Subject Name: Object Oriented Programming -I
Subject Code: 3140705

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Sr. No	CHAPTER NO - 1 : INTRODUCTION TO JAVA AND ELEMENTARY PROGRAMMING	Marks
	TOPIC:1 Java language specification API, JDK and IDE, Creating, compiling and Executing a simple java program, Programming style, documentation and errors	
	DESCRIPTIVE QUESTIONS	
1	Why java is preferred as a programing language for Internet? **(Feb-2021-OLD)[NLJIET]**	**03**
2	What makes a Java platform independent language? Explain in detail. **(Dec-2021-OLD)[NLJIET]** How java supports platform independency? What is the role of JVM in it? **(Jan-2024-NEW) [NLJIET]**	**03** **03**
3	Explain JRE, JDK and JIT. **(Oct-2020-NEW)[NLJIET]** Define the terms- API,JDK, Java Language Specification **[NLJIET]**	**03** **03**
4	Define following. **(Dec-2018-OLD) [NLJIET]** 1) Byte code 2) Java Virtual Machine 3) Unicode	**03**
5	Explain role of JVM. **(Nov-2016-OLD)[NLJIET]** Justify statement **[NLJIET]** (i) JVM is platform dependent. Justify. **(May-2013-OLD)(Dec-2014-OLD)** (ii) There is no destructor in Java. Justify. **(May-2013-OLD)(Dec-2014-OLD)** (i) Method main is a public static method. Justify. **[NLJIET]** (ii) Java program is to be compiled first and then to be interpreted for execution. True or false? Justify your answer.	**02** **07** **07**
6	List features of Java. Briefly explain any two. **(Nov-2017-OLD)[NLJIET]** List and explain various features of java. **(Dec-2013-OLD)[NLJIET]** Explain any three features of JAVA. **(Dec-2019-OLD)[NLJIET]** Explain features of JAVA. **(Jun-2012-OLD)(Jun-2014-OLD)(May-2016-OLD) [NLJIET]** List various features of Java? Also explain any two feature with example. **(May-2015-OLD)[NLJIET]** List out features of Java. Explain any two features.**(Jul-2022-NEW)** Describe the following features of java: **(Dec-2014-OLD)[NLJIET]** 1)Multithreaded 2)Architecture-neutral 3)Interpreted 4)High performance 5) Distributed 6) Portable 7) Dynamic	**03** **03** **07** **07** **03** **07**
7	How can you create packages in Java? **(Dec-2022-NEW)[NLJIET]** What do you understand by package? Discuss benefits of package. **(Jun-2019-OLD) [NLJIET]** What do you mean by package in java? Which package is automatically imported into every source file? **(Dec-2021-OLD)[NLJIET]** What is package? How are they created and used? **(Feb-2021-OLD)[NLJIET]**	**03** **03** **03** **03** **04**

	What is package? What are the requirements of it? What we can achieve using package? **(Dec-2018-OLD)[NLJIET]**	**04**
	Explain package and its use with appropriate example. **(Nov-2017-OLD)[NLJIET]**	**04**
	How package can be created in JAVA? Explain with suitable example. **(Dec-2019-OLD)[NLJIET]**	**04**
	What is a Package? What are the benefits of using packages? Write down the steps in creating a package and using it in a java program with an example. **(Sept-2021-NEW)[NLJIET]**	**07**
	What is package? Explain steps to create package with example. **(Dec-2013-OLD)(May-2016-OLD)[NLJIET]**	**07**
	Explain package in java. List out steps to create user defined package with one example. **[NLJIET]**	**07**
	Explain package in java. List out all packages with short description. **(Jun-2012-OLD)[NLJIET]**	**07**
	What is package? List various built in package used in java. **(May-2015-OLD)(Apr-2017-OLD)[NLJIET]**	**07**
8	What is error? Explain various types of errors. How can we handle run time errors in java? **(May-2015-OLD)[NLJIET]**	**07**
	What are syntax errors (compile errors), runtime errors, and logic errors? **(Jan-2022-NEW)[NLJIET]**	**03**
	Describe syntax errors (compile errors), runtime errors, and logic errors by giving suitable examples?**(Jul-2023-NEW)[NLJIET]**	**04**
9	How to write different types of comments in JAVA. **[NLJIET]**	**03**
10	Explain different block styles used in java with suitable example. **[NLJIET]**	**03**
	TOPIC:2 Reading input from console, identifiers and variables, Assignment statements, Named constants and naming conventions, Data Types (Numeric, Boolean, Character, String) its Operations and Literals	
	DESCRIPTIVE QUESTIONS	
1	Explain Data Types in detail with example. **(Jan-2022-NEW)[NLJIET]**	**07**
2	What is variable? How can we define variable in java? Also list rules for valid variable names. **(May-2015-OLD)[NLJIET]**	**07**
3	What are the four integer types supported by Java. **(Apr-2017-OLD)[NLJIET]**	**02**
4	What are command line arguments and how are they used? **(Feb-2021-OLD) [NLJIET]**	**03**
	TOPIC:3 Evaluating Expressions and operator Precedence, Types of Operators (Augmented assignment, Increment and Decrement, Logical), operator precedence and associativity, numeric type conversions	
	DESCRIPTIVE QUESTIONS	
1	What will be the result of the following Java expression? **(Apr-2017-OLD)[NLJIET]** 4*2-5>4 && 3<5-3	**02**
2	Explain right-shift operators. **[NLJIET]**	**02**
	Explain short circuited operator with example. **(May-2018-OLD)[NLJIET]**	**04**
	Explain short circuited operators and shift operators. **(Jun-2011-OLD)[NLJIET]**	**07**
	Explain short circuited operators, shift operators and this reference. **(May-2013-OLD)[NLJIET]**	**07**
3	Explain Following: **(Jun-2014-OLD)[NLJIET]** 1. Garbage Collection 2. Short Circuit Operators.	**07**
	Explain Significance of Bytecode. **(Dec-2022-NEW)[NLJIET]**	
	What is the Java bytecode, and what is the extension of Java bytecode file? Which software is needed to run Java bytecode? **(Jul-2023-NEW)[NLJIET]**	**03**
4	Explain type-conversion in java. **(Feb-2021-NEW)[NLJIET]**	**04**

	What is Type Casting? Explain widening and narrowing type casting. **(Jan-2022-NEW)[NLJIET]**	**04**
5	What are the data-types and operators available in Java? **(Feb-2021-NEW)[NLJIET]**	**07**
6	Write a note on precedence and associativity. **[NLJIET]**	**07**

7	Answer in brief (within 50 words):
	I. Justify Java enables high performance.
	II. Differentiate between while and do while loop?
	III. How many times is the println statement executed?
	for (int i = 0; i < 10; i++)
	for (int j = 0; j < i; j++)
	System.out.println(i * j);
	IV. IV. If the value of variable x is 1 then what will be returned by the following expression:
	x % 2 = = 0
	(Jul-2023-NEW)[NLJIET]
		07

	PROGRAMS	
1	Write a java program to do sum of command line argument passed two Double numbers. **(Dec-2012-OLD)[NLJIET]**	**04**
2	Write a program to demonstrate the use of operators. **[NLJIET]**	**07**
	CHAPTER NO- 2 : SELECTIONS , MATHEMATICAL FUNCTIONS AND LOOPS	
	TOPIC:1 If statements, Two way, Nested if and multi-way if statements, Switch statements, Conditional Expressions, Common mathematical functions ,While , do-while and for loop, nested loops, Keyword break and continue	
	DESCRIPTIVE QUESTIONS	
1	Explain if and two way if statements with illustrative example. **[NLJIET]**	**03**
2	Difference between Nested if and multi-way if statements. **(Feb-2021-NEW)[NLJIET]**	**03**
3	What is the use of switch statement? Explain with a program. **[NLJIET]**	**04**
4	Explain break and continue statements with example. **[NLJIET]**	**04**
5	Explain the use of for loop, while loop and do-while loop using a program. **[NLJIET]**	**07**
	PROGRAMS	
1	Write a java program to check if the number is negative or positive. **[NLJIET]** Write a java program to check if the number is negative or positive using conditional expression. **[NLJIET]**	**04** **04**
2	Write a java program to check if the number is even or odd. **[NLJIET]**	**04**
3	Write a java program to print the greatest number among three numbers. **[NLJIET]**	**07**
4	Write a simple java program to illustrate the use of mathematical functions. **[NLJIET]**	**07**
5	Write a java program to print the first n Fibonacci numbers. **[NLJIET]**	**07**
6	Write a program to display a multiplication table of 1 to 10 using nested loop. **[NLJIET]**	**07**
7	Write a JAVA program to implement the Fibonacci series using for loop control structure. **(Dec-2019-OLD) [NLJIET]**	**07**
8	Write a java program to print prime number upto 100. **(Apr-2017-OLD)[NLJIET]**	**07**
9	Write a java program which check whether entered number is prime or not ? **(Apr-2017-OLD)[NLJIET]** Write a program which displays first n prime number? Where is n provided by user as command line argument? **(Jan-2024-NEW)[NLJIET]**	**07** **04**
10	Write a program to find whether the given string is palindrome or not. **(Nov-2017-OLD) [NLJIET]**	**03**

