functions. Static and dynamic memory allocation, use of **malloc(), calloc()** and **free()** functions, storage of variables in static and dynamic memory allocation.

cading and writing text files, Using **fput(), fget(), read()** and **write()** functions, Random access in files.

## TEXT BOOKS:


1. E Balaguruswamy, Computer Concepts and Programming in C, TataMcGraw Hill Publications
2. Brian W. Kernighan, Dennis M. Ritchie, C Programming Language 3nd Edition 2011, Pearson Publications


## REFERENCES BOOKS:


1. The Complete Reference C/C++ BY Herbert Schildt
2. Yashavant P. Kanetkar, Let Us C, BPB
3. Test Your Skills in C, Publisher-TMH by S. Thamarai Selvi & R. Murugesan
4. C Language by Amit Chaddha
5. BehrouzA.Computer Science-A Structured Programming Approach Using C.

# Institute for Excellence in Higher Education (IEHE), Bhopal

B.Sc. Honours: **PART-I** Semester: **I**

SUBJECT: **COMPUTER SCIENCE** PAPER: **HONOURS-II/SUBSIDIARY**

**Maximum Marks: 100** **Time : 3:00 Hours**

## C LAB PRACTICALS

**Required IDE for C Programming – Dev C++ / CodeBlock**

### Group - I

1. Programs based on basic mathematics: -
   a) Write a C Program to print the sum and product of digits of an integer.
   b) Write a C Program to reverse a number.
   c) Write a C Program to compute the sum of the first **n** terms of the following series: -
      **S = 1+1/2+1/3+1/4+……+ 1/(n+1)**
   d) Write a C Program to compute the sum of the first **n** terms of the following series: -
      **S =1-2+3-4+5……**
   e) Write a function that checks whether a given string is Palindrome or not. Use this function to find whether the string entered by user is Palindrome or not.
   f) Write a function to find whether a given no. is prime or not. Use the same to generate the prime numbers less than 100.
   g) Write a C Program to compute the factors of a given number.
   h) Write a macro that Write a C Programs two numbers. Write a C Program to use it.
2. Write a C Program to print a triangle of stars as follows (take number of lines from user):

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| * | * | 1 | 1 | 1 | 1 | 1 | 1 |
| *** | *** | 1 2 | 1 2 | 22 | 22 | 21 | 21 |
| ***** | ***** | 1 2 3 | 1 2 3 | 333 | 333 | 321 | 321 |
| ******* | ******* | 1 2 3 4 | 1 2 3 4 | 4444 | 4444 | 4321 | 4321 |
| ********* | ********* | 1 2 3 4 5 | 1 2 3 4 5 | 55555 | 55555 | 54321 | 54321 |

3. Write a C Program to perform following actions on an array entered by the user:
   a) Print the even-valued elements
   b) Print the odd-valued elements
   c) Calculate and print the sum and average of the elements of array
   d) Print the maximum and minimum element of array
   e) Remove the duplicates from the array
   f) Print the array in reverse order
4. The program should present a menu to the user and ask for one of the options. The menu should also include options to re-enter array and to quit the program.

5. Write a C Program that prints a table indicating the number of occurrences of each alphabet in the text entered as command line arguments.
6. Write a program that Write a C Programs two numbers using pointers.
7. Write a program in which a function is passed address of two variables and then alter its contents.
8. Write a program which takes the radius of a circle as input from the user, passes it to another function that computes the area and the circumference of the circle and displays the value of area and circumference from the **main()** function.

## Group - II

9. Write a program to find sum of n elements entered by the user. To write this program, allocate memory dynamically using **malloc() /calloc()** functions or new operator.
10. Write a menu driven program to perform following operations on strings:
    a) Show address of each character in string
    b) Concatenate two strings without using **strcat()** function.
    c) Concatenate two strings using **strcat()** function.
    d) Compare two strings
    e) Calculate length of the string (use pointers)
    f) Convert all lowercase characters to uppercase
    g) Convert all uppercase characters to lowercase
    h) Calculate number of vowels
    i) Reverse the string
11. Given two ordered arrays of integers, write a program to merge the two-arrays to get an ordered array.
12. Write a C Program to display Fibonacci series (i)using recursion, (ii) using iteration.
13. Write a C Program to calculate Factorial of a number (i)using recursion, (ii) using iteration.
14. Write a C Program to calculate GCD of two numbers (i) with recursion (ii) without recursion.
15. Create Matrix class using templates. Write a menu-driven program to perform following Matrix operations (2-D array implementation): a) Sum b) Difference c) Product d) Transpose.
16. Create a structure Student containing fields for Roll No., Name, Class, Year and Total Marks. Create 10 students and store them in a file.

## Group - III

17. Write a program to retrieve the student information from file created in previous question and print it in following format:

    Roll No. Name Marks
18. Copy the contents of one text file to another file, after removing all whitespaces.
19. Write a function that reverses the elements of an array in place. The function must accept only one pointer value and return void
20. Write a program that will read 10 integers from user and store them in an array. Implement array using pointers. The program will print the array elements in ascending and descending order.

## Scheme of Marks

| S.No. | Marls Distribution of Programs | MARKS |
|---|---|---|
| 1. | Group I | 20 |
| 2. | Group II | 20 |
| 3. | Group III | 20 |
| 4. | Practical Record | 20 |
| 5. | Viva | 20 |

# Institute for Excellence in Higher Education (IEHE), Bhopal

B.Sc. Honours: **PART-I** Semester: **II**

SUBJECT: **COMPUTER SCIENCE** PAPER: **HONOURS-I**

**Max. Marks: 100** **Time : 3 hours**

## TITLE: OPERATING SYSTEMS

**Objective of the course:** The course will enable the students to develop basic understanding of operating systems such as:

1. To understand the main components of an OS & their functions.
2. To study the process management and scheduling.
3. To understand various issues in Inter Process Communication (IPC) and the role of OS in IPC.
4. To understand the concepts and implementation Memory management policies and virtual memory.
5. To understand the working of an OS as a resource manager, file system manager, process manager, memory manager and I/O manager and methods used to implement the different parts of OS.
6. To study the need for special purpose operating system with the advent of new emerging technologies.

**Outcomes:**

At the end of the course students will able to:

1. Describe the important computer system resources and the role of operating system in their management policies and algorithms.
2. Understand the process management policies and scheduling of processes by CPU
3. Evaluate the requirement for process synchronization and coordination handled by operating system
4. Describe and analyze the memory management and its allocation policies.
5. Identify use and evaluate the storage management policies with respect to different storage management technologies.
6. Identify the need to create the special purpose operating system.

## SYLLABUS

**An Overview:** Definition, Operating system Concepts, Evolution of operating system, Goals of an Operating System, Types of Operating Systems, Functions of OS

**Processes:** Process Concept, Process Scheduling, Scheduling Criteria, Scheduling (Preemptive, non preemptive scheduling), Scheduling Algorithms – First Come First Serve (FCFS), Shortest Job First (SJF), Round Robin (RR), Shortest remaining time next (SRTN), Priority Based Scheduling, Multilevel Queue Scheduling (MLQ), Interprocess communication, Interprocess Synchronization, Mutual exclusion, Critical Section Problem, Semaphores.

**Deadlocks:** Deadlocks definition, Methods for handling Deadlocks, Deadlock Prevention, Deadlocks Avoidance, Deadlock Detection and Recovery from deadlocks.

**Memory Management:** Introduction Logical versus Physical Address Space, Swapping, Memory management, Contiguous Allocation Methods, Non-contiguous allocation methods, partitioned memory allocation, Fragmentation, Paging, Segmentation, Virtual Memory, Demand Paging, Page Replacement and Algorithms – FIFO, Optimal and LRU.

## LINUX

**Introduction:** Basic Features of Linux Operating System, Advantage of using Linux, Installing requirement & Installation of Linux System, System Shutdown.

Basic Architecture of Linux, Linux System, Kernel, Shell, Linux File System, Managing the file System, Understating the File and Directory System, Linux Standard Directories.

**Linux Commands, Utilities and Editors:** Linux commands for files and directories cd, ls, cp, md, mkdir, more, less, creating and viewing files using cat, file comparisons, Understating shells, understating processes, connecting processes with pipes, Redirecting input output, Background processing, Managing multiple processes, kill, who, sleep, printing commands, grep, fgrep, find, sort, vi editor, user to user communication, write, finger etc.

**Shell Programming in Linux:** Basics of Shell Programming, Various types of shell, Conditional & looping statements, case statements, parameter passing and arguments.

**Semiconductor Memories and Storage Devices:** RAM, ROM, PROM, EPROM, static and dynamic RAM, HDD, SATA, PATA

## TEXT BOOKS:

1. Operating System Concepts by Silberchatz Galwin Gagne, Publisher: Wiley, July-2008
2. Operating Systems: Concepts and Design by Milan Milenkovic, McGraw Hill Higher Education

## REFERENCES BOOKS:

1. Sams Teach Yourself Linux in 24 Hours by William Ball, Sams; Ist Edition
2. Red Hat Linux: Study Guide by Vijay Shekhar, Laxmi Publications; First Edition
3. Windows Server 2008: The Complete Reference

# Institute for Excellence in Higher Education (IEHE), Bhopal

B.Sc. Honours PART-I

Semester II

SUBJECT: COMPUTER SCIENCE

PAPER-II HONOURS-II/SUBSIDIARY

**Maximum Marks: 100**

**Time : 3 hours**

## TITLE: Object Oriented Programming using C++

**Objective of the Course:** The course will enable students to develop basic understanding of Object Oriented Programming concepts and develop C++ language programs using OOPs.

- To understand how C++ improves C with object-oriented features.
- To learn how to write inline functions for efficiency and performance.
- To learn the syntax and semantics of the C++ programming language.
- To learn how to design C++ classes for code reuse.
- To learn how to implement copy constructors and class member functions.
- To understand the concept of data abstraction and encapsulation.
- To learn how to overload functions and operators in C++.
- To learn how containment and inheritance promote code reuse in C++.
- To learn how inheritance and virtual functions implement dynamic binding with polymorphism.
- To learn how to design and implement generic classes with C++ templates.
- To learn how to use exception handling in C++ programs

**Learning Outcomes**: After the completion of this course, a successful student will be able to do the following:

a) Use the characteristics of an object-oriented programming language in a program.
b) Use the basic object-oriented design principles in computer problem solving.
c) Use the basic principles of software engineering in managing complex software project.
d) Program with advanced features of the C++ programming language.

