B.E. COMPUTER SCIENCE AND ENGINEERING

SECOND YEAR SECOND SEMESTER EXAMINATION 2024

ADVANCED OBJECT ORIENTED PROGRAMMING

Time: 3 hours   Full Marks : 100

Use separate answer scripts for PART-I and II

PART-I (Java)

[CO1   Conceptualize the object oriented features of Java and Python]

Answer ANY TWO   **20marks**

1. Define a class for integer matrix operations. Store the user inputs into an mxn array. Display the matrix. Calculate the sum of border elements and non border elements. This calculation should not be visible outside the class. Display the result of the summation from main method.   10

2. (a) Distinguish between unboxing and autoboxing. Why are these needed in Java?

   (b) Turing executes the following program segment and the answer displayed is zero irrespective of any non zero values are given. Name the error. How the program can be modified to get the correct answer?

```
void triangle(double b, double h) {
    double a;
    a = 1/2 * b * h;
    System.out.println("Area="+a); }
```

   (c) Assume a binary file is there that has stored the marks (integers) for all the students. Write the code to find the highest score.   4+2+4=10

3. (a) Write a Java program to copy the first two lines from a text file and print it to the console.

   (b) Autorickshaw and EV both are vehicles. All vehicles can change its gear and apply brakes. Design two classes for Autorickshaw and EV which are basically vehicles. Write the main method.   5+5=10

[CO2   Understand and Develop concurrent programming in Java and Python]

Answer ANY ONE   **10marks**

4. There is an inventory class that tracks the no of items available at a store. There is a Supplier class that updates this count whenever a new item is supplied to the store and a Seller class that reduces the count whenever an item is sold. Both Supplier and Seller classes should access the item count in a consistent manner. Write suitable Java code to implement such a scenario. Write the main method for two Suppliers and one Seller. Discuss any synchronization mechanism adopted in the code. 10

5. (a) What is the specialty of a Thread object that it executes parallelly while other objects are not?

   (b) If a thread waits, how can it resume from waiting? What are the mechanisms?

   (c) Do you obtain lock on a method or an object? Discuss with suitable code snippets.

   (d) Write suitable code snippets to create n threads where n is taken as input.   3+2+3+2=10

[Turn over

[CO3   Understand and Develop event driven programming in Java and Python]   5marks

6. (a) An Exception in Java denotes an event. A Mouse Click is also represented as an event. Analyze why the two are not handled similarly in Java?
(b) When would you invoke a GUI event handler on an event dispatch thread rather than a worker thread? Justify.   2+3=5

|CO4   Design and implement object oriented solution for problems using Java and Python| 15marks

Answer ANY ONE

7. (a) Write a Box class in Java having length, breadth, and height as attribute. There is a ColorBox class that ISA Box. It has an additional attribute named color. Write the main method with appropriate print statements to *evaluate* the role of superclass reference in extracting the attributes of a subclass.
(b) Take input from command line the items that you wish to buy right after the exam. There may be repetitions. Construct a frequency table where you keep track of the items entered and the no of items you have repeated it. Now, display those items which you have repeated at least more than twice. Select and utilize a suitable collection class.   8+7=15

8. (a)   A restaurant makes parathas with various stuffings and their different combinations such as, aloo, gobi, aloo and gobi like that. The restaurant also offers parathas with specific stuffings depending on time-of-the-day (evening/morning/afternoon) at a special discounted rate. *Design* a class in Java with methods to take orders from customers.
(b) The mass and radius of different planets are given as follows.
     MERCURY (3.303e+23, 2.4397e6), VENUS (4.869e+24, 6.0518e6), EARTH   (5.976e+24, 6.37814e6),   MARS   (6.421e+23, 3.3972e6),   JUPITER (1.9e+27,   7.1492e7),   SATURN (5.688e+26, 6.0268e7),   URANUS   (8.686e+25, 2.5559e7),   NEPTUNE (1.024e+26, 2.4746e7).
     Develop a Java program that takes the mass on Earth as input and calculates the weight on a different planet as desired by the user. The formula to calculate the weight on a different planet is as follows. G is the universal constant.

$$mass\ on\ Earth \times \frac{G \times mass\ of\ the\ planet}{radius^2}$$

Justify the object-oriented principles utilized in the program. Write the main method.   5+10=15

PART-II (Python)

Answer all questions

[CO1   Conceptualize the object oriented features of Java and Python]   20marks

1.   Answer any 2 questions-   5+5=10

   a. Compare List and Tuple sequences in Python.

   b. Discuss the following methods associated with the file object –
     a) read() b) readline() c) readlines() d) seek() e) write().

   c. How does Generalization differ from Encapsulation. Explain with examples in Python.

   d. Explain try, except and finally block with an example in Python.

   e. Write a Python program to read lines from a file, break into tokens and convert the tokens to unique numerical values using Python dictionary.

2.   Discuss different mutable and immutable data types in Python.   10

Or

   Discuss advantages of Python over Java as an Object Oriented Programming Language.   10

[CO2   Understand and Develop concurrent programming in Java and Python]   10marks

3.   Write a Python program to design a simple connectionless server, explaining the connectionless service.   10

      Or

   What is multithreading? How to create a multi-threading program in Python?   5+5=10

[CO3   Understand and Develop event driven programming in Java and Python]   10marks

4.   Create a GUI application in Python that provides an Entry field where the user can provide the name of a text file. Open the file and read it, displaying its contents in a Label. You can also replace the Entry widget with menu that has a File Open option that pops up a window to allow the user to specify the file to read. Also add an Exit or Quit option to the menu rather than having a QUIT button.   10

      Or

   Compare Object-oriented programming and Event driven programming. What are the advantages of Event-driven programming.   5+5=10

[CO4   Design and implement object oriented solution for problems using Java and Python] 10marks

5.   Search for palindrome and unique words in a text using class method and string method. 5+5=10

   Or

   Write first seven Fibinacci numbers using generator next function/ yield with a class in python. Trace and memorize the function. Define pickling and unpickling in Python.   5+5=10