	Write a program to find whether the given string is palindrome or not. **[NLJIET]**	**07**
	CHAPTER NO- 3 : METHODS AND ARRAYS	
	TOPIC:1 Defining and calling method, Passing argument by values, Overloading methods and scope of variables, Method abstraction and stepwise refinement	
	DESCRIPTIVE QUESTIONS	
1	The method main is a static method. Why? **(Nov-2016-OLD)[NLJIET]** Method main is a public static method. Justify. **(Oct-2020-NEW)[NLJIET]** Justify: 1. Why we declare main() method as public and static member. 2. Why we generally declare constructor as public member. 3. Why there is no destructor in java. **(Jun-2019-OLD)[NLJIET]**	**02** **04** **07**
2	Explain "Passing argument by values" with example. **(Jan-2022-NEW)[NLJIET]** Explain pass by value in method with the help of a program. **[NLJIET]** Explain the following: i) Arguments and Parameters of a function ii) Pass by Value and Pass by reference **(Jul-2022-NEW)[NLJIET]** Define and write a program to differentiate between pass by value and pass by reference. **(Dec-2010-OLD)[NLJIET]**	**04** **07** **04** **07**
3	Write a program which shows an example of function overloading? **(May-2015-OLD)[NLJIET]** Write a program, which shows an example of function overloading. Also, differentiate between function overloading and overriding. **(Oct-2020-NEW) (Dec-2022-NEW) [NLJIET]** Write a note on function overloading? **[NLJIET]**	**07** **07** **04**
4	(i) Explain short circuited operators. **(Dec-2015-OLD) [NLJIET]** (ii) Explain function overloading with an example. **(Dec-2015-OLD) [NLJIET]**	**07**
5	Write a short note on - Method abstraction and stepwise refinement. **[NLJIET]**	**05**
6	Explain scope of variables using examples. **[NLJIET]**	**05**
	TOPIC:2 Single Dimensional arrays, copying arrays ,Passing and returning array from method, Searching and sorting arrays and the Array class, Two-Dimensional array and its processing, Passing Two-dimensional Array to methods, Multidimensional Arrays.	
	DESCRIPTIVE QUESTIONS	
1	Explain about arrays, Type of arrays and arrays methods. **(Sept-2021-NEW)[NLJIET]**	**03**
2	Explain arraycopy method with the help of a program. **[NLJIET]**	**03**
3	Explain how to pass an array to a method with the help of a program. **[NLJIET]** Explain how to return an array to a method with the help of a program. **[NLJIET]**	**04** **04**
4	Explain various methods provided by Arrays class using a program. **[NLJIET]**	**07**
5	Explain concept of ragged array. **[NLJIET]**	**03**
6	Explain how to pass two dimensional array to a method to find sum of all the elements of the array. **[NLJIET]**	**07**
7	Explain multidimensional array with suitable example. **[NLJIET]**	**05**
	PROGRAMS	
1	Write a java program to find minimum of two numbers using a function. **[NLJIET]**	**05**
2	Write a program that creates and initializes a four integer element array. Calculate and display the average of its values. (**Dec-2015-OLD)[NLJIET]**	**05**

3	Write a program which takes five numbers as command line argument from user, store them in one dimensional array and display count of negative numbers. **(Dec-2018-OLD)[NLJIET]** Write a program to take three numbers as command line argument. Display the maximum among them? **(Jun-2019-OLD)[NLJIET]**	**04** **04**
4	Write a program that creates an integer array and then uses a for loop to check whether the array is sorted from smallest to largest. If so, it prints "sorted" otherwise it prints "Not sorted". **(Dec-2021-OLD)[NLJIET]**	**07**
5	Write a java program to perform matrix multiplication using two dimensional array. **[NLJIET]**	**07**
6	Write a method for computing first n terms of Fibonacci sequence. Define method main taking value of n as command line argument and calling the method. **(Nov-2016-OLD)[NLJIET]**	**04**
7	Write a java program that evaluates a math expression given in string form from command line arguments. **(Jul-2022-NEW)[NLJIET]**	**07**
8	Write a program which declare integer array of 10 elements? Initialize array and define following methods with the specified header: (i) public static int add(int [] array) print addition of all element of array. (ii) public static int max(int [] array) print maximum element of array. (ii) public static int search(int [] array, int key) search element key in array and return index of it. If element is not found method will return -1. **(Jan-2024-NEW)[NLJIET]**	**07**
9	Implement java code to take some (say 10) Strings from users. Put all the input Strings in an array (String name[]). Provide implementation of following methods: (i)search(String s) will return index of String passed in method if String S is found in name, otherwise return -1. (ii)sort() will print sorted String array to user **(Jan-2024-NEW)[NLJIET]**	**07**
	CHAPTER NO - 4 : OBJECTS AND CLASSES	
	TOPIC:1 Defining classes for objects, Constructors, accessing objects via reference variable, using classes from the java library, static variables, constants and methods, visibility modifiers and Data field encapsulation	
	DESCRIPTIVE QUESTIONS	
1	What is the difference between oop and procedural oriented language? **(Feb-2021-NEW)[NLJIET]** Discuss benefits of Object Oriented Approach? **(Jun-2019-OLD)[NLJIET]** Define object oriented concepts. **(Sept-2021-NEW)[NLJIET]** Compare Object oriented programming with sequential programming. **(May-2015-OLD)(May-2018-OLD)(Oct-2020-NEW)[NLJIET]** List out and explain three main principles of object-oriented programming? **(Feb-2021-OLD)[NLJIET]** What do you mean by object-orientation? Briefly discuss the characteristics of object oriented approach. **(May-2016-OLD)[NLJIET]** Explain characteristics of OOP ? **(Nov-2016-OLD)[NLJIET]** Define object orientation. Explain the stages of object orientation methodology. **(Dec-2019-OLD)[NLJIET]**	**03** **03** **03** **03** **04** **07** **07** **07**
2	Explain class and object with respect to java. **(Feb-2021-NEW)[NLJIET]**	**07**

	Describe the relationship between an object and its defining class? **(Jan-2024-NEW) [NLJIET]**	**03**
3	Write use of keyword import. **(Nov-2016-OLD)[NLJIET]** What is the use of static import? Explain it giving an example. **(Feb-2021-OLD) [NLJIET]** Write a single program which demonstrates the usage of following keywords: i) import, ii) new, iii) this, iv) break, v) continue Show how to compile and run the program in java **(Jul-2022-NEW)[NLJIET]**	**02** **03** **04**
4	When will you declare a method as a static? Explain static method with suitable example.**(Dec-2018-OLD)[NLJIET]** Explain static variable and static method with example. **(Jan-2022-NEW)[NLJIET]**	**03** **04**
5	How to access object via reference variable? Explain with example. **(Feb-2021-NEW)[NLJIET]**	**04**
6	What is the purpose of 'static' keyword? Write a program to demonstrate the use of static members of the class.**(Dec-2021-OLD) [NLJIET]** Explain static keyword with example**. (Oct-2020-NEW)[NLJIET]**	**04** **04**
7	Explain constructor with the help of example.**(Dec-2022-NEW)[NLJIET]** What is a constructor in JAVA? How many types of constructors are there in JAVA? Explain with examples. **(Dec-2019-OLD)[NLJIET]** What is constructor? What are the rules for creating constructor in java? **(May-2015-OLD)[NLJIET]** List and explain available type of constructors in java with example. **(Feb-2021-NEW)[NLJIET]** Explain the following constructors using appropriate example: i) Default constructor and Parameterised constructor ii) Shallow copy and Deep copy constructor **(Jul-2022-NEW)[NLJIET]**	**03** **04** **07** **07** **04**
8	What do you mean by Overloading? Explain constructor overloading with suitable example. **(Dec-2018-OLD) [NLJIET]** What is constructor? Explain constructor overloading. **(Jan-2022-NEW)[NLJIET]** What is constructor? Explain constructor overloading with example. **(Jun-2014-OLD)(Nov-2017-OLD)[NLJIET]** Explain constructor overloading using example. **(Dec-2015-OLD)[NLJIET]** Define constructor. How objects are constructed? Explain constructor overloading with an example. **(Sept-2021-NEW)[NLJIET]** What is constructor overloading? **(Feb-2021-NEW)[NLJIET]**	**04** **04** **07** **07** **07** **04**
9	Differentiate between constructor and method of a class. **(Jan-2013-OLD)(May-2018-OLD)(Dec-2018-OLD) [NLJIET]** Define method overloading and its purpose. Write a program to demonstrate the constructor overloading. **(Jan-2013-OLD)(Dec-2010-OLD)[NLJIET]**	**03** **07**
10	Justify: **[NLJIET]** 1. Why we declare main() method as public and static member. 2. Why we generally declare constructor as public member. 3. Why there is no destructor in java.	**07**
11	What is the purpose of 'this' and 'static' keyword? Write a java program to explain this. **(Feb-2021-OLD)[NLJIET]** Explain about static variables and static method in java. **[NLJIET]**	**04** **04**
12	Discuss public, private and protected access modifiers. **(Nov-2017-OLD)[NLJIET]** Differentiate between protected and default access specifiers.**(Jun-2019-OLD) [NLJIET]** Explain access modifiers with Example. **(Feb-2021-NEW)[NLJIET]** Explain keywords private and protected. **(Nov-2016-OLD)(May-2018-OLD)[NLJIET]** Write short notes on access specifiers and modifiers in java. **(Sept-2021-NEW)[NLJIET]** Discuss public, private, protected and default access modifier with example. **(Apr-2017-OLD)(Dec-2014-OLD)[NLJIET]**	**03** **03** **03** **04** **04** **07**

	Discuss various access modifiers available in JAVA? How access modifier affects the visibility of a member in different access locations? **(Dec-2019-OLD)[NLJIET]** Define Encapsulation and access specifier **(Jul-2022-NEW)[NLJIET]**	**07** **03**
13	Explain different Visibility modifiers. **(May-2018-OLD)[NLJIET]** Explain visibility modifiers. **(Jan-2022-NEW)[NLJIET]** What is visibility modifier? Explain all with example. **(May-2015-OLD)[NLJIET]**	**03** **03** **07**
14	Explain Random and Date class with the help of a program. **[NLJIET]**	**07**

15	(i) Given that Thing is a class, how many objects and how many reference variables are created by the following code?
	Thing item, stuff;
	item = new Thing();
	Thing entity = new Thing();
	
	(ii) Examine following code. Write and justify output.
	public class MyClass {
	public static void main(String[] args) {
	C c = new C();
	System.out.println(c.max(12, 29));
	}
	}
	class A {
	int max(int x, int y) { if (x>y) return x; else return y; }
	}
	class B extends A{
	int max(int x, int y) { return super.max(y, x) - 10; }
	}
	class C extends B {
	int max(int x, int y) { return super.max(x+10, y+2); }
	}
	(Jul-2023-NEW)[NLJIET]
		04

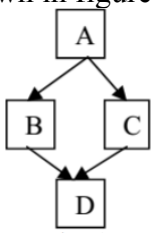
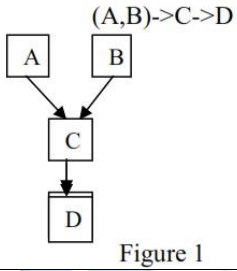
16	Analyze following code. Validate and explain output of code. If any error exists, indicate portion. Suggest code to eliminate error:
	
	public class Circle {
	private double radius;
	public static void main(String args[]){
	Circle c1=new Circle(2);
	System.out.println("Area "+c1.getArea());
	B b1=new B(2, 2);
	System.out.println("Area "+b1.getArea());
	}
	public Circle(double radius) {
	radius = radius;
	}
	public double getRadius() {
	return radius;
	}
	public double getArea() {
	return radius * radius * Math.PI;
	}
	}
	class B extends Circle {
		04

	private double length;
	B(){}
	B(double radius, double length) {
	length = length;
	}
	public double getArea() {
	return (super.getArea() * length);
	}
	} **(Jan-2024-NEW)[NLJIET]**	

