Ref No: Ex/IT/PC/B/T/221/2024

BE in INFORMATION TECHNOLOGY

2ND YEAR, 2ND SEMESTER EXAMINATION, 2024

OBJECT ORIENTED SYSTEMS

Full marks: 100 **Total Time: 3 hours**

Answer all parts of a question together in one place. Do not scatter the answers.

CO1 **[35 MARKS]**	1. a) Fill up the blanks with appropriate phrases. Hence justify the validity of each of the completed sentences with proper arguments. Provide code snippets where necessary. i) The _____ block is executed every time an object is created. However, the_____ block is executed only once when the _____. ii) There is no concept of pointers in Java because _____. iii) The access specifiers of Java can be arranged in the order _____< _____<_____<public. iv) Method hiding occurs when _____. However, it never occurs if _____. v) Arrays of objects are passed to a function by _____. Only one slot of an array of objects is passed by _____. vi) The _____ methods of a Base class are _____ in Child class, but cannot be overridden. vii) All the resources used in a program are closed automatically if _____. b) With proper justification, state whether each of the following can be done or not. Provide code snippets where/if required. i) Keeping no abstract methods within an abstract class. ii) Giving a stricter access specifier to the overridden method of child class. iii) Overloading the ***main()*** method in a class. iv) Creating a 2D array; with each row having different number of columns. v) Putting a try-catch-finally block within a finally block. vi) Initializing non-static member variables of a class within a static block. vii) Calling the member methods of a class in cascaded fashion by anonymous object. viii) Resolving the name conflicts of classes in different packages. c) Distinguish between each of the following pairs: i) Reference data types and primitive data types. ii) Static binding and dynamic binding [(2x7)+(2x8)+(2x2.5)=35]
CO2 **[25 MARKS]**	2. a) Write a Java class having a method that opens a text file in read mode, select all the words containing atleast one numeral and write them into another file. Hence count the number of such words in the file. b) Create two threads P1 and P2. The P1 thread will print the odd numbers as 1 3 5 …. The P2 thread will print 2 4 6 8 10... Now synchronize these two thread to get the output as 1 2 3 4 5 6 7 8. Use ***sleep()*** method to print the output after every 1 second. Write this program twice using synchronized block and synchronized method separately. c) Demonstrate how deadlock situation occurs in a multi-threaded environment. Show how this situation can be eliminated.

[Turn over

	d) Distinguish between each of the following pairs*:* i) ***join()*** and ***wait()*** ii) Scanner and InputStreamReader iii) FileInputStream and BufferedInputStream [(7+7+(3+2)+(2x3)=25]
CO3 **[25 MARKS]**	3. a) Define a generic class with a member method ***frequency(A)*** that take arrays A of different datatypes (int, float, char) as input and finds the frequency of each element. Example: An array contains 1,2,1,3,4,3,2,1,4,5: Freq(1)=3, Freq(2)=2, Freq(3)=1, Freq(4)=2, Freq(5)=1. Or, Define a generic class with a member method ***BinSearch(A, P)*** that takes a sorted array A of different data types (int , char, float, double) and an element P as input from the user and finds whether P is present in A or not using Binary Search technique. Also find the location of the element in the array. b) Show how a static generic method is defined in a class and how it is invoked. c) Write suitable code snippet to invoke the *startsWith(), equalsIgnoreCase(), toUpperCase(), concat(), trim(), compareTo()* and *lastIndexOf()* methods of **String** class using Reflection. Illustrate their functionalities with suitable examples. Within the same code, show how to invoke the different overloaded versions of *substring()* method of **StringBuffer** class using Reflection. Provide examples. d) Discuss the major drawbacks of Reflection with suitable code snippets. [8+3+(7+3)+4=25]
CO4 **[10 MARKS]**	4. a) Distinguish between each of the following related to UML with proper examples. i) aggregation and composition relation ii) include and extend relation iii) use case diagram and sequence diagram b) State how the different access specifiers of member methods are represented in a class diagram. c) Discuss multiplicity with suitable example. [(2x3)+2+2=10]
CO5 **[5 MARKS]**	5. Discuss singleton design pattern. Or, Explain iterator design pattern. [5]

Course Outcomes:

CO1: Differentiate different object oriented programming language and Solve problems by developing Java programs using (i) classes, (ii) inheritance, (iii) nested classes and (iv) exceptions.

CO2: Solve problems using thread programming and Input-Output.

CO3: Develop programs using advanced programming paradigms: (i) Introspection capabilities, (ii) Generic Programming.

CO4: Model and Sketch software systems by using different artifacts of Unified Modeling Language.

CO5: Explain and illustrate basics of design patterns by developing programs.