## SYLLABUS

1. **Principle of Object Oriented Programming:** Software Evolution, The Traditional Approach (Structured Methodology Overview, A Structured Methodology Solution, Shortcoming of Procedure Oriented Language), Object Oriented Paradigm, Basic Concepts of Object Oriented Programming, Benefits of OOP, Object oriented Language.

2. **C++ Programming Basics:** Basic Program Construction, Input/Output using cin/cout, Basic and user Defined data types, Manipulators, type Conversions, Arithmetic Operators and Library Functions.

3. **Loops, Decisions and structures:** Relational Operators, Loops: *for, while* and do-while, Decisions - *if, if...else, switch* Statements, Logical Operators, Control Statements: *break, continue* and *goto*, Structured and Enumerated Variables.

4. **Functions:** Simple Functions, Function Prototyping, Overloaded Functions, Inline Functions, Variable and Storage classes.

5. **Classes and Objects:** Specifying a Class, Defining Member Functions, Making an Outside Function Inline, Private Member Functions, Arrays within a Class, Array of Objects, Objects as Function Arguments, Returning Objects.

6. **Constructors and Destructors:** Constructors, Parameterized Constructors, Multiple Constructors in a Class, Constructors with Default Arguments, Dynamic Initialization of Object, Destructors.

7. **Operator Overloading:** Overloading Unary Operators (The Operator, Keyword, Operators Arguments, Operators Return Value), Overloading Binary Operators (Arithmetic's Operators, Concatenating Strings, Multiple Overloading, Comparison Operators, Arithmetic Assignments Operators), Type Conversions (Conversions between Basic Types, Conversions between Objects of different Classes).

8. **Inheritance - Extending Classes:** Derived Class and Base Class, Public and Private Inheritance, Levels of Inheritance, Multiple Inheritance (Multiple Functions in Multiple Inheritance, Constructors in Multiple Inheritance).

9. **Pointers:** Address and Pointers (The Address of Operators and Pointer Variables, Accessing the Variables Pointed to, Pointer to void), Pointers and Arrays (Pointer Constants and Pointer Variables), Pointers and Functions, Memory Management: New and Delete Operators, Pointers to Objects.

10. **Virtual Functions and Polymorphism:** Virtual Functions (Accessing of Normal Members Function with Pointers, Accessing of virtual Members Functions with Pointers, Pure Virtual Functions, Abstract Classes, Virtual Base Classes)

11. **Files and Streams:** Streams (Streams classes, Header files), String I/O, Character I/O, Object I/O (Writing/Reading an object to/form Disk, Binary Versus Character files, Compatible Data Structures).

**TEXT BOOKp**

1. Object-Oriented programming with C++ by E. Balagurusamy, Tata Mc-Graw Hill

**REFERENCES BOOKS**


1. Object-Oriented programming in Turbo C++ Robert Lafore, Galgotia Publications Pvt. Limited
2. C++ Primer by Stanley B. Lippman, Addison Wesley Professional
3. Object-Oriented programming in C++ by Nabajyoti Barkakati
4. The Complete Reference C/C++ by Herbert Schildt.
5. C++ by Schumn's Series, Tata Mc-Graw Hill

*Institute for Excellence in Higher Education (IEHE), Bhopal*

B.Sc. Honours : **PART-I** Semester : **II**

SUBJECT : **COMPUTER SCIENCE** PAPER : **HONOURS-II/SUBSIDIARY**

Max. Marks: 100 Time : 03 Hrs

TITLE : **Object Oriented Programming using C++ (Practical Syllabus)**

**1) Some basic Programs :**

a. Write a program for finding greatest number to any three value Sum of first ten natural numbers
b. Calculate the marks of five subjects and also find percentage.
c. Make a program of swapping a variable without using third variable.
d. Display table of any number.
e. Program that displays the size of every data type.
f. Write a program to showing bitwise operators.
g. Demonstrate the use of assignment operator.
h. Write a program for finding vowel by using switch statement.
i. Similar other programs

**2) C++ Programs (Based on Control statement/looping/ Decisions/Structures):**

a. Program for explaining difference between do…while and while statement.
b. Entered number is odd or even by using *if … else*
c. The greatest among three numbers by using *if* statement.
d. Calculate sum of any numbers by using *for* loop
e. Sum of natural numbers by using *while* loop.
f. Demonstrate the use of nested if .. else statement.
g. Demonstrate the use of switch case statement.
h. Program to enter a number from 1-7 and display the corresponding day of the week using switch case statement.
i. Design a program for explaining control statement of "break".
j. Design a program for explaining control statement of "goto".
k. Design a program for explaining control statement of "continue".
l. Similar other programs

**3) C++ Program based on Functions:**

a. Write a function to Design a calculator program by using operators calculating simple and compound interest.
b. Design a program of overloading function for addition and subtraction of numbers.
c. Write a program for explaining inside a function.
d. Similar other programs

**4) C++ Programs based on Classes and Object.**

a. Program for explaining outside a function.

b. Program for explaining inside a function.
c. Design a program for accessing a private member functions.
d. Design a program for accessing a private member variables.
e. Program for explaining Array within a class.
f. Program for explaining Array of class
g. Program for returning Objects.
h. Similar other programs

**5) C++ Programs based on Constructors and Destructors.**

a. Design a program for defining constructor
b. Program for Defining Multiple Constructors.
c. Program for Defining Overloading a Constructor.
d. Design a program of explaining Destructor
e. Program for Dynamic initialization of Constructor of Long terms Fixed Deposit System.
f. Similar other programs.

**6) C++ Programs based on Operator Overloading.**

a. Program of Overloading Unary Operators.
b. Design a program of Overloading Binary operator.
c. Design a program of Overloading Binary operator.
d. Write a program for explaining type conversion.
e. Similar other programs

**7) C++ Programs based on Inheritance.**

a. Design a program of single inheritance.
b. Design a program of three level inheritances.
c. Design a program of multiple inheritances.
d. Design a program of Hybrid inheritances.
e. Design a program of constructor in multiple inheritances.
f. Design a program of multiple functions in multiple inheritance inheritances.
g. Similar other programs

**8) C++ Programs Pointers.**

a. Design a program for Explaining pointer.
b. Program to display read and display by using pointer with array.
c. Program to display read and display by using array of pointers.
d. Write a program for explaining pointer to function..
e. Design a program for explaining pointers to objects.
f. Design a one program of memory management.
g. Similar other programs

**9) C++ Program based on Virtual Functions and Polymorphism.**

a. Design a program for explaining Virtual function.
b. Design a program by using Virtual function of Hybrid inheritance.
c. Design a program for explaining Run time Polymorphism.
d. Similar other programs

**10) C++ Programs based on Files and Streams :**

a. Write a Program for defining unformatted I/O operations.
b. Write a Program for reading strings with getline().
c. Write a program for displaying string with write().
d. Design a program on Working with some file operations.

**Scheme of Internal Marks Distribution:**

| S.No. | Topic | Marks |
|---|---|---|
| 1. | Some basic Programs/ C++ Programs (Based on Control statement/looping/ Decisions/Structures)/ C++ Program based on Functions | 20 Marks |
| 2. | C++ Programs based on Classes and Object./ C++ Programs based on Constructors and Destructors./ C++ Programs based on Operator Overloading. | 20 Marks |
| 3. | C++ Programs based on Inheritance./ C++ Programs Pointers./ C++ Program based on Virtual Functions and Polymorphism/ Files and Streams | 20 Marks |
| 4. | Practical Record | 20 Marks |
| 5. | Viva | 20 Marks |

# Institute for Excellence in Higher Education (IEHE), Bhopal

B.Sc. Honours: **PART-II** Semester: **III**

SUBJECT: **COMPUTER SCIENCE** PAPER: **HONOURS-II/SUBSIDIARY**

**Maximum Marks: 100** **Time : 3 hours**

TITLE: **Database Management System & Design**

**Objective of the course:**

**The course will enable the students to develop basic understanding of following things:**

1 To describe a sound introduction to the discipline of database management systems.

2 To give a good formal foundation on the relational model of data and usage of Relational Algebra.

3 To introduce the concepts of basic SQL as a universal Database language.

4 To enhance knowledge to advanced SQL topics like embedded SQL, procedures connectivity through JDBC.

5 To demonstrate the principles behind systematic database design approaches by covering conceptual design, logical design through normalization.

6 To provide an overview of physical design of a database system, by discussing Database indexing techniques and storage techniques.

**Learning Outcomes:**

**At the end of the course the students will able to:**

1 Explain the features of database management systems and Relational database. 2 Design conceptual models of a database using ER modelling for real life applications and construct queries in Relational Algebra.

3 Create and populate a RDBMS for a real-life application, with constraints and keys, using SQL.

4 Retrieve any type of information from a data base by formulating complex queries in SQL.

5 Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database.

6 Build indexing mechanisms for efficient retrieval of information from a database.

## SYLLABUS

### PART-(A): DATABASES & THEIR CONTEXT

1. **Database Systems and the Evolution of Database Technology**

   The Evolution of Database Technology, File-Oriented Systems, Database Systems: Hierarchical and Network Model Systems, Relational Database Systems; Database Systems: Hardware, Software, Data & People.

2. **Database Systems in the Organization**

   Data Sharing - Between functional units, between different levels of users and between different locations. Databases and Management Control – Database Design, Database

Security & Integrity. Risk and Costs of Databases – Organizational Conflict, Development Project Failure, System Failure, Overhead Cost. Logical & Physical Data Representation – Three-Level Database Architecture. Database Development – Database Design and the traditional System Development Life Cycle (SDLC), The Database Development Life Cycle (DDLC), Preliminary Planning, Feasibility Study, Requirement Definition, Conceptual Design, Implementation

## PART-(B): DATABASE DESIGN

### 3. Principles of Conceptual Database Design

Reality, Requirements Definition and Conceptual Data Modeling- Reality & Models, Conceptual Data Models. Fundamentals – Objects, Specialization & Generalization, Relationships, Cardinality, Attributes & their examples. Aggregation & their examples, View Integration: An example.

### 4. The Relational Data Model

*Fundamental Concepts* - Relations, Null Values, Keys, Foreign Keys; Integrity Constraints: Entity Integrity & Relational Integrity.