	TOPIC:2 passing objects to methods, array of objects, immutable objects and classes, scope of variable and the this reference.	
	DESCRIPTIVE QUESTIONS	
1	Explain keyword this. **(Nov-2016-OLD)[NLJIET]** Write a short note on "this" reference. **[NLJIET]** What is the use of this keyword? How it is different from super keyword? **(Jul-2023-NEW)[NLJIET]**	**02** **04** **03**
2	How to pass object to a method? Explain with example. **[NLJIET]**	**04**
3	Explain array of objects with the help of a program. **[NLJIET]**	**07**
4	Explain the concept of immutable object with example. **[NLJIET]**	**07**
5	Explain scope of instance, class and local variable with the help of example. **[NLJIET]**	**07**
6	Explain immutable objects and classes with example. **[NLJIET]**	**05**
	PROGRAMS	
1	Define time class with hour and minute. Also define addition method to add two time objects. **(Dec-2015-OLD)[NLJIET]**	**07**
2	Write a program to create circle class with area function to find area of circle. **(Dec-2015-OLD)[NLJIET]**	**07**
3	It is required to compute SPI (semester performance index) of n students of a class for their registered subjects in a semester. Assume that all students register for 6 subjects and each subject carry 5 credits. Also, follow GTU convention and method for computation of SPI. Declare a class called student having following data members: id_no, grades_obtained and spi. Define constructor, display and calculate_spi methods. Define main to process data of n students. **(Nov-2016-OLD)[NLJIET]**	**07**
4	It is required to compute SPI (semester performance index) of n students of your college for their registered subjects in a semester. Declare a class called student having following data members: id_no , no_of_subjects_registered, subject_code , subject_credits, grade_obtained and spi. - Define constructor and calculate_spi methods. - Define main to instantiate an array for objects of class student to process data of n students to be given as command line arguments. **(May-2013-OLD)[NLJIET]**	**07**
5	Write a class named Rectangle to represent a rectangle. It contains following members: Data: width (double) and height (double) that specify the width and height of the rectangle. Methods: 1. A no-arg constructor that creates a default rectangle. 2. A constructor that creates a rectangle with the specified width and height. 3. A method named getArea() that returns the area of this rectangle. 4. A method named getPerimeter() that returns the perimeter **(Jun-2019-OLD)[NLJIET]**	**07**
6	Design a class named Fan to represent a fan. The class contains:	**07**

	- Three constants named SLOW, MEDIUM and FAST with values 1,2 and 3 to denote the fan speed. - An int data field named speed that specifies the speed of the fan (default SLOW). - A boolean data field named f_on that specifies whether the fan is on(default false). - A double data field named radius that specifies the radius of the fan (default 4). - A data field named color that specifies the color of the fan (default blue). - A no-arg constructor that creates a default fan. - A parameterized constructor initializes the fan objects to given values. - A method named display() will display description for the fan. If the fan is on, the display() method displays speed, color and radius. If the fan is not on, the method returns fan color and radius along with the message "fan is off". Write a test program that creates two Fan objects. One with default values and the other with medium speed, radius 6, color brown, and turned on status true. Display the descriptions for two created Fan objects. **(Nov-2011-OLD)[NLJIET]**	
7	Define the Rectangle class that contains: Two double fields x and y that specify the center of the rectangle, the data field width and height , A no-arg constructor that creates the default rectangle with (0,0) for (x,y) and 1 for both width and height. A parameterized constructor creates a rectangle with the specified x,y,height and width. A method getArea() that returns the area of the rectangle. A method getPerimeter() that returns the perimeter of the rectangle. A method contains(double x, double y) that returns true if the specified point (x,y) is inside this rectangle. Write a test program that creates two rectangle objects. One with default values and other with user specified values. Test all the methods of the class for both the objects. **(Nov-2011-OLD)[NLJIET]**	**07**
8	Write a program that defines class named StopWatch. The class contains: • Private data fields startTime and endTime with getter methods. • no-arg constructor that initializes startTime with the current time. • A method named start() that resets the startTime to the current time. • A method named stop() that sets the endTime to the current time. • A method named getElapsedTime() that returns the elapsed time for the stopwatch in milliseconds. • Declare object of StopWatch to demonstrate stop watch. Hint: Use System.currentTimeMillis() to get current time in milliseconds. **(Jul-2023-NEW)[NLJIET]**	**07**
9	Design a java class Rectangle which contains following field and methods: (i) Field: length, width: int (ii) Default Constructor: initialize all fields with 0 value (iii) Method: int getArea() will return area of rectangle. **(Jan-2024-NEW)[NLJIET]**	**07**
	CHAPTER NO – 5 : OBJECT ORIENTED THINKING	
	TOPIC:1 Class abstraction and Encapsulation, thinking in objects and class relationships, Primitive data type and wrapper class types, Big integer and Big decimal class	
	DESCRIPTIVE QUESTIONS	
1	Explain method parseInt. **(Nov-2016-OLD)[NLJIET]** Explain Aggregation and Association. **(Nov-2016-OLD)[NLJIET]**	**02** **03**
2	Explain the keywords: **(May-2018-OLD)[NLJIET]**	**04**

	1. Wrapper class 2. finalize () method 3. Recursion 4. Static	
3	What are Wrapper classes? What is Autoboxing? **(Jun-2019-OLD)[NLJIET]** What is wrapper class? What is the use of wrapper class in Java? **(Dec-2018-OLD) [NLJIET]** What are the wrapper classes? Explain the use of any one wrapper class. **(Feb-2021-OLD)[NLJIET]** Explain Primitive data type and wrapper class data types. **(Feb-2021-NEW)[NLJIET]** What is Wrapper class in Java? Explain with examples. **(May-2016-OLD)[NLJIET]**	**03** **03** **03** **04** **07**
4	Explain about Encapsulation, Abstraction. **(Sept-2021-NEW)[NLJIET]**	**04**
5	Write a note on class relationships. **[NLJIET]**	**04**
6	Explain the use of BigInteger and BigDecimal with the help of programs. **[NLJIET]**	**07**
	TOPIC:2 String class, String Builder and String Buffer class	
	DESCRIPTIVE QUESTIONS	
1	Describe the following methods related to String i) replace() ii) compareTo() **(Dec-2019-OLD)[NLJIET]** Explain about different types of string methods. **(Sept-2021-NEW)[NLJIET]**	**03** **03**
2	(i) Create a two dimensional array. Instantiate and Initialize it. (ii) Differentiate String class and StringBuffer class. **(Apr-2017-OLD)(Nov-2017-OLD)[NLJIET]**	**04**
3	Differentiate the followings: **(Jan-2013-OLD)[NLJIET]** i) String class and StringBuffer class ii) Constructor and Method	**05**
4	State difference between String Class and StringBuffer Class. **(May-2018-OLD)(Dec-2022-NEW)[NLJIET]** Write difference between String class and StringBuffer class. **(Oct-2020-NEW)[NLJIET]** Differentiate String class and StringBuffer class. **(Jan-2022-NEW)[NLJIET]** Differentiate between String and StringBuffer class. **(Dec-2021-OLD)[NLJIET]** What is the difference between the StringBuffer and StringBuilder classes? **(Sept-2021-NEW)[NLJIET]** Differentiate String class and StringBuffer class with explanation of its methods. **(Jun-2012-OLD)(Dec-2014-OLD)[NLJIET]** Compare String with StringBuffer. Also, write a program to count the occurrence of a character in a string. **(Dec-2013-OLD)(Dec-2022-NEW)[NLJIET]**	**03** **03** **03** **04** **04** **07** **07**
5	List out different methods available for String class in java and explain any two with proper example. **(Dec-2022-NEW)[NLJIET]**	**04**
	TOPIC:3 Super class and subclass, using super keyword, overriding and overloading methods, polymorphism and dynamic binding	
	DESCRIPTIVE QUESTIONS	
1	Write two usage of keyword super. **(Nov-2016-OLD) [NLJIET]** Explain Super keyword with the help of example. **(Dec-2019-OLD)[NLJIET]** Explain super keyword with example. **(Oct-2020-NEW)[[NLJIET]** Write a java program to demonstrate the uses of super keyword in java. **(Dec-2021-OLD)[NLJIET]** What are the uses of 'super' keyword? Write a java program to explain all of them.**(Feb-2021-OLD)[NLJIET]**	**02** **04** **04** **04** **07**
2	Which is the super class of every class in java? List out its important methods. **(Dec-2021-OLD)[NLJIET]**	**03**
3	State whether the following statements are true or false: **(Nov-2011-OLD)[NLJIET]** (i) The elements in an array must be of primitive data types. (ii) When invoking a constructor from a subclass, its super class's no-arg constructor is always invoked.	**03**

	(iii) A protected data or method can be accessed by any class in the same package. (iv) A method can change the length of an array passed as a parameter.	
4	Write a program to demonstrate the multipath inheritance for the classes having relations as shown in figure 1. **(Dec-2010-OLD)(Dec-2014-OLD)[NLJIET]**  Figure 1 Explain single level and multiple inheritances in java. Write a program to demonstrate combination of both types of inheritance as shown in figure 1.i.e.hybrid inheritance **(Dec-2010-OLD) [NLJIET]**  Figure 1	**07** **07**
5	What do you understand by super keyword? Write use of super keyword. **(Jun-2019-OLD)[NLJIET]** Explain the use of final keyword in JAVA. **(Dec-2019-OLD) [NLJIET]** Explain keyword final by giving examples. **(Nov-2016-OLD)[NLJIET]** Explain following keywords 1) Static 2) Super **(Feb-2021-NEW)[NLJIET]** Explain following keywords (1) super (2) this **(Jan-2022-NEW)[NLJIET]** Explain following keywords of java with example.1) super 2) this **(Dec-2018-OLD) [NLJIET]** Explain final and super by giving examples. **(Jun-2011-OLD) [NLJIET]** Explain following with example: 1. Super keyword. 2. Final keyword. **(Jun-2014-OLD)(Nov-2017-OLD)[NLJIET]** Explain use of final, static and super keyword by giving examples. **(May-2016-OLD)[NLJIET]** Explain the words super, static, final and this with the help of example. **(Dec-2013-OLD)[NLJIET]** Explain the words ‘static’ and ‘this’ with the help of example. **(Nov-2017-OLD)[NLJIET]** Explain following Java keywords using appropriate examples: i) static, ii) final, iii) super **(Jul-2022-NEW)[NLJIET]**	**03** **03** **04** **04** **04** **07** **07** **07** **07** **07** **07** **03**
6	What is Final Class? Why they are used? **(Dec-2022-NEW)[NLJIET]** Explain about Final class, Fields, Methods. **(Sept-2021-NEW)[NLJIET]** What are final class, final function and final variable in java? Explain with example. **(May-2015-OLD)[NLJIET]**	**03** **03** **07**
7	Defines types of inheritance. **(Jul-2022-NEW)[NLJIET]** Describe Inheritance and its types with suitable example. **(May-2018-OLD)[NLJIET]** List OOP characteristics and describe inheritance with examples. **(May-2013-OLD)(Dec-2022-NEW)[NLJIET]** Describe Inheritance and its type with suitable example. **(May-2016-OLD)[NLJIET]** Explain inheritance with its types and example. **(May-2015-OLD)(Apr-2017-OLD) [NLJIET]**	**03** **04** **07** **07** **07**

