Ref No: Ex/IT/PC/B/T/221/2025

BE in INFORMATION TECHNOLOGY

2ND YEAR, 2ND SEMESTER EXAMINATION, 2025

OBJECT ORIENTED SYSTEMS

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

CO1 **[40 MARKS]**	1. a) Justify the validity of the following statements with supporting arguments. Provide code snippet/s where/ if necessary. i) There is only one entry point to a program, irrespective of the number of ***main()*** methods in a class. ii) Method overriding is also known as late binding. iii) A non-static member method can be invoked within the static block of a class. iv) Reference data types do not store the value directly in a variable. v) Every member method in a Base class can be overridden in its Child class. vi) An interface solves the diamond problem automatically. vii) The ***ensureCapacity()*** method doubles the capacity of a StringBuffer object. viii) Two strings can be compared by = = operators. ix) A private member method in a ***Base*** class cannot be overridden in its ***Child*** class. x) Two different packages should never have classes having same name. b) 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 difference between the keywords ***final*** and ***finally*** is _____. ii) Classes in a package must be declared as _____, otherwise they cannot be _____. iii) Static methods in a Base class can be overridden, but it results in method _____. iv) A _____ array is called a jagged array if _____. v) An abstract class may not have a/an _____, but it must be _____. vi) Run time polymorphism occurs only for _____ of a class, but not for _____. vii) The difference between checked and unchecked exception is _____. viii) The parameterized constructor of the Base class must be called from _____ by _____. ix) The ***equalsIgnoreCase()*** and ***compareToIgnoreCase()*** methods differ by_____. x) Two strings can be concatenated by _____ or _____. [(2x10)+(2x10)=40]
CO2 **[25 MARKS]**	2. a) Distinguish between each of the following pairs*:* Use supporting code snippets. i) ***sleep()*** and ***wait()*** ii) ***interrupt()*** and ***interrupted()*** iii) ***readLine()*** and ***nextLine()*** iv) ***nextInt()*** and ***hasNextInt()*** b) 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) It is better to create threads by _____ than _____. ii) Synchronized _____ ensure more concurrency than synchronized _____ because_____. iii) Race around condition occurs in _____ and is eliminated by _____. iv) Deadlock can be prevented by _____ so that no _____ occurs. v) Inter thread communication is achieved by _____.

	c) Write a Java class having a method that opens a text file ***a.txt*** in read mode, select all the palindrome words and write them into another file ***b.txt***. Hence count the number of such words in the file. Or, Write a Java class having a method that opens a text file in read mode, select all the words containing atmost one vowel and write them into another file. Hence count the number of such words in the file. Here the file names should be taken as input from the user. [(2x4)+(2x5)+7=25]
CO3 **[20 MARKS]**	3. a) What special purpose is achieved by Java Reflection? b) Write suitable code snippets to invoke the ***charAt(), substring(int,int)*** and ***indexOf()*** methods of ***String*** class using reflection. Hence show the output with proper examples. c) Define a generic class having 3 overloaded versions of a generic method. One of them should be static. Now show with a suitable program how to invoke these methods from ***main()***. d) Define a generic class with a member method ***highest_occurence(A)*** that take arrays A of different datatypes (int, float, char) as input and finds the highest occurring element. Example: An array contains 1,2,1,3,4,3,2,1,4,5,1,8,9,1: Highest occurring element is 1. Or, Invoke any 4 methods of ***StringBuffer*** class (which are not available for ***String*** class) using reflection. Hence show the output of each of them with suitable example. [2+6+5+7=20]
CO4 **[10 MARKS]**	4. a) Illustrate how the different parts of a class are represented in a class diagram. b) Distinguish between each of the following pairs: (Any 3) i) Aggregation and composition ii) Synchronous and asynchronous transmission in sequence diagram iii) Include and extend relations iv) Generalization and inheritance c) Discuss multiplicity and role related to class diagram of UML. [2+(2x3)+2=10]
CO5 **[5 MARKS]**	5. Discuss singleton design pattern. Or, Explain iterator design pattern. Or, Explain command design pattern.

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.