*Normalization Process* – First Normal Form, Functional Dependencies, Second Normal Form, Third Normal Form, Fourth Normal Form; Other Normal Form: Fifth Normal Form & Domain/Key Normal Form.

*Transforming a Conceptual Model to a Relational Model* – Transforming Objects Sets and Attributes, Transforming Models without External Keys, Transforming Specialization and Generalization, Object Sets; Transforming Relationships: One-One Relationships, One-Many Relationships, Many-Many Relationships; Transforming Aggregated Object Sets, Transforming Recursive Relationships, Transformation examples.

*Comparison of Conceptual and Relational Data Modeling.*

## PART-(C): RELATIONAL DATABASE IMPLEMENTATION

### 5. Relational Algebra and Calculus

*Relational Algebra:* Union, Intersection, Difference, Product, Select, Project, Join - Natural, Theta & Outer Join, Divide, Assignment.

*Relational Calculus:* Target list & Qualifying Statement, The Existential Quantifier, The Universal Quantifier.

### 6. Relational Implementation with SQL

*Relational Implementations an Overview.*

*Schema and table Definition* – Schema and Table Definition, Data Types & Domain, Defining Tables, Column Definition.

*Data Manipulation:* Simple Queries (SELECT, FROM, WHERE); Multiple-Table Queries, Subqueries, Correlated Subqueries; EXISTS and NOT EXISTS, Built-In Functions, GROUP BY and HAVING clause Built-In Functions with Subqueries.

*Relational Algebra Operations* – UNION, INTERSECT, EXCEPT, JOIN.

*Database Change Operations* – INSERT, UPDATE, DELETE.

*Using SQL with Data Processing Languages*; View Definition, Information Schema.

7. **Physical Database Systems**

Introduction, Physical Access of the Database.

*Physical Storage Media:* Secondary Storage, Physical Storage Blocks.

*Disk Performance Factors:* Access Motion Time, Head Activation Time, Rotational Delay, Data Transfer Rate, Data Transfer Time.

*Data Storage Formats on Disk:* Track Format, Record Format, Input/output Management.

*File Organizing and Addressing Methods*: Sequential File Organization, Indexed-Sequential File Organization, Direct File Organization

*Indexing*: **Basic concept of Indexing, Ordered Indexing- Primary Index and Secondary Index, Dense Index, Sparse Index**

Implementing Logical Relationships: Linked Lists, Inverted Lists, Balanced-Tree Index (B+-Tree Index Files).

## TEXT BOOK

1. Database Management and Design 2nd edition by Gary W. Hansen & James V. Hansen, Prentice Hall.

## REFERENCE BOOKS


1. An Introduction to Database System by Bipin C. Desai, Galgotia publications
2. An Introduction to Database System 8th Edition by C.J. Date
3. Principle of Database Management System by James Martin, Prentice Hall
4. Database System Concepts 6th edition by Henry Korth Abraham. Silbersetz, Tata McGraw Hills
5. Database Management Systems by ISRD Group, Tata McGraw Hills


# Institute for Excellence in Higher Education (IEHE), Bhopal

B.Sc. Honours: **PART-II** Semester: **III**

Time: 03 Hours

Max. Marks: 100

TITLE: **Database Management System & Design Practical Syllabus**

1. Create a table using table wizard.
2. Create table using CREATE command.
3. Write a query for the use of USE command.
4. Write a query for the use of BROWSE command
5. Write a query for the use of DISPLAY command
6. Write a query for the use of LIST command
7. Write a query for the use of INSERT command
8. Write a query for the use of EDIT/CHANGE command
9. Write a query for the use of CLEAR command
10. Write a query for the use of APPEND command
11. Write a query for the use of DELETE command
12. Write a query for the use of PACK command
13. Write a query for the use of REPLACE command
14. Write a query for the use of GOTO and SKIP command
15. Write a query for the use of MODIFY STRUCTURE command
16. Write a query for the use of COPY command
17. Write a query for the use of COPY STRUCTURE command
18. Write a query for the use of SORT command
19. Write a query for the use of TRIM, LTRIM, RTRIM and ALLTRIM command.
20. Creating tables Worker.dbf, Assignment.dbf, Building.dbf, and Skill.dbf
21. Using '?' operator to perform arithmetic operation.
22. Simple queries using SELECT, FROM and WHERE clause
23. Multiple table queries using SELECT command.
24. Write Sub queries using SELECT command.
25. Use of built in functions in queries (SUM, MAX, MIN, COUNT, AVG)
26. Write queries using GROUP BY and HAVING clause
27. Create a report in FoxPro using report wizard.
28. Create a form in FoxPro using form wizard.
29. Create indexes in FoxPro.
30. Create a relationship using SET RELATION command between two tables.

**Scheme of Internal Marks Distribution:**

| | | |
|---|---|---|
| 1 | Query based on simple commands/ multiple table queries | 20 Marks |
| 2 | Report creation using report wizard and Index creation | 20 Marks |
| 3 | Form creation using form wizard/ Relationship creation between tables | 20 Marks |
| 4 | Practical Record | 20 Marks |
| 5 | Viva | 20 Marks |

# *Institute for Excellence in Higher Education (IEHE), Bhopal*

B.Sc. Honours: **PART-II** Semester: **III**

Time: 03 Hours

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# *Institute for Excellence in Higher Education (IEHE), Bhopal*

B.Sc.Honours: **PART-II** Semester:**IV**

**SUBJECT: COMPUTER SCIENCE** **PAPER: HONOURS-I**
**Maximum Marks: 100** **Time : 3 hours**

TITLE: **COMPUTER GRAPHICS AND MULTIMEDIA**

**Objective of the Course:** In this course students will gain the broad understanding of discipline of computer graphics and multimedia.

**Course Learning Outcomes:** Explain the core concepts of computer graphics, including viewing, projection, perspective, modelling and transformation in two and three dimensions, apply the concepts of colour models, lighting and shading models, textures, ray tracing, hidden surface elimination, anti-aliasing, and rendering.

## SYLLABUS

**Introduction to computer graphics & graphics systems:** Overview of computer graphics, representing pictures, preparing, presenting & interacting with pictures for presentations; Visualization & image processing; RGB color model, direct coding, lookup tables. Interactive Input devices, display processor, Line drawing; various algorithms and their comparison, circle generation- Bresenham's mid point circle drawing algorithm, mid point ellipse drawing algorithm.

**Attributes of output primitives:** line style, color and intensity, Area filling algorithms, Scan line algorithm, boundary fill flood fill algorithm, Antialiasing techniques. Two dimensional transformations: translation,scaling, rotation, reflection sheering, composite transformation. transformation commands, character generation.

**Viewing coordinates:** Window, view port, clipping, Window to view port transformation, line clipping algorithm; Cohen Sutherland, polygon clipping: Sutherland hodgman algorithm. Illumination model: Light sources, diffuse reflection specular reflection, reflected light, intensity levels, surface shading; phong shading ground shading, color models like RGB, YIQ, CMY, HSV etc.

**3-D Viewing:** Three-dimensional concepts, 3D display techniques, 3D representation polygon & curved surfaces, Design of curves & surfaces- Bezier's Method, B-spline methods, 3D



Proposed for the session 2021-22

transformation transition, scaling, composite transformation rotation about arbitrary axis, projections: Parallel & Perspective,

**Introduction to multimedia:** multimedia components, multimedia hardware, SCSI, IDE, MCI, Multimedia data and file formats, RTF, TIFF, MIDI, JPEG, DIB, MPEG, Multimedia tools, presentations tools,Authoring tools, presentations.

**References:**

1. D.Hearn and M.P. Baker "Computer Graphics" (2nd ed), PHI.
2. S. Harrington – "Computer Graphics - a Programming approach" (2nd ed) McGrawhill.
3. New Mann & Sprovl- "Principles of interactive computer graphics" (2nd ed) McGrawhill.
4. Roger S. David "Procedural Elements for Computer Graphics", McGraw Hill.
5. Roger S David "Mathematical Elements for Computer Graphics", McGraw Hill.
6. Foley & Vandan "Computer Graphics Principles & Practice in "C" "Addision Wesly.
7. Tay Vaugham " Multimedia Making it Work" 5th Ed. 2001, Tata McGraw Hill.
8. Prabhat K. Andleigh & Kiran Thakur "Multimedia System Design", PHI
9. Drew, "Fundamentals of Multimedia", Pearsons.
10. Nigel Chapman, J. Chapman "Digital Multimedia" Wiley India.

# Institute for Excellence in Higher Education (IEHE), Bhopal

B.Sc. (Honours): **PART-II** Semester: **IV**

SUBJECT: **COMPUTER SCIENCE** PAPER: **HONOURS-II/Subsidiary**

**Maximum Marks: 100** **Time : 3 hours**

TITLE: **ORACLE**

## Objectives

The objective of this course is to provide a strong formal foundation in database concepts implementation, technology and practice to become a well informed database application developer.

## Learning Outcomes

- Understand the underlying concepts of database technologies.
- Populate and query a database using SQL DDL/DML commands.
- Implement Security by applying User Management.
- Declare and enforce integrity constraints on a database.
- Enable to perform PL/SQL programming. .

## SYLLABUS

**Introduction:**

**Interactive SQL**: DBMS components (overview): Normalization (1,2,3rd): **EF CODD'S Rules,** ER diagrams Data Integrity: Security Backup Recovery. Concept of SQL * Loader. Invoking SQL * plus.

The Oracle Data Type, Two Dimension Matrix creation. Insertion of Data into Tables. Updating the contents of a table. Deletion operations. Modifying the structure of Tables. Removing / Deleting / Dropping Tables. Data Constraints.

The many faces of the select command. computations in Expressions. List used to select Data, Logical operators. Range Searching, Pattern matching. Oracle Functions, Grouping, Data from Tables in SQL. Manipulating Dates in SQL, Joins.

Constructing an English Sentence with Data from Table columns.

Sub queries, using the union, intersect and minus clause indexes, views, sequences Granting Permissions, Revoking the Permissions given.