	What is inheritance in java? Explain different types of inheritance with proper example partial code. **(Dec-2022-NEW)[NLJIET]**	**07**
	Explain inheritance with its types and give suitable example. **(Oct-2020-NEW)[NLJIET]**	**07**
	State the design hints for class and inheritance. Also discuss the working and meaning of the "static" modifier with suitable examples. **(Sept-2021-NEW)[NLJIET]**	**07**
8	Write a java program to implement the multiple inheritance concepts for calculating area of circle and square. **(Sept-2021-NEW)[NLJIET]**	**07**
9	Compare method overloading with method overriding. **(Dec-2021-OLD)[NLJIET]**	**03**
	How can we protect sub class to override the method of super class? Explain with example.**(Oct-2020-NEW)[NLJIET]**	**03**
	Explain Method Overloading and Overriding. **(Jan-2022-NEW)[NLJIET]**	**04**
	Distinguish between method overloading and overriding with suitable example. **(Jun-2019-OLD)[NLJIET]**	**04**
	Differentiate between Method overloading and Method overriding. **(May-2016-OLD) (Nov-2017-OLD)[NLJIET]**	**04**
	Differentiate method overloading and method overriding with the help of example. **(Dec-2019-OLD)[NLJIET]**	**04**
	Explain method overriding and method overloading with the help of examples. **(Jun-2011-OLD)[NLJIET]**	**07**
	Differentiate Method Overloading and Method Overriding with example. **(Jun-2012-OLD)[NLJIET]**	**07**
	Differentiate between Method overloading and method overriding with example. **(Dec-2014-OLD)[NLJIET]**	**07**
	Difference between method overloading and method overriding with suitable examples. **[NLJIET]**	**07**
	Explain Overloading and Overriding with example. **(Dec-2013-OLD)[NLJIET]**	**07**
	Explain method overriding with example. **(Dec-2015-OLD)[NLJIET]**	**07**
	Write a program which shows an example of function overriding? **(May-2015-OLD)(May-2018-OLD)[NLJIET]**	**07**
	Explain types of polymorphism? **(Jul-2023-NEW)[NLJIET]**	**04**
10	Explain dynamic method dispatch by giving an example. **(Nov-2016-OLD)[NLJIET]**	**03**
	Describe dynamic method dispatch with example. **(Dec-2019-OLD)[NLJIET]**	**04**
	Explain Dynamic method dispatch with proper example. **(Jun-2014-OLD) (Nov-2017-OLD)[NLJIET]**	**07**
	Explain dynamic method dispatch with example? **(Nov-2016-OLD) (Jun-2019-OLD)[NLJIET]**	**07**
	What is dynamic method dispatch? Explain with suitable example. **(Dec-2018-OLD) [NLJIET]**	**07**
	Explain the followings: **(Nov-2011-OLD)[NLJIET]** (i) Dynamic Method Dispatch with example (ii) this, super, final	**06**
	Explain the followings with example Dynamic Method Dispatch , this, super, final. **(Dec-2014-OLD)[NLJIET]**	**07**
11	Explain Runtime Polymorphism with example. **(Apr-2017-OLD)[NLJIET]**	**07**
	What do you mean by run time polymorphism? Write a program to demonstrate run time polymorphism. **(Oct-2020-NEW)[NLJIET]**	**07**
	Write a java programme to explain Runtime polymorphism using interfaces. **(Apr-2017-OLD)[NLJIET]**	**07**
12	What is Dynamic binding? Show with an example how dynamic binding works. **(Sept-2021-NEW)[NLJIET]**	**03**
	Define polymorphism with its need. Define and explain static and dynamic binding using program. **(Dec-2010-OLD)(Jan-2013-OLD)[NLJIET]**	**07**

	What is polymorphism? Explain dynamic binding with example. **(Jan-2022-NEW)[NLJIET]** Explain in detail how inheritance and polymorphism are supported in java with necessary examples. **(Sept-2021-NEW)[NLJIET]** Define types of polymorphism**(Jul-2022-NEW)[NLJIET]**	**07** **07** **03**
13	Explain this reference, key word static and garbage collection. **(Jun-2011-OLD) [NLJIET]**	**07**
14	What are the uses of 'final' keyword? Write a java program to explain all of them. **(Feb-2021-OLD)[NLJIET]**	**07**
15	Consider class A as the parent of class B. Explain among the following which statement will show the compilation error. i) A a = new A(); ii) A a = new B(); iii) B b = new A(); iv) B b = new B(); **(Jul-2022-NEW)[NLJIET]**	**04**
16	Answer in brief(within two lines): (i) If a method defined in a subclass has the same signature as a method in its superclass with the same return type, is the method overridden or overloaded? (ii) How do you invoke an overridden superclass method from a subclass? (iii) What is the purpose of "this" keyword? (iv) Differentiate between following statements: int a=3; Integer b=new Integer(3); (v) Which java keyword is used to prevent inheritance (prevent class to be extended)? (vi) Can we create reference of interface. If we can create, then what is the use of it? (vii) What is the difference between a String in Java and String in C/C++? **(Jan-2024-NEW)[NLJIET]**	**07**
	TOPIC:4 Casting objects and instance of operator, The ArrayList class and its methods, The protected data and methods	
	DESCRIPTIVE QUESTIONS	
1	Explain ArrayList. **(Nov-2016-OLD)[NLJIET]** Explain ArrayList class. **(Oct-2020-NEW)[NLJIET]** What are the differences between ArrayList and LinkedList? Demonstrates use of ArrayList with example? **(Jul-2023-NEW)[NLJIET]** Differentiate between ArrayList and LinkedList? Which list should you use to insert and delete elements at the beginning of a list? What methods are in LinkedList but not in ArrayList? **(Jan-2024-NEW)[NLJIET]** Explain ArrayList Class with its methods? **(Jan-2024-NEW)[NLJIET]**	**02** **04** **07** **07** **04**
2	Explain instanceof operator.**(Jun-2011-OLD)(Nov-2016-OLD)[NLJIET]** (i) Explain instanceof operator. (ii) There is no destructor in Java. Justify. **(Dec-2015-OLD)[NLJIET]**	**03** **07**
3	Explain super, instanceof and volatile. **(May-2013-OLD)[NLJIET]** Explain following key words: this, super, instance of, static. **(May-2015-OLD) (Apr-2017-OLD)[NLJIET]**	**07** **07**

4	What will be the output of following code snippet?
	(1)
	class evaluate {
	public static void main(String args[])
	{
	int arr[] = new int[] {0 , 1, 2, 3, 4, 5, 6, 7, 8, 9};
	int n = 6;
	n = arr[arr[n] / 2];
	System.out.println(arr[n] / 2);
	}
	}
		04

	(2)
	class equality {
	int x;
	int y;
	boolean isequal()
	{
	return(x == y);
	}
	}
	class Output {
	public static void main(String args[])
	{
	equality obj = new equality();
	obj.x = 5;
	obj.y = 5;
	System.out.println(obj.isequal());
	}
	}**(Dec-2018-OLD)[NLJIET]**	

	PROGRAMS	
1	Declare a class called employee having employee_id and employee_name as members. Extend class employee to have a subclass called salary having designation and monthly_salary as members. Define following: - Required constructors - A method to find and display all details of employees drawing salary more than Rs. 20000/- - Method main for creating an array for storing these details given as command line arguments and showing usage of above methods. **(Jun-2011-OLD)[NLJIET]**	**07**
2	Declare a class called book having author_name as private data member. Extend book class to have two sub classes called book_publication & paper_publication. Each of these classes have private member called title. Write a complete program to show usage of dynamic method dispatch (dynamic polymorphism) to display book or paper publications of given author. Use command line arguments for inputting data. **(May-2013-OLD)(Dec-2015-OLD) [NLJIET]**	**07**
3	Declare a class called Book having book title & author name as members. Create a sub-class of it, called BookDetails having price & current stock of book as members. Create an array for storing details of n books. Define methods to achieve following: - Initialization of members - To query availability of a book by author name / book title - To update stock of a book on purchase and sell Define method main to show usage of above methods. **(Nov-2016-OLD)[NLJIET]**	**07**
4	Write a JAVA program to create a super class called figure that stores the dimensions of a two-dimensional object. It also defines a method called area () that computes the area of an object. The program derives two sub classes from figure. The first is rectangle and the second is Triangle. Each of these subclasses overrides area (), so that it returns the area of a rectangle and a triangle respectively. **(Dec-2019-OLD)[NLJIET]**	**07**
5	Compare String with StringBuffer. Also write a program to count occurrence of character in a string. **[NLJIET]**	**07**
6	Write a program that creates a String and then test whether the String is a palindrome or not, which means that if you reverse the order of the characters in the String, you get the same String back. **(Dec-2021-OLD)[NLJIET]** Write a program to find out whether the given number is palindrome or not? **(Jan-2024-NEW)[NLJIET]**	**07** **03**

7	Write a program to take string input as command line argument. In addition, count occurrence of each character in a given string. **(Oct-2020-NEW)[NLJIET]**	**07**
8	Write a program to find length of a string. **[NLJIET]**	**04**
9	Write a program to reverse a string. **[NLJIET]**	**04**
10	Write a program to add input elements in ArrayList collection class, then sort the inserted elements in descending order and display the sorted output. hint: use Collections.reverseOrder() **(Jul-2022-NEW)[NLJIET]**	**07**
11	Create a class called Employee that includes: I. Three instance variables— id (type String), name (type String) and monthly_salary (double). II. A default constructor that initializes the three instance variables. III. A setter and a getter method for each instance variable (for example for id variable void setId(String id), String getId( )). IV. displayEmployee() method for displaying employee details. Write a driver class named EmployeeTest that demonstrates class Employee's capabilities. Create two Employee objects and display each object's yearly salary. Then give each Employee a 10% raise and display each Employee's yearly salary again. **(Jul-2023-NEW)[NLJIET]**	**07**
	CHAPTER NO – 6 : EXCEPTION HANDLING, I/O, ABSTRACT CLASSES AND INTERFACES	
	TOPIC:1 Exception types, finally clause, rethrowing Exceptions, chained exceptions, defining custom exception classes	
	DESCRIPTIVE QUESTIONS	
1	Discuss exception and error. **(Nov-2017-OLD)[NLJIET]**	**03**
2	What is the importance of exception handling? How is it handled in Java? **(Dec-2022-NEW)(Dec-2021-OLD)[NLJIET]**	**03/04**
	What is Exception? Demonstrate how you can handle different types of exception separately. **(Dec-2018-OLD)(Feb-2021-NEW)[NLJIET]**	**04**
	What is an Exception? List out various built-in exceptions in JAVA and explain any one. Exception class with suitable example. **(Oct-2020-NEW)[NLJIET]**	**07**
	What is an Exception? Explain Exception handling in JAVA. **(Jun-2014-OLD) (Apr-2017-OLD)[NLJIET]**	**07**
	What is exception? List out and explain the keywords used to handle exceptions. **(Feb-2021-OLD)[NLJIET]**	**07**
	What is Exception? Explain various Built-in exceptions in java. Also give difference between throw and throws keywords. **(Dec-2013-OLD)[NLJIET]**	**07**
	Explain use of throw in exception handling with example. **(Dec-2015-OLD)[NLJIET]**	**07**
	Define exception. List java's common exceptions. Write a JAVA program to generate and handle division by zero arithmetic exception. **(Dec-2019-OLD)[NLJIET]**	**07**
	What is an Exception? Explain the exception hierarchy. Explain how to throw, catch and handle Exceptions. **(Sept-2021-NEW)[NLJIET]**	**07**
	Differentiate between checked and unchecked exception? **(Jul-2023-NEW)[NLJIET]**	**03**
	Demonstrate use of try catch block by catching ArithmeticExceptions and InputMismatchExceptions? **(Jul-2023-NEW)[NLJIET]**	**07**
	Distinguish unchecked exception and checked exception? Give example of each type of exception? **(Jan-2024-NEW)[NLJIET]**	**04**
3	Explain the following terms with respect to exception handling. i) throw ii) finally **(Dec-2019-OLD)[NLJIET]**	**03** **07**

	Explain the following terms with respect to exception handling. i) try ii) catch iii) throw iv) finally. **(Dec-2014-OLD)[NLJIET]**	**07**
	What is an Exception? Explain try, catch and finally with example. **(Jan-2022-NEW)[NLJIET]**	**07**
	Demonstrate use of try-catch construct in case of hierarchical Exception Handling. (i.e handling various exception belongs to the exception hierarchy) **(Jul-2022-NEW)[NLJIET]**	**03**
	Explain following Java keywords using appropriate examples: i) throw, ii) throws, iii) finally **(Jul-2022-NEW)[NLJIET]**	**07**
	Explain following keywords with example 1) throw 2) throws **(Dec-2018-OLD)[NLJIET]**	**04**
	Exemplify throw and throws clause of exception handling? **(Jul-2023-NEW)[NLJIET]**	**03**
	Explain the use of finally. Show the type of code usually kept in finally? **(Jan-2024-NEW)[NLJIET]**	
4	When do we use throws keyword? Explain with example.**(Dec-2021-OLD) [NLJIET]**	**03**
	What is the keyword "throw" used for? What is the keyword "throws" used for? **(Jan-2022-NEW)[NLJIET]**	**03**
	(i) Explain keywords - super and throws. **(Dec-2015-OLD)[NLJIET]** (ii) Method main is a public static method. Justify.	**07**
	Outline the use of throw in exception handling with example. **(Jan-2024-NEW)[NLJIET]**	**04**
5	Explain use of finally in exception handling. **(May-2018-OLD)[NLJIET]**	**04**
	With example explain use of finally in exception handling. **(Dec-2015-OLD)[NLJIET]**	**07**
	Explain following keywords of java with example. **(Dec-2018-OLD)[NLJIET]** 1) final 2) finally	**07**
	Explain & illustrate by examples use of final, finally and method finalize. **(May-2013-OLD)[NLJIET]**	**07**
	Explain : (1) Final (2) Finally (3) Finalize **(Nov-2016-OLD) [NLJIET]**	**07**
	Differentiate between final, finally and finalize. What will happen if we make class and method as final? **(Jun-2019-OLD)(Feb-2021-NEW)[NLJIET]**	**07**
	Give Definitions: static, finalize, final **(Jan-2024-NEW)[NLJIET]**	**07**
6	What is the use following java keywords **(Jan-2013-OLD)[NLJIET]** super, transient, finally, final, static, throw, throws	**07**
	Explain following with example: i) Finalize() ii) static iii) super iv) final **(May-2016-OLD)[NLJIET]**	**07**
7	Explain the importance of exception handling in java. Which key words are used to handle exceptions? Write a program to explain the use of these keywords. **(Jan-2013-OLD)(Nov-2017-OLD)[NLJIET]**	**07**
8	(i) Explain final and finally. **(Dec-2015-NEW)[NLJIET]** (ii) Explain array implementation in Java.**(Dec-2015-OLD)[NLJIET]**	**07**
9	(i) Explain keywords this and protected. **(Dec-2015-OLD)[NLJIET]** (ii) Explain keywords abstract and volatile.	**07**
10	Demonstrate the use of ArrayIndexOutOfBound exception and Arithmetic exception. **[NLJIET]**	**07**
11	Explain Arithmetic exception generated by divide by zero. **[NLJIET]**	**04**
12	(i) Demonstrate the use of rethrowing an exception with a program. **[NLJIET]** (ii) Demonstrate the use of chained exceptions with a program.	**07**
	TOPIC:2 File class and its input and output, Reading data from web	
	DESCRIPTIVE QUESTIONS	
1	Explain File constructors, any two methods of class File and method seek. **(Jun-2011-OLD)[NLJIET]**	**07**

2	Demonstrate the use of displaying contents of a web page using a program. **[NLJIET]**	**07**
3	Write a java program to explain the use of File class and its methods. **(Dec-2021-OLD)(Feb-2021-OLD) [NLJIET]** Explain File class with its methods. **(Jan-2022-NEW)[NLJIET]**	**07** **07**
4	Explain file io using byte stream with appropriate example. hint: use FileInputStream, FileOutputStream **(Jul-2022-NEW)[NLJIET]**	**07**
5	Explain file io using character stream with appropriate example. hint: use FileReader, FileWriter **(Jul-2022-NEW)[NLJIET]**	**07**
6	Define Object Serialization? **(Jul-2023-NEW) [NLJIET]**	**03**
	TOPIC:3 Abstract classes, interfaces, Comparable and Cloneable interface.	
	DESCRIPTIVE QUESTIONS	
1	List two characteristics of an abstract class. **(Nov-2016-OLD)[NLJIET]** Explain abstract class with example. **(Feb-2021-NEW)(Jan-2022-NEW)[NLJIET]**	**02** **03**
2	State whether the following statements are true or false: **(Nov-2011-OLD)[NLJIET]** (i) An abstract class contains constructors. (ii) The catch block is the preferred means for releasing resources to prevent resource leaks. (iii) An interface can extend an abstract class.	**03**
3	Explain the following terms: Abstraction, Encapsulation, Polymorphism and Inheritance. **(Feb-2021-OLD)[NLJIET]**	**04**
4	Differentiate abstract class with interface. **(Feb-2021-OLD)[NLJIET]** Differentiate between Interface and abstract class. When Interface is preferred over abstract class.**(Jun-2019-OLD)[NLJIET]** Differentiate between interface and abstract class. **(May-2016-OLD)[NLJIET]** Explain: Abstract Class and Interface with example. Compare Both. **[NLJIET]** Differentiate Abstract class and interface with suitable example. **(Nov-2016-OLD) (Apr-2017-OLD)[NLJIET]** Differentiate between abstract class and interface specifying matrices of differences. Write a program to define abstract class, with two methods addition() and subtraction(). addition() is an abstract method. Implement the abstract method and call that method using a program(s).**(Dec-2010-OLD)[NLJIET]** What do you mean by Interface? Compare interface and abstract class with suitable example. **(Dec-2018-OLD)[NLJIET]** Differentiate between Abstract class and Interfaces **(Jul-2022-NEW)(Dec-2014-OLD) [NLJIET]**	**03** **04** **04** **07** **07** **07** **07** **03**
5	What are interfaces in java? How do they support polymorphism? **(Feb-2021-OLD) [NLJIET]** What are the interfaces? How are they supporting polymorphism? **(Dec-2021-OLD) [NLJIET]** Explain interface in JAVA. How do interfaces support polymorphism? **(May-2018-OLD) (Jun-2012-OLD)[NLJIET]**	**04** **04** **07**
6	Explain interface with help of example(s). **(Nov-2016-OLD)[NLJIET]** What is an interface? Explain with example. **(Jan-2022-NEW)[NLJIET]** Define Interface and explain how it differs from the class. **(Oct-2020-NEW)[NLJIET]** How interface are useful in java? Explain with example. **(May-2015-OLD)[NLJIET]** Explain use of Interface with suitable example. **(May-2016-OLD)[NLJIET]** State four similarities between Interfaces and Classes. **(Jan-2024-NEW)[NLJIET]**	**03** **03** **04** **07** **07** **04**
7	Explain the interface with an example program. **(Sept-2021-NEW)[NLJIET]**	**04**
8	Explain Comparable and Cloneable interface. **(Feb-2021-NEW)[NLJIET]**	**07**
9	Compare List and Set. **(Jan-2022-NEW)[NLJIET]** Explain Set and Map in Java with example. **(Dec-2022-NEW)[NLJIET]**	**03** **07**