# Institute for Excellence in Higher Education (IEHE), Bhopal

B.Sc. (Honours): **PART-II** Semester: **IV**

SUBJECT: **COMPUTER SCIENCE** PAPER: **HONOURS-II/Subsidiary**

**Maximum Marks: 100** **Time : 3 hours**

TITLE: **ORACLE (Practical Syllabus)**

1. **Create following tables using DDL - CREATE command**:

i) CLIENT_MASTER(Clientno , Name, City, Pincode, State, Baldue)

ii) PRODUCT_MASTER(Productno, Description, ProfitPercent, Unitmeasure, Qtyonhold, Reorderlvl, Sellprice, Costprice)

iii) SALESMAN_MASTER(Salesmanno, Salesmanname, Address1, Address2, City, Pincode, State, Salamt, Tgttoget,Ytdsales, Remarks)

iv) SALES_ORDER(Orderno, Clientno, Orderdate, Delyaddr, Salesmanno, Delydate, Billyn, Delydate, Orderstatus)

v) SALES_ORDER_DETAILS(Orderno, Productno, Qtyordered, Qtydisp, Productrate)

2. **Populate data into above mentioned tables using DML command**.

3. **Creating tables using constraints- PRIMARY KEY, FOREIGN KEY, UNIQUE, NOT NULL, CHECK CONSTRAINT**

4. Queries based on retrieving records from tables -using SELECT command.

5. Queries based on updating records from tables – using UPDATE command.

6. Queries based on deleting records from tables- using DELETE command.

7. Queries based on deleting table structure- using DROP command.

8. Queries based on altering table structure - using ALTER TABLE command.

9. Queries based on adding constraint, deleting constraint via ALTER TABLE command.

10. Queries based on renaming table- using RENAME command.

11. Queries based on arithmetic and logical operators.

12. Queries based on LIKE, BETWEEN, IN/ NOT IN PREDICATES.

13. Queries based on use of DUAL table.

14. Queries based on oracle Aggregate Functions- AVG, MIN, COUNT, MAX, SUM.

15. Queries based on use of Numeric Functions – ABS, POWER, ROUND, SQRT, EXP, GREATEST, LEAST, MOD, TRUNC, FLOOR, CEIL.

16. Queries based on use of String Functions – LOWER, INITCAP, UPPER, SUBSTR, ASCII, COMPOSE, DECOMPOSE, INSTR, LENGTH, LTRIM, RTRIM, TRIM, VSIZE.

17. Queries based on use of Conversion Functions – TO_NUMBER, TO_CHAR.

18. Queries based on use of Date Functions – TO_DATE, ADD_MONTHS, LAST_DAY, MONTHS_BETWEEN, NEXT_DAY, ROUND.

19. Queries based on GROUP BY, HAVING, ORDERBY clause.

20. Queries based on SUBQUERIES- Correlated/ Non Correlated sub query.

21. Queries based on JOINS and Nested tables.

22. Write SQL statement for creating different types of indexes.

23. Write SQL statement for creating views.

24. Write SQL statement for creating sequences.

**Program based on PL/SQL:**

25. Using GRANT and REVOKE command for granting permission.

26. Using transaction control commands COMMIT, ROLLBACK, SAVEPOINT.

27. Write PL/SQL program to find sum of two numbers.

28. Write PL/SQL program using IF- THEN- ELSEIF- ELSE- ENDIF statement.

29. Write PL/SQL program using SIMPLE LOOP, WHILE LOOP, FOR LOOP Statements.

30. Write PL/SQL program for creating explicit cursor.

31. Write PL/SQL program for creating triggers.

32. Write PL/SQL program for creating Procedures.

33. Write PL/SQL program for creating Functions.

**Scheme of Internal Marks Distribution:**

| S.N. | Topic | Marks |
|---|---|---|
| 1. | Queries based on DDL commands. | 20 marks |
| 2. | Queries based on DML commands | 20 marks |
| 3. | Creating PL/SQL program | 20 marks |
| 4. | Practical Record | 20 marks |
| 5. | VIVA | |

# *Institute for Excellence in Higher Education (IEHE), Bhopal*

B.Sc.(HONOURS) : **PART-III** Semester: **V**

**SUBJECT: Computer Science** **PAPER: Honours-I**

**Maximum Marks: 100** **Time : 3 hours**

## TITLE: Object Oriented Programming with Java

### Objective

Students will try to learn:

1. To understand how to design, implement, test, debug, and document programs that use basic data types and computation, simple I/O, conditional and control structures, string handling and functions.
2. To understand the importance of Classes & objects along with constructors, Arrays and Vectors.
3. Discuss the principles of inheritance, interface and packages and demonstrate though problem analysis assignments how they relate to the design of methods, abstract classes and interfaces and packages.
4. To understand the importance of Multi-threading & different exception handling mechanisms.
5. To learn, experience of designing, implementing, testing, and debugging graphical user interfaces in Java using an applet and AWT that respond to different user events.
6. To understand Java Swings for designing GUI applications based on MVC architecture.

### Learning Outcomes:

Students will be able to:

1. Implement Object Oriented programming concept using basic syntaxes of control Structures, strings and function for developing skills of logic building activity.
2. Identify classes, objects, members of a class and the relationships among them needed for a finding the solution to a specific problem.
3. Demonstrates how to achieve reusability using inheritance, interfaces and packages and describes faster application development can be achieved.



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4. Demonstrate understanding and use of different exception handling mechanisms and concepts of multi threading for robust faster and efficient application development.

5. Identify and describe common abstract user interface components to design GUI in Java using Applet & AWT along with response to events.

6. Identify, Design & develop complex Graphical user interfaces using principal Java Swing classes based on MVC architecture.

## SYLLABUS

Object: Oriented Paradigm, Benefits of OOP, Applications of OOP.

Java History, Java Features, How Java Differs from C and C++, Java and internet, Java and World Wide Web, Web Browsers, Hardware and Software Requirements, Java Supports Systems, Java Environment.

Java Program Structure, Java Tokens, Java Statements, Implementing a Java Program, Java Virtual Machine, Command Line Arguments, and Programming Style.

Constants, Variables, Data Types, Declaration of Variables, Giving Values to Variables, Scope of Variable, Symbolic Constants, Type Casting, Getting Values of Variables, Standard Default Values.

Arithmetic Operator, Relational Operators, Logical Operators, Assignment Operators, Increment and Decrement Operators, Conditional Operators, Bitwise Operators, Special Operators, Arithmetic Expressions, Evaluation of Expressions, Precedence of Arithmetic Operators, Type Conversions in Expressions, Operator Precedence and Associatively, Mathematical Functions.

Decision Making with if Statement, Simple if Statement, The if.....Else Statement, Nesting of if ...Else Statement, The if else Ladder, The Switch Statement, The? Operator. The While Statement, The do Statement, The for Statement, Jump in Loops, Labeled Loops.

Defining a Class, Adding Variables, Adding Methods, Creating Objects, Accessing Class Members, Constructors, Methods Overloading, Static Members, Nesting of Methods, Inheritance; Extending a Class, Overloading Methods, Final Variables and Methods, Final Classes, Finalize Methods Abstract Methods and Classes, Visibility Control Arrays, One Dimensional Array, Strings, Vectors, Wrapper Classes.

Defining Interfaces, Extending Interfaces, Implementing Interfaces, Accessing Interface Variables.

Java API Packages, Using System Packages, Naming Conventions, Creating Packages, Accessing a Package, Using a Package, Adding a Class to a Package, and Hiding Classes.



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Creating Threads, Extending the Thread Class, Stopping and Blocking a Threads, Life Cycle of a Thread, Using Threads Methods, Threads Exceptions, Threads Priority, Synchronization, Implementing the 'Runnable interface.

Types of Errors, Exceptions, Syntax of Exception Handling Code, Multiple Catch Statements, Using Finally Statements, Throwing Our Own Exceptions, Using Exceptions for Debugging.

Concept of Stream, Stream Classes, Byte Stream Classes, Character Stream Classes, Using Streams, Other Useful I/O Classes, Using the File Class, Input / Output Exceptions, Creation of Files, Reading / Writing Characters, Reading / Writing Bytes, Handing Primitive Data Types, Concatenating and Buffering Files, Random Access, Files, Interactive Input and Output, other Stream Classes

**TEXT BOOK**

1. Programming with Java, E Balguruswami, Tata McGraw-Hill Publication, 2nd Edition

**REFERENCE BOOKS**

1. The Complete Reference, Herbert Schildt, Seventh Edition
2. Java Projects, BPB, BPB Publication, 2004
3. Programming in Java, Dr. S.S. Kandare, S Chand Publication

# Institute for Excellence in Higher Education (IEHE), Bhopal

B.Sc.(HONOURS) : **PART-III** Semester: **V**

**SUBJECT: Computer Science** PAPER: **Honours-I**

**Maximum Marks: 100** **Time : 3 hours**

## TITLE: Object Oriented Programming with Java (Practical)

**1) Java Program based on Mathematical Problems :**

a. Write a program to find the average of three numbers using command line argument.
b. Write a program to find the average of three numbers using scanner class.
c. Write a program to illustrate the narrowing and widening type casting.
d. Write a program of swapping a variable without using third variable.
e. Write a program to determine the sum of following harmonic series for a given value of n:
   1 + 1/2 + 1/3 + 1/4 +.....+1/n
f. Write a program to calculate the volume of right circular cone and cuboid.
g. Write a program to illustrate the increment and decrement operator.
h. Similar other programs.

**2) Specific Java Programs (Based on Control statement/looping/ Strings):**

a. Write a program to find the greatest among three numbers by using nesting *if.....else* statement.
b. Write a program to illustrate the switch case statements.
c. Write a program to find the number of and sum of all integers greater than 100 and less than 200 that are divisible by 7.
d. Write a program to compute the sum of the digits of a given integer number.
e. Write a program to reverse the digits of the number by using *while* loop.
f. Write a program to illustrate the Fibonacci numbers by using do.....while loop.
g. Write a program to print the following some pattern:-

(1)
```
*
***
*****
*******
*********
```

(2)
```
1
01
101
0101
10101
```

(3)
```
1
2 2
3 3 3
4 4 4 4
5 5 5 5 5
```



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h. Write a program to illustrate the control statements of "break", "goto" and "continue".
i. Write a program to illustrate the String functions strcpy, strlen, strcmp and strcat.
j. Similar other programs.