	Compare List, Set and Map interfaces. Also compare ArrayList, TreeSet and HashMap classes in java. **(Dec-2013-OLD)[NLJIET]**	**07**
10	(i) Explain with the help of example(s), use of interface. **(Dec-2015-OLD)[NLJIET]** (ii) Explain packages. **(May-2013-OLD)[NLJIET]**	**07**
11	Explain about callback. **(Sept-2021-NEW)[NLJIET]**	**03**
	PROGRAMS	

1	Consider following code fragment:
	try {
	statement1;
	statement2;
	statement3;
	}
	catch (Exception1 ex1) {
	}
	finally {
	statement4;
	}
	statement5;
	1. Which Statements will execute if no exception is occurs.
	2. Which Statements will execute if Exception 1 is occurs at statement 2. **(Jun-2019-OLD)[NLJIET]**
		04

2	Write a program to rise and handle divide by zero exception. **(Feb-2021-NEW)[NLJIET]**	**07**
3	Explain Exception handling in JAVA. Write an application that generates custom exception if any value from its command line arguments is negative. **(Jun-2012-OLD)(Jan-2013-OLD)[NLJIET]**	**07**
4	Explain Exception handling in JAVA. Write an application that generates custom exception if any value entered from command line arguments is greater than 100. **[NLJIET]**	**07**
5	Write a method for computing x^y by doing repetitive multiplication. x and y are of type integer and are to be given as command line arguments. Raise and handle exception(s) for invalid values of x and y. Also define method main. Use finally in above program and explain its usage.**(May-2016-OLD)(May-2018-OLD) (Feb-2021-NEW)[NLJIET]**	**07**
6	Declare a class called Coordinate to have 3 dimensional Cartesian coordinates. **(Dec-2015-OLD)[NLJIET]** Define following methods : - Constructor(s) - add_coordinates to add two Coordinate objects and to produce resultant object. Generate and handle exception if all three coordinates of the resultant Coordinate object are zero. Define method main to show use of above methods.	**07**
7	Write a complete program to accept N integer numbers from the command line. Raise and handle exceptions for following cases : - when a number is –ve - when a number is evenly divisible by 10 - when a number is greater than 1000 and less than 2000 - when a number is greater than 7000 Skip the number if an exception is raised for it, otherwise add it to find total sum. **(Nov-2016-OLD)[NLJIET]**	**07**
8	The abstract Vegetable class has three subclasses named Potato, Brinjal and Tomato. Write an application that demonstrates how to establish this class hierarchy. Declare one instance variable of type String that indicates the color of a vegetable. Create and display instances of these objects. Override the toString() method of Object to return a string with the name of the vegetable and its color. **(Nov-2011-OLD)(May-2016-OLD)[NLJIET]**	**07**

9	Describe abstract class called Shape, which has three subclasses say Triangle, Rectangle, and Circle. Define one method area() in the abstract class and override this area() in these three subclasses to calculate for specific object i.e. area() of Triangle subclass should calculate area of triangle etc. Same for Rectangle and Circle. **(Jun-2012-OLD) (Oct-2020-NEW)[NLJIET]**	**07**
10	Write an abstract class named Person and its two subclasses named Student and Employee. A person has a name, address, phone number, and email address. A student has enrollment, course. An employee has an office, salary, and designation. Define constructors and methods for input and display for both classes. Write a main program to give demonstration of all. **(Jun-2019-OLD)[NLJIET]**	**07**
11	Write a JAVA program to read student.txt file and display the content. **(Oct-2020-NEW)[NLJIET]**	**04**
12	Write a program to check whether the name given from the command line is file or not? If it is a file then print the size of file and if it is directory then it should display the name of all files in it. **[NLJIET]**	**07**
13	Write a program that illustrates interface inheritance. Interface P is extended by P1 and P2. Interface P12 inherits from both P1 and P2.Each interface declares one constant and one method. class Q implements P12.Instantiate Q and invoke each of its Methods. Each method displays one of the constants **(Jun-2012-OLD)(Jan-2022-NEW)[NLJIET]** Write a program that illustrates interface inheritance. Interface A is extended by A1 and A2. Interface A12 inherits from both P1 and P2.Each interface declares one constant and one method. Class B implements A12.Instantiate B and invoke each of its methods. Each method displays one of the constants. **(Dec-2014-OLD)[NLJIET]**	**07** **07**
14	The Transport interface declares a deliver () method. The abstract class Animal is the superclass of the Tiger, Camel, Deer and Donkey classes. The Transport interface is implemented by the Camel and Donkey classes. Write a test program that initialize an array of four Animal objects. If the object implements the Transport interface, the deliver () method is invoked. **(Nov-2011-OLD)(Jan-2013-OLD)[NLJIET]**	**07**
15	Write a program to make calculator that accepts input from commandline? Use java's exception handling mechanism to handle abnormal situation? **(Jul-2023-NEW)[NLJIET]**	**07**
	CHAPTER NO – 7 : JAVAFX BASICS AND EVENT-DRIVEN PROGRAMMING AND ANIMATIONS	
	TOPIC:1 Basic structure of JAVAFX program, Panes, UI control and shapes, Property binding, the Color and the Font class, the Image and Image-View class, layout panes and shapes	
	DESCRIPTIVE QUESTIONS	
1	Explain in brief: Color class and its methods. **(Oct-2020-NEW)[NLJIET]** List out JavaFX UI controls and explain any one in detail **(Dec-2022-NEW)[NLJIET]**	**03** **03**
2	Explain following classes in JavaFX. **(Feb-2021-NEW)[NLJIET]** 1) Color class 2) font class 3) Image and image view class.	**03**
3	Write importance of JAVAFX compare to AWT and Swing. **(Oct-2020-NEW)[NLJIET]** Explain the architecture of JavaFX. **(Dec-2022-NEW)[NLJIET]** Discuss JavaFX benefits? **(Jul-2023-NEW) [NLJIET]**	**04** **04** **04**
4	Enlist various layout panes and explain any two in detail. **(Oct-2020-NEW) (Dec-2022-NEW)[NLJIET]** Explain different layout panes used in JavaFX. **(Jan-2022-NEW)[NLJIET]** Enlist various Layout panes available in JavaFX? **(Jul-2023-NEW) [NLJIET]**	**07** **07** **03**
5	With a neat diagram explain the Model view controller design pattern and list out the advantages and disadvantages of using it in designing an application.	**07**

	(Sept-2021-NEWY)[NLJIET]	
6	Explain line, rectangle, circle and ellipse shapes with the help of a program. **[NLJIET]**	**07**
7	Illustrate basic structure of JavaFX program? **(Jul-2023-NEW) [NLJIET]**	**07**
8	What do you understand by JavaFX? How it is different from AWT? **(Jan-2024-NEW) [NLJIET]**	**03**
	TOPIC:2 Events and Events sources, Registering Handlers and Handling Events, Inner classes, anonymous inner class handlers, mouse and key events, listeners for observable objects, animation	
	DESCRIPTIVE QUESTIONS	
1	What do you understand by inner class? **(Jun-2019-OLD)[NLJIET]** Explain inner class with example. **(Dec-2018-OLD)(Jan-2022-NEW)[NLJIET]** Explain the concept of inner classes and explain the types of inner classes with an example program. **(Sept-2021-NEW)[NLJIET]** How the concept of inner classes is used for event handling? **(Jan-2013-OLD)**	**03** **04** **07** **03**
2	What is reflection and how does it help to manipulate java code. **(Sept-2021-NEW)[NLJIET]** Demonstrate animation effect in JavaFX. **(Dec-2022-NEW)[NLJIET]**	**04** **04**
3	Explain inner class and working of concatenation operator + by giving examples. **(Jun-2011-OLD)[NLJIET]**	**07**
4	Explain mouse and key event handler in JavaFX. **(Feb-2021-NEW)[NLJIET]** Explain Event handling in Java **(Dec-2015-OLD) [NLIET]** Explain event handling and different event types of Java. **(Jun-2011-OLD)[NLJIET]** Explain Event Handling in java and describe methods of mouse event and key event. **(Jun-2012-OLD)[NLJIET]** Explain about adapter classes and mouse events with an example. **(Sept-2021-NEW)[NLJIET]** What do you understand by event source and event object? Explain how to register an event handler object and how to implement a handler interface? **(Jul-2023-NEW)[NLJIET]**	**03** **07** **07** **04** **07**
5	Answer the following questions: **(Nov-2011-OLD)[NLJIET]** (i) What is an inner class? (ii) Explain Cosmic superclass and its methods. (iii) Ragged Array	**07**
6	Explain following terms with example: (A) Nested Class (B) Anonymous Inner Class **(May-2018-OLD)[NLJIET]**	**07**
7	How do you create a Scene object? How do you set a scene in a stage? Is it possible to create multiple scenes? Write a program to place a circle in the scene and fill circle with red color. **(Oct-2020-NEW)[NLJIET]**	**07**
	CHAPTER NO – 8 : JAVAFX UI CONTROLS AND MULTIMEDIA	
	TOPIC:1 Labeled and Label, button, Checkbox, RadioButton, Textfield, TextArea, Combo Box, ListView, Scrollbar, Slider	
	DESCRIPTIVE QUESTIONS	
1	Explain following controls 1) text-Area 2) scrollbar 3) checkbox 4) combo-box. **(Feb-2021-NEW)[NLJIET]** List JavaFX UI controls? **(Jul-2023-NEW) [NLJIET]**	**04** **04**
2	Explain following controls (1) Checkbox (2) Radio Button (3) Textfield (4) Label **(Jan-2022-NEW)[NLJIET]**	**04**
3	Explain ListView, Scrollbar and Slider controls. **[NLJIET]**	**07**
	TOPIC:2 Video and Audio	

	DESCRIPTIVE QUESTIONS	
1	Explain with example, how to add audio in javaFX application. **[NLJIET]**	**05**
2	Explain with example, how to add video in javaFX application. **[NLJIET]**	**07**
3	Write a short note on JAVAFX controls. **(Jul-2022-NEW)[NLJIET]**	**07**
	PROGRAMS	
1	Write a javafx application that has three Buttons labeled Red, Green, Blue & on clicking the background color should change accordingly & have a label displaying the color selected. **[NLJIET]**	**07**
2	Write a program to create a login form using labels, text box, radio button, drop down and button. **[NLJIET]**	**07**
3	Develop a GUI based application using JAVAFX controls. **(Jul-2022-NEW)[NLJIET]**	**07**
4	Design and develop EMI Calculator using JavaFX? The user will enter a loan amount, annual interest rate, and number of years and click the Calculate button to get EMI and total payment ? formula is EMI= $P*r*(1+r)^n /((1+r)^n -1)$ P is Principal Loan Amount r is rate of interest calculated on monthly basis. (i.e., r = Rate of Annual interest/12/100. If rate of interest is 10.5% per annum, then r =10.5/12/100=0.00875) n is loan term / tenure / duration in number of months?  **(Jan-2024-NEW)[NLJIET]**	**07**
	CHAPTER NO – 9 : BINARY I/O ,RECURSION AND GENERICS	
	TOPIC:1 Text I/O, binary I/O, Binary I/O classes, Object I/o, Random Access files	
	DESCRIPTIVE QUESTIONS	
1	Write short notes about I/O stream classes. **(Sept-2021-NEW)[NLJIET]** List various classes for Binary Input Output? **(Jan-2024-NEW)[NLJIET]**	**04** **03**
2	Explain usage of class FileInputStream and FileOutputStream by giving an example. **(Nov-2017-OLD)[NLJIET]** Explain usage of class FileInputStream and FileOutputStream by giving an example. **(Feb-2021-NEW)[NLJIET]**	**03** **04**
3	How can we open and read a text file in java? Explain your answer with example. **(May-2015-OLD)[NLJIET]**	**07**
4	Compare byte streams and character streams. **(May-2013-OLD)[NLJIET]**	**07**
5	Differentiate the following: **(Jun-2014-OLD)[NLJIET]** 1. Text I/O v/s Binary I/O. 2. String class v/s StringBuffer class. What are the differences between text I/O and binary I/O? **(Jul-2023-NEW)[NLJIET]**	**07** **04**
6	Differentiate checked exceptions with unchecked exceptions. **(Feb-2021-OLD)[NLJIET]** Differentiate between Text I/O and Binary I/O. **(Oct-2020-NEW)[NLJIET]** Differentiate Text I/O and Binary I/O. **(Feb-2021-NEW)(Jan-2022-NEW)[NLJIET]**	**03** **03** **03**

	Differentiate the following: **(May-2018-OLD)[NLJIET]** A. Text I/O and Binary I/O B. Checked and Unchecked exceptions Differentiate the followings: **(Nov-2011-OLD)[NLJIET]** (i) Checked and Unchecked Exceptions (ii) Constructor and method (iii) Text I/O and Binary I/O Differentiate the followings: **(Jun-2019-OLD)[NLJIET]** 1. Checked and Unchecked Exceptions 2. Socket and ServerSocket 3. Text I/O and Binary I/O 4. String and StringBuffer	**04** **06** **07**
7	Describe and demonstrate Binary I/O classes of java? **(Jul-2023-NEW)[NLJIET]**	**07**
8	Explain DataInputStream and DataOutputStream Classes? Implement a java program to demonstrate any one of them? **(Jan-2024-NEW) [NLJIET]**	**07**
	TOPIC:2 Problem solving using Recursion, Recursive Helper methods, Tail Recursion	
	DESCRIPTIVE QUESTIONS	
1	What is recursive helper method? Explain the properties of recursive method. **[NLJIET]**	**04**
2	What is tail recursion? Give an example. **[NLJIET]**	**05**
3	Differentiate between iteration and recursion. **[NLJIET]**	**04**
	TOPIC:3 Defining Generic classes and interfaces, Generic methods, Raw types and backward compatibility, wildcard Generic types, Erasure and Restrictions on Generics	
	DESCRIPTIVE QUESTIONS	
1	What are the benefits of using generic types? **(Nov-2011-OLD)(Dec-2014-OLD) [NLJIET]**	**03**
2	Answer in one line: (i) Write the name of package in which all collection classes and interface are grouped. (ii) Write the name of collection interface or abstract class which store and process object in a first-in, first-out fashion. (iv) Write the name of method that checks whether the collection contains the specified element. **(Jul-2023-NEW)[NLJIET]**	**03**
3	Explain interface and its usage. **(May-2013-OLD)(Nov-2017-OLD)[NLJIET]** Explain about Proxy class, Interface and Methods. **(Sept-2021-NEW)[NLJIET]** Explain package and interface by giving examples.**(Jun-2011-OLD)[NLJIET]** Explain package and interface with Example. **(Jun-2014-OLD)[NLJIET]** Explain interface and its usage. **[NLJIET]**	**03** **03** **07** **07** **07**
4	How do you declare a generic type in a class? Explain. **(Oct-2020-NEW)[NLJIET]** Explain Generics in java with demo program. **(Jun-2012-OLD)[NLJIET]** Illustrate by example – generic programming. **(May-2013-OLD)[NLJIET]** What is Generic programming and why is it needed? Explain with example. List the limitations and restrictions of generic programming. **(Sept-2021-NEW)[NLJIET]**	**03** **07** **07** **07**
5	Define generics in java. Write a program to demonstrate generic interface and generic method.**(Dec-2010-OLD) [NLJIET]** Define generics in java. Write a program to demonstrate generic class and generic constructor. **(Dec-2010-OLD) [NLJIET]**	**07** **07**
6	i) What are generics and how are they used? **(Jan-2013-OLD)[NLJIET]** ii) Differentiate between Enumeration and Iterator.	**07**
7	Explain raw types and backward compatibility with example. **[NLJIET]**	**07**

8	Write a short note on unbounded, upper bound and lower bound wildcards. **[NLJIET]**	**07**
9	Differentiate (i) Enumeration and Iterator. (ii) Vector and Array **(Nov-2016-OLD) [NLJIET]**	**07**
	PROGRAMS	
1	Write a program using BufferedInputStream, FileInputStream, BufferedOutputStream, FileOutputStream to copy Content of one file File1.txt into another file File2.txt. **(Jun-2012-OLD)(May-2018-OLD)[NLJIET]** Write a Java program to copy content of file1.txt to file2.txt using Java file handling. **[NLJIET]** Discuss BufferedInputStream and BufferedOutputStream classes with an example. **(Dec-2022-NEW) [NLJIET]**	**07** **07** **07**
2	Write a java program which read numbers from number.txt file and store even number to even.txt and odd number into odd.txt file. **(Apr-2017-OLD)[NLJIET]**	**07**
3	Write a program to display the bytes of a file in reverse sequence. Provide the name of the file as a command line argument. (Use RandomAccessFile) **(Jun-2012-OLD)[NLJIET]**	**07**
4	Read employee salary and calculate the income tax based on 10% of income and store it in tax.txt file for five different employees. **(Apr-2017-OLD)[NLJIET]**	**07**
5	Write an application that reads a file and counts the number of occurrences of digit 5. Supply the file name as a command-line argument. **(Dec-2015-OLD)[NLJIET]**	**07**
6	Write a program that takes input for filename and search word from command line arguments and checks whether that file exists or not. If exists, the program will display those lines from a file that contains given search word. **(Nov-2011-OLD)[NLJIET]**	**07**
7	Write a program that counts the no. of words in a text file. The file name is passed as a command line argument. The program should check whether the file exists or not. The words in the file are separated by white space characters. **(Nov-2011-OLD)(Jan-2013-OLD)[NLJIET]** Write a program that counts the number of words in a text file. The file name is passed as a command line argument. The words in the file are separated by white space characters. **(Jan-2022-NEW)[NLJIET]** Write a program that counts number of characters, words, and lines in a text file. **(Jun-2019-OLD) [NLJIET]**	**07** **07** **07**
8	Write a program to count the total no. of chars, words, lines, alphabets, digits, white spaces in a given file. **(Dec-2013-OLD)[NLJIET]**	**07**
9	Write a program that counts number of characters, words, and lines in a file. Use exceptions to check whether the file that is read exists or not. **(Dec-2014-OLD)[NLJIET]**	**07**
10	Write a program to replace all “word1” by “word2” from a file1, and output is written to file2 file and display the no. of replacement. **(Dec-2010-OLD)(Dec-2014-OLD) [NLJIET]**	**07**
11	Write a java program which read source file and destination file name and copy the content of source file to destination file. **[NLJIET]**	**07**
12	Create a class called Student. Write a student manager program to manipulate the student information from files by using the BufferedReader and BufferedWriter. **(Nov-2017-OLD)(Dec-2022-NEW)[NLJIET]**	**07**
13	Write a program that reads file name from user, through command line argument and displays/reads content of the text file on console. **(Dec-2018-OLD) [NLJIET]**	**03**
14	Write a program to read the content of a file into a character array and write it into another file. Get names of the files from command line. **(Feb-2021-OLD)[NLJIET]**	**07**
15	Write a java program to search the file named the word entered as a filename from command line; if it exists in the system then program should print the content of a file on console. **(Dec-2021-OLD)[NLJIET]**	**07**

16	Define a recursive method for computing x raised to power y by doing repetitive multiplication where x and y are positive integer numbers. Define main to use above method. **(Nov-2016-OLD)[NLJIET]**	**04**
	CHAPTER NO – 10 : LIST, STACKS, QUEUES AND PRIORITY QUEUES	
	TOPIC:1 Collection, Iterators, Lists, The Comparator interface, static methods for list and collections, Vector and Stack classes, Queues and priority Queues	
	DESCRIPTIVE QUESTIONS	
1	What is java collection framework? What are the benefits of the java collection framework?**(Dec-2018-OLD)[NLJIET]** List out methods of Iterator and explain it **(Dec-2022-NEW)[NLJIET]**	**03** **04**
2	Describe the Java Collections Framework. List the interfaces, abstract classes and concrete classes of collection hierarchy. **(Nov-2011-OLD)[NLJIET]** What is Vector class? **(Dec-2022-NEW)[NLJIET]**	**03** **03**
3	What is Collection? Explain list, stack, queue classes. **(Feb-2021-NEW)[NLJIET]**	**03**
4	What do you understand by Collection framework in java? List methods available in iterator interface. **(Jun-2019-OLD)[NLJIET]** What is Collection in Java? Explain the use of Iterator. **(Feb-2021-OLD)[NLJIET]** What is Java Collection? **(Dec-2022-NEW)[NLJIET]** Write a short note on Java Collections **(Jul-2022-NEW)[NLJIET]** What method do you use to obtain an element in the collection from an iterator? Explain with example. **(Oct-2020-NEW)[NLJIET]**	**03** **03** **03** **07** **04**
5	Write a note on 'Collection in JAVA'. Also discuss List and Enumeration Interface. **(Nov-2017-OLD)[NLJIET]** What is Collection in java? List out various methods of List and Enumeration interfaces. **(Dec-2021-OLD)[NLJIET]**	**03** **04**
6	Answer following: **(Jan-2013-OLD)(Jun-2014-OLD)[NLJIET]** 1. Collection in JAVA. 2. Features of Map Interface.	**07**
7	What is collection in Java? Differentiate between Vector and ArrayList. **(Jan-2013-OLD) (Dec-2014-OLD)(May-2016-OLD)(Apr-2017-OLD)[NLJIET]**	**07**
8	Explain use of Linked List collection class with example. **(Dec-2015-OLD) (May-2018-OLD)[NLJIET]**	**07**
9	Write a java program to take infix expressions and convert it into prefix expressions. **(Jul-2022-NEW)[NLJIET]**	**07**
10	Define Queue interface of java collection classes? **(Jul-2023-NEW)[NLJIET]** Characterize the role of Iterator interface? **(Jan-2024-NEW) [NLJIET]**	**03** **03**
	CHAPTER NO – 11 : SETS AND MAPS	
	TOPIC:1 Comparing the performance of Sets and Lists, singleton and unmodifiable collections and Maps.	
	DESCRIPTIVE QUESTIONS	
1	Compare Set and List interfaces. **(Oct-2020-NEW)[NLJIET]**	**03**
2	What is map interface? Explain its types with suitable example. **[NLJIET]**	**04**
3	What is the difference between HashTable and HashMap. **[NLJIET]**	**05**
4	What is singleton and unmodifiable collection? Explain it in detail. **[NLJIET]**	**04**