**3) Java Program based on Methods, Arrays, Inheritance and Interfaces:**

a. Write a program to illustrate the default constructor and parameterized constructor.
b. Write a program to illustrate the method overloading.
c. Write a program to illustrate the static variables and methods.
d. Write a program to illustrate the nesting of methods.
e. Write a program to illustrate the single inheritance.
f. Write a program to illustrate the method overriding.
g. Write a program to illustrate the final variables and final methods.
h. Write a program to illustrate the constructor overloading.
i. Write a program to illustrate the abstract method.
j. Write a program to sort a list of given numbers in 1-D array.
k. Write a program to multiply two 2-D arrays.
l. Write a program to implement the interface.
m. Write a program to create a package and use its methods in another class.
n. Similar other programs.

**4) Java Program based on Multithreading and Exception Handling**

a. Write a program to illustrate the multi threading.
b. Write a program to illustrate the multi threading with thread priorities.
c. Write a program to illustrate the "Runnable Interface".
d. Write a program to illustrate the thread methods.
e. Write a program to illustrate the exception handling.
f. Write a program to illustrate the multiple catch statements.
g. Write a program to illustrate the finally statements.
h. Write a program to illustrate throwing our own exceptions.
i. Similar other programs.

**5) Java Program based on Java Applet and Files in Java :**

a. Write a program to add two numbers using applet programming.
b. Write a program to draw a circle and rectangle and filled both with color blue.
c. Write a program to draw a bar chart and line chart by using applet.



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d. Write a program to display numerical values in applet.
e. Write a program to illustrate the interactive input to an applet.
f. Write a program to draw a human face by using applet.
g. Write a program to illustrate the copying characters from one file into another.
h. Write a program to illustrate the writing, reading and copying bytes from a file.
i. Similar other programs.

**Scheme of Internal Marks Distribution:**

| S.N. | Topic | Marks |
|---|---|---|
| 1. | Java Program based on Mathematical Problems : | 20 marks |
| 2. | Specific Java Programs (Based on Control statement/looping/ Strings): | 20 marks |
| 3. | Java Program based on Methods, Arrays, Inheritance and Interfaces: | 20 marks |
| 4. | Java Program based on Multithreading and Exception Handling | 20 marks |
| 5. | Java Program based on Java Applet and Files in Java | 20 marks |
| 6. | Practical Record | 20 marks |
| 7. | Viva | 20 marks |

B.Sc.(HONOURS):**PART-III** Semester: V

SUBJECT:**COMPUTERSCIENCE** PAPER:**HONOURS-I**

**Maximum Marks 100** **Time: 3 Hour**

# TITLE: **Programming in Python**

**Course objective:**

- Build an understanding of the fundamental concept of Python.
- Familiarize the students with the basic concept of Python.
- Introduced the student in the field of advanced programming in Python.

**Expected outcomes:**

- A Student will have good knowledge of Python PROGRMMING.
- A Student will learn use of visual python to design complex software.
- A Student will be able to design objects for software.

## SYLLABUS

**Planning the Computer Program:**

Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation.

**Techniques of Problem Solving:**

Flowcharting, decision table, algorithms, Structured programming concepts, Programming methodologies viz. top-down and bottom-up programming.

**Overview of Programming:**

Structure of a Python Program, Elements of Python, Syntax, Comments.

**Introduction to Python:**

Python Interpreter, Using Python as calculator, Python shell, Indentation, Atoms, Identifiers and keywords, Literals, Strings, Operators (Arithmetic operator, Relational operator, Logical or Boolean operator, Assignment, Operator, Ternary operator, Bit wise operator, Increment or Decrement operator), Lists, Tuples, Sets, Booleans.

**Creating Python Programs:**

Input and Output Statements, Decision Making Statements (if Statement, Simple if Statement, The if.....Else Statement, Nesting of if ...Else Statement, The if else Ladder, The Switch Statement, The? Operator), Looping (The While Statement, The do Statement, The for Statement, Jump in



Proposed for the Session 2021-22

Loops, Labeled Loops). Control statements (Exit function, Difference between break, continue and pass.), Defining Functions, default arguments, Arrays, String, String Formatting.

**Python Class and File Handling:**

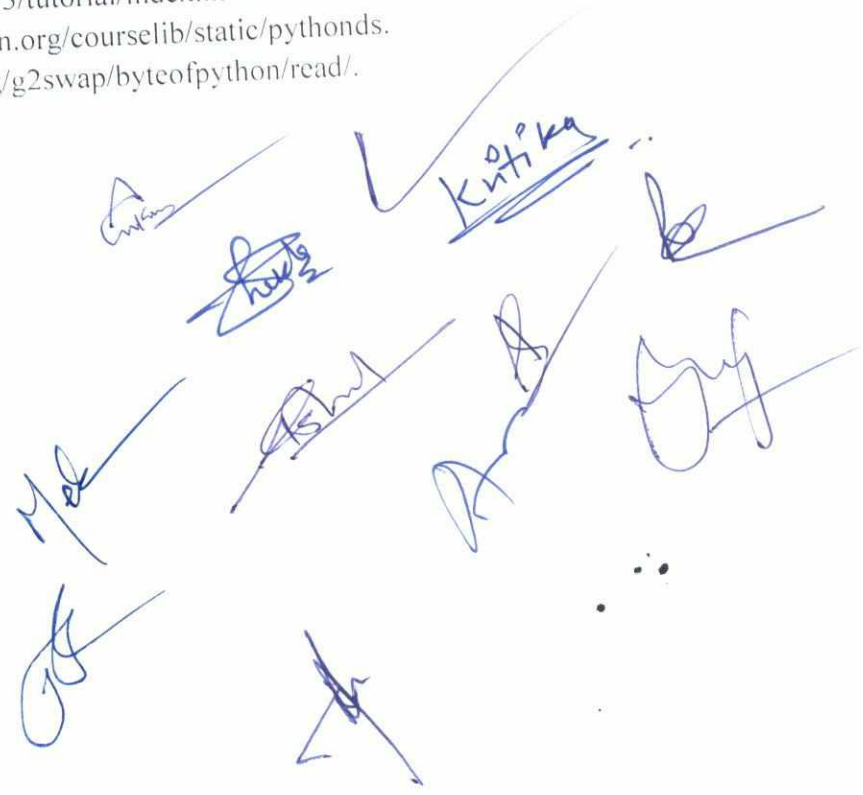
Classes, Objects, Inheritance, Iterators, Scope, Modules, Dates, Math, Try.Except, File Handling, Read/Write Files, Create/Delete Files.

**Text books:**


1. Dr. Charles R. Severance, "Python for Everybody", 2016.
2. T. Budd, Exploring Python, TMH, 1st Ed.2011.
3. Dave Kuhlman, "A Python Book: Beginning Python, Advanced Python, and Python Exercises", 2013.


**Reference Books:**


1. Allen Downey, Jeffrey Elkner, Chris Meyers, "How to think like a computer scientist : learning with Python ", Freely availableonline, 2012.
2. Python Tutorial/Documentationwww.python.or2015.
3. http://docs.python.org/3/tutorial/index.html.
4. http://interactivepython.org/courselib/static/pythonds.
5. http://www.ibiblio.org/g2swap/byteofpython/read/.

*InstituteforExcellenceinHigherEducation(IEHE),Bhopal*

B.Sc.(HONOURS):**PART-III** Semester: V

SUBJECT:**COMPUTERSCIENCE** PAPER:**HONOURS-I**

**Maximum Marks 100** **Time: 3 Hour**

TITLE: **Programming in Python ( Practical )**

## Programming using Python (Practical Syllabus)

**Section: A ( Simple programs)**

1. Write a menu driven program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon userschoice.
2. WAP to calculate total marks, percentage and grade of a student. Marks obtained in each of the three subjects are to be input by the user. Assign grades according to the following criteria:

   Grade A: Percentage >=80

   Grade B: Percentage>=70 and <80 Grade C: Percentage>=60 and <70 Grade D: Percentage>=40 and <60

   Grade E:Percentage<40
3. Write a menu-driven program, using user-defined functions to find the area of rectangle, square, circle and triangle by accepting suitable input paramters fromuser.
4. WAP to display the first n terms of Fibonacciseries.
5. WAP to find factorial of the givennumber.
6. WAP to find sum of the following series for n terms: 1 – 2/2!+3/3! ----------n/n!
7. WAP to calculate the sum and product of two compatiblematrices.

**Section: B (Visual Python):**

*All the programs should be written using user defined functions, wherever possible.*

1. Write a menu-driven program to create mathematical 3D objects I.curve
   II. sphere
   III. cone
   IV. arrow
   V. ring
   VI. cylinder.

2. WAP to read n integers and display them as ahistogram.

3. WAP to display sine, cosine, polynomial and exponentialcurves.
4. WAP to plot a graph of people with pulse rate p vs. height h. The values of p and h are to be entered by theuser.
5. WAP to calculate the mass m in a chemical reaction. The mass m (in gms) disintegrates according to the formula m=60/(t+2), where t is the time in hours. Sketch a graph for t vs. m, wheret>=0.
6. A population of 1000 bacteria is introduced into a nutrient medium. The population p grows asfollows:

   $$P(t) = (15000(1+t))/(15+ e)$$

   where the time t is measured in hours. WAP to determine the size of the population at given time t and plot a graph for P vs t for the specified time interval.
7. Input initial velocity and acceleration, and plot the following graphs depicting equations of motion:
   I. velocity wrt time(v=u+at)
   II. distance wrt time (s=u*t+0.5*a*t*t)
   III. distance wrt velocity ( s=(v*v-u*u)/2*a)
8. WAP to show a ball bouncing between 2 walls.(Optional)

**Scheme of Marks Distribution:**

| | |
|---|---|
| 1. Simple Program | 30 Marks |
| 2. Visual Python | 30 Marks |
| 3. Practical Record | 20 Marks |
| 4. Viva | 20 Marks |

**7. Physical Database Systems**

Introduction, Physical Access of the Database.

*Physical Storage Media:* Secondary Storage, Physical Storage Blocks.

*Disk Performance Factors:* Access Motion Time, Head Activation Time, Rotational Delay, Data Transfer Rate, Data Transfer Time.

*Data Storage Formats on Disk:* Track Format, Record Format, Input/output Management.

*File Organizing and Addressing Methods*: Sequential File Organization, Indexed-Sequential File Organization, Direct File Organization

*Indexing*: **Basic concept of Indexing, Ordered Indexing- Primary Index and Secondary Index, Dense Index, Sparse Index**

Implementing Logical Relationships: Linked Lists, Inverted Lists, Balanced-Tree Index (B+-Tree Index Files).