	PROGRAMS	
1	Write a complete program to implement a singly linked list with nodes storing integer information using suitable utility class. **[NLJIET]**	**07**
2	Write a java program to illustrate performance of set and list. **[NLJIET]**	**07**
	CHAPTER NO – 12 : CONCURRENCY	
	TOPIC:1 Thread states and life cycle, Creating and Executing threads with the Executor Framework, Thread synchronization	
	DESCRIPTIVE QUESTIONS	
1	Explain: wait, sleep and synchronize. **(Jun-2011-OLD) [NLJIET]** Explain wait, notify, synchronized and native methods. **(May-2013-OLD)[NLJIET]** Explain wait, notify, notifyall, synchronized methods in thread. **(May-2016-OLD) [NLJIET]**	**07** **07** **07**
2	Explain garbage collection and finalization. **(Dec-2019-OLD)[NLJIET]** Explain the concept of finalization. **(Sept-2021-NEW)[NLJIET]** What is garbage collection? What is the roll of finalize () in it? **(Dec-2021-OLD) (Feb-2021-OLD) [NLJIET]** Answer the following questions: **(Nov-2011-OLD)[NLJIET]** (i) Explain the life cycle of a thread. (ii) Explain Java garbage collection mechanism. Explain Java garbage collection mechanism **(Dec-2022-NEW)[NLJIET]** Elaborate the role of java garbage collector. **(Jan-2024-NEW)[NLJIET]**	**03** **03** **04** **07** **04** **03**
3	What do you understand by thread? Describe the complete life cycle of thread. **(Jun-2019-OLD) [NLJIET]** What is a thread? Describe the complete life cycle of thread. **(Dec-2014-OLD) (Dec-2019-OLD)[NLJIET]** Draw and Explain Thread Life Cycle. **(Nov-2017-OLD)[NLJIET]** Describe with diagram the life cycle of Thread. **(Dec-2022-NEW)[NLJIET]** Explain Thread Life Cycle in detail. Write a code to create Thread in JAVA. **(Jun-2012-OLD)[NLJIET]** What is Thread? Draw and explain life cycle of thread. **(May-2015-OLD) (Apr-2017-OLD)[NLJIET]** Draw and explain life cycle of Thread. Also list and explain various methods of thread. **(Dec-2013-OLD)[NLJIET]** What is a thread? Describe the complete life cycle of thread with example. **[NLJIET]** Explain Thread life cycle and describe creation of thread with suitable example. **(May-2016-OLD)[NLJIET]** What do you understand by thread? Describe the complete life cycle of thread. **(Feb-2021-NEW)[NLJIET]** What is thread? Describe the complete life cycle of thread. **(Jan-2022-NEW)[NLJIET]** Explain thread life cycle **(Jul-2022-NEW)[NLJIET]** Describe thread life cycle with block diagram? **(Jul-2023-NEW)[NLJIET]**	**04** **04** **04** **04** **07** **07** **07** **07** **07** **03** **07** **03** **03**
4	Explain Life cycle of Thread. Describe wait(), notify() and notifyall(). **(Nov-2016-OLD) [NLJIET]**	**07**
5	Why synchronization is required in multithreaded programming and how can we implement it in program? **(Jun-2012-OLD)[NLJIET]** List and Explain Methods for Inter-thread communication (cooperation). **(Nov-2017-OLD)[NLJIET]** What is thread synchronization? Write a program to demonstrate the use of 'synchronized' keyword. **(Dec-2021-OLD)[NLJIET]**	**07** **03** **07**

	Discuss the role of thread synchronization in inter-thread communication? Explain with example.**(Dec-2019-OLD)[NLJIET]** Why synchronization is required in multithreaded programming. Write a program that uses thread synchronization to guarantee data integrity in a multithreaded application. **(Jan-2013-OLD)[NLJIET]**	**07** **07**
6	Explain thread Synchronization with join() and isAlive() methods. **(Jun-2014-OLD) [NLJIET]** Explain use of following methods with suitable example isAlive(), join(), setPriority().**(Dec-2018-OLD)[NLJIET]** Explain Thread Synchronization with example. **(Jan-2022-NEW)[NLJIET]** Explain the thread state, thread properties and thread synchronization. **(Sept-2021-NEW)[NLJIET]** Explain synchronization in Thread with suitable example. **(Dec-2022-NEW) [NLJIET]**	**07** **07** **07** **07** **07**
7	(i) Compare methods wait and sleep.**(Dec-2015-OLD) [NLJIET]** (ii) Explain Runnable and notifyAll.	**07**
8	(i) Explain method join with the help of an example. **(Dec-2015-OLD)[NLJIET]** (ii) Explain two usage of keyword synchronized.	**07**
9	What is multithreading? What are the ways in which you can create a thread? Explain with Example. **(Dec-2018-OLD)[NLJIET]** What is Multithreading? Explain Life Cycle of Thread with example. **(Jun-2014-OLD) [NLJIET]** Explain multi threading in java using example. **(Dec-2015-OLD)[NLJIET]** Differentiate multithreading and multiprocessing.**(Dec-2019-OLD)[NLJIET]** Explain multithreading using Thread class **(Jul-2022-NEW)[NLJIET]** Explain multithreading using Runnable interface **(Jul-2022-NEW)[NLJIET]** In multi-threads using the Runnable interface, explain with an example how a start() method calls the run() method of a class implementing a runnable interface.**(Jul-2022-NEW)[NLJIET]**	**07** **07** **07** **03** **04** **04** **04**
10	What is runnable interface? How can you use this interface in creating thread? **(Feb-2021-OLD)[NLJIET]** Differentiate between Thread class and Runnable interface for implementing Threads? **(Jul-2023-NEW)[NLJIET]** Characterize the two ways of implementing thread in Java? Illustrate each method by example? **(Jan-2024-NEW) [NLJIET]**	**04** **04** **07**
11	What are the advantages of multithreading? Write a java program using 'Runnable' interface to demonstrate multithreading. **(Dec-2021-OLD) [NLJIET]** Discuss benefits of multithreading? **(Jan-2024-NEW) [NLJIET]**	**07** **03**
	PROGRAMS	
1	Write a program to create two thread one display alphabet from a to z and other will display numbers from 1 to 100. **(Jun-2019-OLD)[NLJIET]**	**04**
2	Explain Thread life cycle in detail. Write a program to create a child thread to print integer numbers 1 to 10. **(Oct-2020-NEW)[NLJIET]**	**07**
3	Write a program to create two threads, one thread will print odd numbers and second thread will print even numbers between 1 to 100 numbers. **(May-2016-OLD)[NLJIET]** Write a program to create two threads, one thread will print odd numbers and second thread will print even numbers between 1 to 20 numbers. **(Dec-2014-OLD)[NLJIET]**	**07** **07**
4	Write a program to create two threads, one thread will check whether given number is prime or not and second thread will print prime numbers between 0 to 100. **(May-2018-OLD)[NLJIET]**	**07**

5	Write an application that read limit from user and executes two threads. One thread displays total of first n even numbers & another thread displays total of first n odd numbers. Create the threads by implementing the Runnable interface. **(Apr-2017-OLD)[NLJIET]**	**07**
6	Write an application that executes two threads. One thread displays "Welcome" every 1000 milliseconds & another thread displays "Good Bye" every 5000 milliseconds. Create the threads by implementing the Runnable interface. **(Nov-2016-OLD)[NLJIET]**	**07**
7	What is multithreading? Why it is required? Write a program that creates three threads. Make sure that the main thread executes last. **(Jan-2013-OLD)[NLJIET]**	**07**
8	Write an application that creates and starts three threads. Each thread is instantiated from the same class. It executes a loop with 10 iterations. Each iteration displays string "HELLO", sleeps for 300 milliseconds. The application waits for all the threads to complete & displays the message "Good Bye..." **(Dec-2013-OLD)[NLJIET]**	**07**
9	Write an application that executes two threads. One thread displays "Good Morning" every 1000 milliseconds & another thread displays "Good Afternoon" every 3000 milliseconds. Create the threads by implementing the Runnable interface. **(Dec-2013-OLD)[NLJIET]**	**07**
10	Write a multithreaded program to print all odd positive numbers in ascending order up to n, where n is a positive integer number given as a command line argument. Instantiate requited number of threads, where each thread except the last, examines next 50 numbers and the last thread examines remaining numbers up to n. **(Dec-2015-OLD) [NLJIET]**	**07**
11	Write a complete multi-threaded program to meet following requirements: - Read matrix [A] m x n - Create m number of threads - Each thread computes summation of elements of one row, i.e. i th row of the matrix is processed by i th thread. Where 0 <= i < m. - Print the results. **(Jun-2011-OLD)[NLJIET]**	**07**
12	In multi-threading using Thread class, explain with an example how a start() method call invokes the run method of the class extending Thread class. **(Jul-2022-NEW)[NLJIET]**	**04**