## TEXT BOOK

1. Database Management and Design 2nd edition by Gary W. Hansen & James V. Hansen, Prentice Hall.

## REFERENCE BOOKS


1. An Introduction to Database System by Bipin C. Desai, Galgotia publications
2. An Introduction to Database System 8th Edition by C.J. Date
3. Principle of Database Management System by James Martin, Prentice Hall
4. Database System Concepts 6th edition by Henry Korth Abraham. Silbersetz, Tata McGraw Hills
5. Database Management Systems by ISRD Group, Tata McGraw Hills


# *Institute for Excellence in Higher Education (IEHE), Bhopal*

B.Sc. (HONOURS): **PART-III** Semester: **V**

SUBJECT: **COMPUTER SCIENCE** PAPER: **HONOURS-II/SUBSIDIARY**

**Maximum Marks: 100** **Time : 3 hours**

## TITLE: Internet Technology

**Course objective:**

- Build an understanding of the fundamental concept of computer network.
- Familiarize the students with the basic concept of web and cyber security.
- Introduced the student in the field of advanced Internet technology and cyber Security.

**Expected outcomes:**

- A Student will have good knowledge of HTML PROGRMMING.
- A Student will learn use of forms, tables and hyperlinks to design web pages.
- A Student will be able to design static web pages.

## SYLLABUS

**Networking Protocols and OSI Model:**
Protocols in computer communications, The OSI model and OSI layer function.

**Internetworking Concepts:**
Internetworking, Problem in internetworking, dealing with Hardware & Software issues, Virtual network. Internetworking Devices: Repeaters, Bridges, Routers, Gateways. Internet Basics: History and Architecture.

**TCP/IP:**
Introduction to TCP/IP Model and Layers. Addressing: Physical, Logical, Port, Specific addresses. **IP (Internet Protocol) Addresses:** IP datagram, Concept of IP Address, Classes of IP Addresses. ARP (Address Resolution Protocol), RARP (Reverse Address Resolution Protocol), ICMP (Internet Control Message Protocol).

**TCP (Transmission Control Protocol):** Features of TCP, Relationship between TCP/IP, Ports & Sockets, TCP Connections, TCP Segment Format. UDP (User Datagram Protocol), UDP Datagram, Differences between UDP & TCP.

**Protocol and Services on Internet:**
DNS (Domain Name System), Email (Electronic Mail), FTP (File Transfer Protocol), WWW (World Wide Web), HTTP (Hyper Text Transfer Protocol), CGI (Common Gateway Interface), TELNET (Remote login), Search Engines, Web Browser.

**HTML (Hyper Text Markup Language):** Introduction to HTML, Structure of HTML 5 code, Basic Tags and Attributes of HTML working with Image, Background, colouring Text & Images. **Lists:** List item, unordered list, ordered list, Definition list **Links:** Creating Hyper links, Using Graphical Hyperlinks, Creating Anchors and Linking to section in a page, E-mailing with Hyper Linking. **Tables:** TABLE, TR & TD Tags, Cell Spacing & Cell Spacing & Cell Padding and Colspan & Rowspan, CSS (Cascading Style Sheet). **Forms:** FORM and INPUT Tag, Adding Controls, Controls-Button, Checkbox, Image, Radio Button, Text Box, Password, Text are, Select, Label, Submit & Reset.

*Text books:*


1. Web Technologies: TCP/IP to Internet Application Architectures by Achyut S. Godbole and Atul Kahate, McGraw Hill Eduction, 3rd Edition.
2. TCP/IP Protocol Suite by Behrouz A. Forouzan, McGraw Hill Education; 4th Edition.
3. Fundamentals of Cyber Security by Mayank Bhushan, BPB Publications; 1st edition (1 August 2017)


***Reference Books:***


1. O Level Internet Technology & Web Design Edition by Satish Jain, Shashank Jain, BPB Publications (M2-R4) 2007
2. Introduction to Computer Networks and Cybersecurity by Chwan-Hwa (John) Wu, J. David Irwin, CRC Press; 1 edition (1 March 2013).

# Institute for Excellence in Higher Education (IEHE), Bhopal

B.Sc. (HONOURS): **PART-III** Semester: **V**

SUBJECT: **COMPUTER SCIENCE** PAPER: **HONOURS-II/SUBSIDIARY**

**Maximum Marks: 100** **Time : 3 hours**

## TITLE: Cyber Security

Maximum Marks: 100

**Course objective:**

- Build an understanding of the fundamental concept of computer network.
- Familiarize the students with the basic concept of web and cyber security.
- Introduced the student in the field of advanced cyber Security.

**Expected outcomes:**

- After Studying that subject students would have capability to make own web site and host their own web site on internet. Also students would have enough knowledge about what are the technologies used in internet..
- A Student will be able to design static web pages.

## SYLLABUS

**Web Security:**
Principles of Security, Cryptography, Plain Text and Cipher Text, Symmetric Key Algorithms, Public Key Algorithms, Digital Certificates, Digital Signature and Secure Socket Layer (SSL).

**Network Security:** Firewalls, IP Security, Virtual Private Networks (VPN).

**Cyber Security:** Introduction of Cyber Security and Cyber Laws in India.

**Email Security:** Importance of E-mail Security, Threats through E-mails – Attachments, Fake E- Mails, Spam E-Mails. **Social Networking:** Introduction to Social Networking, Risks in Social Networking, a. Illegal content, b. Spam

**Online Payments** :Introduction ,Payments using Credit Cards, Security electronic money ,PayPal

**Introduction to XML** : What is XML,XML versus HTML ,Electronic Data Interchange , XML terminology ,Introduction to DTD ,Document type declaration ,element type declaration. Attribute Declaration ,limitations of DTD ,Introduction to schema ,Complex type ,Extensible Stylesheet language transformation (XSLT) , Basic of parsing.

*Text books:*

1. Web Technologies: TCP/IP to Internet Application Architectures by Achyut S. Godbole and Atul Kahate, McGraw Hill Eduction, 3rd Edition.

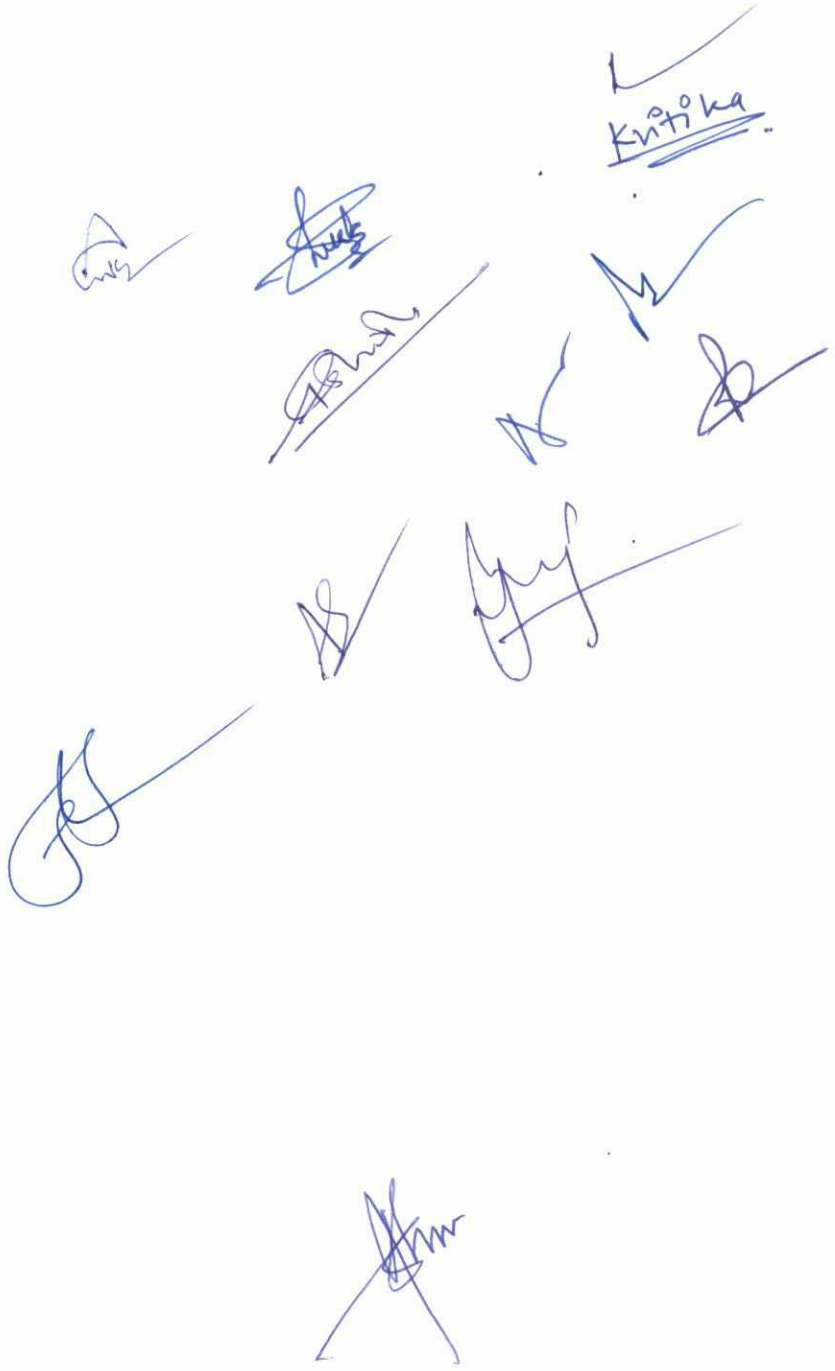


Session 2020-21

2. Fundamentals of Cyber Security by Mayank Bhushan, BPB Publications; 1st edition (1 August 2017)

***Reference Books:***

1. O Level Internet Technology & Web Design Edition by Satish Jain, Shashank Jain, BPB Publications (M2-R4) 2007
2. Introduction to Computer Networks and Cybersecurity by Chwan-Hwa (John) Wu, J. David Irwin, CRC Press; 1 edition (1 March 2013).



*Institute for Excellence in Higher Education (IEHE), Bhopal*

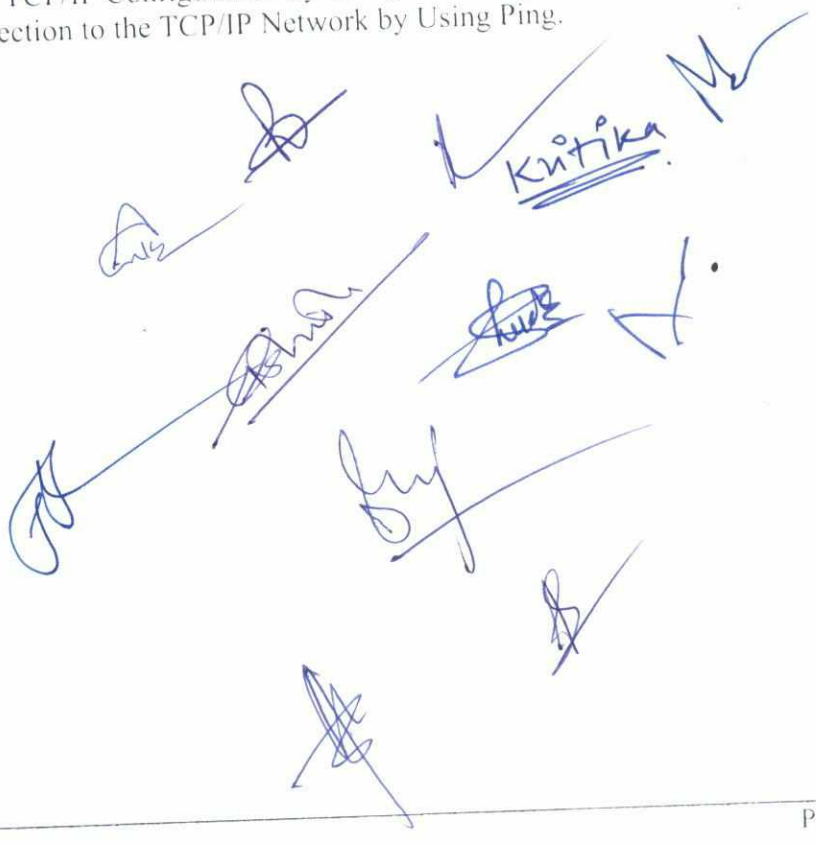
B.Sc. (HONOURS): **PART-III** Semester: **V**

SUBJECT: **COMPUTER SCIENCE** PAPER: **HONOURS-II/SUBSIDIARY**

**Maximum Marks: 100** **Time : 3 hours**

## TITLE: Cyber Security (Practical )

Q .1 Implement the Substitution cipher method of cryptography.
Q .2 Investigate the support for XML in .net.
Q.3 how to secure e-mail.
Q.4 how to convert plain text to cipher text.
Q.5 how to create Virtual Private Networks (VPN).
Q.6 how to create Cyber Security in e-mail.
Q.7 Study of the features of firewall in providing network security and to set Firewall Security in windows.
Q.8 Steps to ensure Security of any one web browser (Mozilla Firefox / Google Chrome).
Q.9 Identify the TCP/IP Configuration by Using IP Config.
Q.10 Test Connection to the TCP/IP Network by Using Ping.



# Institute for Excellence in Higher Education (IEHE), Bhopal

B.Sc. Honours: **PART-** Semester:

SUBJECT: **COMPUTER SCIENCE** PAPER: **HONOURS-I**

Max. Marks: 100 Time : 3 Hour

## Title : Advance Java Programming

**Objectives**

i. Understanding of advance JAVA programming.
ii. Demonstrate advance JAVA programming in real world.
iii. Develop a program with real world application
iv. Develop mini projects.
v. Solve real time industry problems through advance JAVA programming.

**Outcomes :**

a. Explain concept of applet life cycle.
b. Differentiate applet and application
c. Describe the classes in the AWT package that relate to the applet class
d. Describe the basics of JDBC and its connectivity
e. Describe life cycle of servlet
f. Explain the architecture of JSP and its life cycle.
g. Develop simple programs using Java Server Pages tags

**Java Applets:** Preparing to Write Applets, Building Applet Code Applet Life Cycle, Creating an Executable Applet, Designing a Web Page, Applet Tag, Adding Applet to HTML File, Running the Applet, More About the Applet tag, Passing Parameters to Applets, Aligning the Display, More About HTML Tags, Displaying Numbering Values, Getting Input from the user.

The Graphics Class, Lines and Rectangles, Circles and Ellipses, Drawing Arcs, Drawing Polygons, Line Graphs, Using Control Loops in Applets, Drawing Bar Charts.

**Abstract Window Toolkit (AWT):** Abstract Window Toolkit (AWT): classes hierarchy, windows fundamentals, Frame Windows: creating a frame window in applet, canvas, creating windows program, Graphics-AWT Controls: Labels, Text Field, Push buttons, Layout Managers (Flow Layout, Border Layout, Grid Layout, Card Layout), Developing Graphical User Interface using Swing: J Applet, J Label, J Text Field, J Button, J Check Box, J Radio Button, J Combo Box, Menus. Event Classes: Mouse Event Class, Action Event Class, Window Event Class, Event Listener Interface: Mouse Listener, Action Listener, Window Listener and Key Listener.

**I Java Data Base Connectivity (JDBC):** Two-Tier Database Design, Three Tier Database Design, The JDBC API: The API components, database operations like creating tables, CRUD (Create, Read, Update, Delete) operations using SQL, JDBC- advantages and disadvantages, JDBC drivers, JDBC-ODBC bridge, Develop.Java program using JDBC

**Servlets:** The life cycle of a servlet, The Java Servlet Development Kit, he Simple Servlet: create and compile servlet source code, start a web browser and request the servlet, example of echo servlet and deployment in tomcat server, The javax. servlet Package: reading database/table records and displaying them using servlet.

**Java Server Pages (JSP):** Relation of Applets and Servlets with JSP, JSP Scripting Elements, JSP Expressions, Difference between JSP and Servlet, JSP Declarations, Simple JSP program to fetch database records.

TEXT BOOK

1. Java Programming, Sachin Malhotra, Saurabh Choudhary ,Oxford

REFERENCE BOOKS

1 Complete Reference Java 2, Herbert Schildt ,TMH
2 Core Java Volume-I Fundamentals, Cay S. Horstmann Gary Cornell ,Pearson
3 Swing: A Beginner's Guide ,Herbert Schildt, TMH
4 Java Programming Cook Book ,Herbert Schildt, MGH
5 Unleashed Java 2 Platform ,Jamie Jaworski ,Sams Techmedia

B.Sc. Honours: PART-

Semester:

SUBJECT: COMPUTER SCIENCE

PAPER: HONOURS-

Max. Marks: 100

Time: 3:00 Hours

## Title : Advance Java Lab

The practical should be properly designed and implemented with an attempt to develop different types of skills (outcomes in psychomotor and affective domain) so that students are able to acquire the competencies/programme outcomes. Following is the list of practical exercises for guidance.

### PART-A

1. Develop an applet that draws a circle. The dimension of the applet should be 500 x 300 pixels. The circle should be centered in the applet and have a radius of 100 pixels. Display your name centered in a circle.( using drawOval() method) .
2. Draw ten red circles in a vertical column in the center of the applet.
3. Built an applet that displays a horizontal rectangle in its center. Let the rectangle fill with color from left to right.
4. Develop an applet that display the position of the mouse at the upper left corner of the applet when it is dragged or moved. Draw a 10x10 pixel rectangle filed with black at the current mouse position.
5. Develop an applet that contains one button. Initialize the label on the button to "start", when the user presses the button, which changes the label between these two values each time the button is pressed.
6. Develop an applet that uses the mouse listener, which overrides only two methods which are mouse Pressed and mouse Released.

### PART-B

1. Develop an program that contains three check boxes and 30 x 30 pixel canvas.T he three checkboxes should be labeled "Red", "Green", "Blue". The selection of the check boxes determine the color of the canvas. For example, if the user selects both "Red" and "Blue", the canvas should be purple.
2. Create an application that displays a frame with a menu bar. When a user selects any menu or menu item, display that selection on a text area in the center of the frame .
3. Develop a program that draws two sets of ever-decreasing rectangles one in outline form and one filled alternately in black and white.

### PART-3

1. Develop a database application that uses any JDBC driver.
2. Develop a Graphical User Interface that performs the following SQL operations: a) Insert b) Delete c) Update.
3. Develop a program to present a set of choice for user to select a product and display the price of product.

**PART-4**

1. Develop a simple servlet program which maintains a counter for the number of times it has been accessed since its loading, initialize the counter using deployment descriptor.
2. Create a web form which processes servlet and demonstrates use of cookies and sessions.

**PART-5**

1. Develop a simple JSP program for user registration and then control will be transfer it into second page.
2. Develop a simple JSP program for user login form with static and dynamic database.
3. Develop a JSP program to display the grade of a student by accepting the marks of five subjects.

**SUGGESTED SPECIFICATION TABLE WITH HOURS AND MARKS (Theory)**

| S.no. | Unit Title | Marks |
|---|---|---|
| 1 | Java Applets | 10 |
| 2 | Abstract Window Toolkit (AWT) | 10 |
| 3 | Java Data Base Connectivity (JDBC) | 20 |
| 4 | Servlets | 20 |
| 5 | Java Server Pages (JSP) | 20 |
| 6 | Viva | 20 |
| | Total | 100 |

Kritika.

B.Sc. Honours: **PART-III** Semester: **VI**

**SUBJECT: COMPUTER SCIENCE** **PAPER: HONOURS-I**
**Maximum Marks 100** **Time : 3 Hours**

## Title : Artificial Intelligence with Python

**Introduction:**
Introduction to Artificial Intelligence, Background and Applications, Turing Test and Rational Agent approaches to AI, Introduction to Intelligent Agents, their structure, behavior and environment.

**Problem Solving and Searching Techniques**
Problem Characteristics, Production Systems, Control Strategies, Breadth First Search, Depth First Search, Hill climbing and its Variations, Heuristics Search Techniques: Best First Search, A* algorithm, Constraint Satisfaction Problem, Means-End Analysis, Introduction to Game Playing, Min-Max and Alpha-Beta pruning algorithms.

**Knowledge Representation**
Introduction to First Order Predicate Logic, Resolution Principle, Unification, Semantic Nets, Conceptual Dependencies, Frames, and Scripts, Production Rules, Conceptual Graphs.

**Programming in Python**
Python NumPy Array (Indexing, Split, Search, Sort, Filter), NumPy Random, NumPy ufunc, Matplotlib (Plotting, Line, Markers, Labels, Subplot, Scatter, Bars, Histograms, Pie Charts), SciPy (Constants, Optimizer, Graphs, Spatial Data, Interpolation).

**Dealing with Uncertainty and Inconsistencies**
Truth Maintenance System, Default Reasoning, Probabilistic Reasoning, Bayesian Probabilistic Inference, Possible World Representations.

**Understanding Natural Languages**
Parsing Techniques, Context-Free and Transformational Grammars, Recursive and Augmented Transition Nets.

## BOOKS RECOMMENDED:


1. Alberto Artasanchez and Prateek Joshi, Artificial Intelligence with Python – 2nd Edition, 2020.
2. DAN.W. Patterson, Introduction to A.I and Expert Systems – PHI, 2007.
3. Russell &Norvig, Artificial Intelligence-A Modern Approach, LPE, Pearson Prentice Hall, 2nd edition, 2005.
4. Rich & Knight, Artificial Intelligence – Tata McGraw Hill, 2nd edition, 1991. House, 3rd edition, 2001.
5. Ivan Bratko, Prolog Programming for Artificial Intelligence, Addison-Wesley, Pearson Education, 3rd edition, 2000.


B.Sc. Honours: **PART-III** Semester: **VI**

SUBJECT: COMPUTER SCIENCE
**Maximum Marks 100**

PAPER: HONOURS-I
**Time : 3 Hours**

## Title : Artificial Intelligence with Python (Practical)

1. Write a program to calculate the factorial of a given number.
2. Write a program to calculate the nth Fibonacci number.
3. Write a program, insert_nth(item, n, into_list, result) that asserts that result is the list into_list with item inserted as the n'th element into every list at all levels.
4. Write a program to remove the Nth item from a list.
5. Write a program, remove-nth(Before, After) that asserts the After list is the Before list with the removal of every n'th item from every list at all levels.
6. Write a program to implement append for two lists.
7. Write a program to implement palindrome(List).
8. Write a program to implement max(X,Y,Max) so that Max is the greater of two numbers X and Y.
9. Write a program to implement maxlist(List,Max) so that Max is the greatest number in the list of numbers List.
10. Write a program to implement sumlist(List,Sum) so that Sum is the sum of a given list of numbers List.
11. Write a program to implement two predicates evenlength(List) and oddlength(List) so that they are true if their argument is a list of even or odd length respectively.
12. Write a program to implement reverse(List,ReversedList) that reverses lists.
13. Write a program to implement maxlist(List,Max) so that Max is the greatest number in the list of numbers List using cut predicate.
14. Write a program to implement GCD of two numbers.
15. Write a program that implements Semantic Networks/Frame Structures.
16. Write a program to calculate the mean of given numbers.
17. Write a program to calculate the moad of given numbers.

18. Write a program to calculate the median of given numbers.
19. Write a program to calculate the Standard Deviation of given numbers.
20. Write a program to calculate the percentile of given numbers.
21. Write a program to create an array containing 300 random floats values between 0 and 5.
22. Write a program to draw a histogram of given numbers.
23. Write a program to create an array containing 10000 random numbers and display them using a histogram with 100 bars.
24. Write a program to calculate the normal data distribution of given numbers and display them using a histogram with 100 bars.
25. Write a program to draw a scatter plot diagram of given numbers.
26. Write a program to draw the line of Linear Regression of given values.
27. Write a program to predict the speed of a 10 years old car using linear regression of given numbers.
28. Write a program to draw the line of Polynomial Regression of given values.
29. Write a program to predict the speed of a car passing at 5 PM using polynomial regression of given numbers.
30. Write a Program to measure accuracy of a model by using a Train/Test method.

**Scheme of Marks Distribution:**

| | |
|---|---|
| 1. Simple Program | 30 Marks |
| 2. Graphical Program | 30 Marks |
| 3. Practical Record | 20 Marks |
| 4. Viva | 20 Marks |

*Institute for Excellence in Higher Education (IEHE), Bhopal*

B.Sc.Honours: **PART-III** Semester: **VI**

SUBJECT: **COMPUTER SCIENCE** PAPER: **HONOURS –II/SUBSIDIARY**

**Maximum Marks: 100** **Time : 3 hours**

## TITLE: SOFTWARE ENGINEERING

**Course Objective:**
In this course, students will gain a broad understanding of the discipline of software engineering and its application to the development of and management of software systems.

**Learning Outcome:**

- knowledge of basic SW engineering methods and practices, and their appropriate application;
- A general understanding of software process models such as the waterfall and evolutionary models.
- An understanding of the role of project management including planning, scheduling, risk management, etc.
- An understanding of software requirements and the SRS document.
- An understanding of different software architectural styles.
- An understanding of implementation issues such as modularity and coding standards.
- An understanding of approaches to verification and validation including static analysis, And reviews.
- An understanding on quality control and how to ensure good quality software.
- An understanding of some ethical and professional issues that are important for software engineers.
- development of significant teamwork and project based experience.

## SYLLABUS

**INTRODUCTION**: Characteristics of Software, Software Engineering, Evolving role of software, the changing nature of software, System software, Application software, Engineering/Scientific software, Embedded software, Product-line software, Web-applications Software Engineering: A Layered Technology, process, Methods and Tools, A Generic view of software Engineering, The Software Process, Software Process Models – The Linear Sequential Model, The Prototyping Model, The RAD Model, Evolutionary Software Process Model – The Incremental Model, The Spiral Model, The Component Assembly Model, The

Concurrent Development Model. The Formal Methods Model Fourth Generation Techniques, Process Technology, Product and Process.

**PROJECT MANAGEMENT CONCEPT:**
The Management Spectrum – The People, The Product, The Process, The Project. People – The Players, Team Leaders, The Software Team.

**Software Process and Project Metrics:** Introduction to measures, metrics and indicators. Process Metrics and Software process Improvement, Project Metrics. Software Measurement – Size Oriented Metrics, Function Oriented Metrics.

**INTRODUCTION TO MICROSOFT VISUAL STUDIO.NET:** Overview of .NET framework, understanding ASP.NET application and controls, concept of Internet Information services, ASP.NET coding model, auto post back, view states, details about Page class, Windows Form, Server Controls: HTML server control, web controls, list controls, validation control, state management: view, session and application state.

**SOFTWARE PROJECT PLANNING AND QUALITY ASSURANCE:** Observations on Estimating, Project Planning Objectives, Software Scope - Obtaining Information Necessary for Scope, Feasibility. Resources–Human Resources, Reusable Software Resources, Environment Resources.

**SoftwareQualityAssurance:**QualityConcepts,Quality,QualityControl,QualityAssurance,Cost of Quality, The Quality Movement, Software Quality Assurance- Background Issues, SQA Activities. There view meeting, Review Reporting and Record Keeping

**ANALYSIS CONCEPTS AND PRINCIPLES**
Requirements Analysis, Requirements, Elicitation for software Initiating the Process, Facilitated Application specification Techniques, Quality function Deployment, Analysis Principles.

**FUNCTIONAL MODELING AND INFORMATION FLOW:**
Data Flow Diagram (DFD), Extensions for real- Time systems, Behavioral Modeling, The Mechanics of Structural analysis –Creating an Entity/Relationship Diagram, Creating a Dataflow Model, Creating a Control Flow Model, The Control Specification, The Control Specification, The Process Specification. The Data Dictionary..

**DESIGN CONCEPT AND PRINCIPLES:**
Software Design and Software Engineering, The Design Process- Design and Software Quality, The evaluation of software Design. Design Principles, Design Concepts- Abstraction, Refinement, Modularity, Software Architecture, Control Hierarchy, Structural Portioning, Data Structure, Software Procedure and Information Hiding, Effective Modular Design- Fundamental Independence, Cohesion,

Coupling. Design Documentation.

**SOFTWARE TESTING TECHNIQUES**

Software testing fundamental – testing objectives, testing principles, testability. Test case design, white box testing, basic path testing- flow graph notation, cyclomatic complexity, deriving test cases, graph matrices. Control structure testing- condition testing, data flow testing, loop testing. Black box testing- graph based testing methods, equivalence portioning, boundary value analysis, comparison testing, orthogonal array testing.

**MAINTENANCE:**

Software Maintenance-Software Supportability- Reengineering Business Process Reengineering- Software Reengineering- Reverse Engineering Restructuring- Forward Engineering- Economics of Reengineering.

**TEXTBOOKS:**

1. Software Requirements, Karl E. Wiegers, Word Power Publishers, 2000.
2. Software Requirements and Estimation, Rajesh Naik , Swapna Kishore.

**REFERENCES:**

1. Requirements Engineering: A Good practice Guide, Ian Sommerville, Pete Sawyer, Pearson, 2004.
2. Managing Software Requirements A Use Case Approach, 2/e, Dean, Don ,Addision- Wesley, 2003.
3. Requirements Engineering and Rapid Development, Ian Graham, Addision-Wesley, 1998.

*Institute for Excellence in Higher Education (IEHE), Bhopal*

B.Sc. Honours : **PART-III** Semester: VI

SUBJECT: **COMPUTER SCIENCE** PAPER: **HONOURS – II/SUBSIDIARY**
**Maximum Marks: 100** **Time : 3 hours**

## TITLE:SOFTWAREENGINEERING(PRACTICAL SYLLABUS)

Platform: ASP.NET using C#

1. Create a web form and add various controls in it.
2. Write a program to print message and name in separate lines.
3. Write a program to print sum of two numbers.
4. Write a program to swap two numbers.
5. Write a program to check whether two numbers are equal using if statement.
6. Write a program to check whether two numbers are equal using if else statement.
7. Write a program to check given number is positive or negative (if).
8. Write a program to check given number is positive or negative (if else).
9. Write a program to read roll number, name and marks of 3 subjects (switch- case).
10. Write a program to find factorial of given number (while).
11. Write a program to find factorial of given number (do while).

Major Project: Students can make project using any technology: Python, Asp.net using C#, Java, PHP or HTML.

### Scheme of Marks:

| S. No. | Topic | Marks |
|---|---|---|
| 1 | Knowledge of Language | 10 Marks |
| 2 | Project Reviews | 20 Marks |
| 3 | Project Report | 20 Marks |
| 4 | Viva | 60 Marks |