JAVA PROGRAMMING

Subject Code:(CS621OE)

Regulations : R16 JNTUH

Class:III Year B.Tech ECE II Semester

Department of Electronics and communication Engineering

BHARAT INSTITUTE OF ENGINEERING AND TECHNOLOGY

Ibrahimpatnam -501 510, Hyderabad

JAVA PROGRAMMING (CS621OE)
COURSE PLANNER

Course Overview:

This course teaches the fundamental ideas behind the object-oriented approach to programming; through the widely-used Java programming language. Concentrating on aspects of Java that best demonstrate object-oriented principles and good practice, you'll gain a solid basis for further study of the Java language, and of object-oriented software development. You'll be confident to write any complex application easily.

Prerequisites:

Concepts of computer programming (like programming in C --Files concepts). The course introduced under the subject 'C Programming' or 'Computer Programming' or 'Computer Programming and Data Structures' of B.Tech 1st Year is sufficient to cope up this subject.

Course Objectives:

At the end of the course, the students will be able to:

- Understand object oriented programming concepts- and apply them in problem solving.
- Understand the basics of java Console and GUI based programming.
- Describe the basics of inheritance for reusing the program.
- Demonstrate how the multi tasking is performed by using threads.
- Enumerate the types of exception handling.
- Describe the byte streams and character streams for file management

Course Outcomes:

S. No.	**Course Outcomes (CO)**	**nowledge Level (Blooms Level)**
After completing this course the student must demonstrate the knowledge and ability to:		
CO1	*Understand* the concept of OOP as well as the purpose and usage principles of inheritance, polymorphism, encapsulation and method overloading	Application (Level 2)
CO2	*Identify* classes, abstract classes, objects, members of a class and the Relationships among them needed for a specific problem.	Remember(Level 1)
CO3	*Create* Java application programs using sound OOP practices (e.g., interfaces and APIs) and proper program structuring (e.g., by using access control identifies, automatic documentation through comments, error exception handling multithreaded applications with Synchronization).	Create (Level 6)
CO4	*Develop* programs using the Java Collection API as well as the Java standard class library.	Create (Level 6)
CO5	*Develop* the skills to apply java programming in problem solving and design GUI based applications.	Create (Level 6)

How Program Outcomes are assessed:

Program Outcomes (PO)	**Level**	**Proficiency**

			assessed by
PO1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	3	Assignments, Tutorials, Mock Tests
PO2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	2	Assignments, Tutorials
PO3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	3	Assignments, Tutorials, Mock Tests
PO4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	3	Assignments, Tutorials, Mock Tests
PO5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.	3	Assignments, Tutorials, Mock Tests
PO6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.	-	-
PO7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	-	-
PO8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.	-	-
PO9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	-	-
PO10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	-	-
PO11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	-	-
PO12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	-	-

How Program Specific Outcomes are Assessed:

Program Specific Outcomes (PSO)		Level	Proficiency assessed by
PSO1	**Software Development and Research Ability:** Ability to understand the structure and development methodologies of software systems. Possess professional skills and knowledge of software design process. Familiarity and practical competence with a broad range of programming language and open source platforms. Use knowledge in various domains to identify research gaps and hence to provide solution to new ideas and innovations.	3	Assignments, Tutorials, Mock Tests

PSO2	**Foundation of mathematical concepts:** Ability to apply the acquired knowledge of basic skills, principles of computing, mathematical foundations, algorithmic principles, modeling and design of computer- based systems in solving real world engineering Problems.	2	Assignments, Tutorials
PSO3	**Successful Career:** Ability to update knowledge continuously in the tools like Rational Rose, MATLAB, Argo UML, R Language and technologies like Storage, Computing, Communication to meet the industry requirements in creating innovative career paths for immediate employment and for higher studies.	3	Assignments, Tutorials, Mock Tests

1: Slight (Low)	**2: Moderate (Medium)**	**3: Substantial (High)**	**- : None**

Course Content:

UNIT-IOOP concepts: Data abstraction , encapsulation , inheritance, benefits of inheritance , polymorphism, classes and objects , procedural and Object oriented programming paradigms
Java Programming-History of Java, comments, datatypes, variables, constants, , scope and life time of variables,operators,operator hierarchy, expressions, type conversion and casting, enumerated types,control flow block scope, conditional statements, loops break and continue statements.simple java program ,arrays,console input and output, formatting output, constructors, methods, parameter passing, static fields and methods, access control, this keyword, overloading methods and constructors recursion,garbage collection,building strings, exploring string class
UNIT-II Inheritance –Definition ,hierarchies, super and subclasses , Member access rules, super keyword,preventing inheritance : final classes and methods , the Object class and its methods. Polymorphism- Dynamic binding, method overriding, abstract classes and methods . Interfaces : Interfaces VS Abstrct classes,defining an interface , implementing interfaces, accessing implementations through interface references, extending interface.
Inner classes: Uses of inner classes, local inner classes, anonymous inner classes, static inner classes, examples.Packages: Definition, Creating and Accessing a package, understanding CLASSPATH, importing packages.
UNIT-III Exception handling – Dealing with errors, benefits of exception handling, the classification of exceptions- exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, rethrowing exceptions, exception specification,built in exceptions, creating own exception sub classes
Multi-Threading:- Differences between multiple processes and multiple threads, thread states, creating threads, interrupting threads, thread priorities, synchronizing threads, inter thread communication, producer consumer pattern.
UNIT-IV Collection Frame work in java: Introduction to java Collections, overview of java collection frame work, Generics, commonly used collection classes- ArrayList, Vector, Hash table, Stack, Enumeration, Iterator,String tokenizer, Random, Scanner, Calendar and Properties
Files: streams – byte streams, character streams, text input/ Output binary input/ output Random access file operations, file management using file class.
Connecting to Database-JDBC type 1 to 4 drivers , connecting to a data base , querying a data base and processing the results, updating data with JDBC.
UNIT –V GUI Programming with java-The AWT class hierarchy, Inroduction to Swing, Swing VS AWT, Hierarchy for Swing components, containers-JFrame, JApplet,JDialog,JPannel, Overview of some swing components-Jbutton, Jlabel,JTextfield,JTextarea, simple Swing Applications, LayoutManagement- Layout Manager types- border , grid and flow
Event handling: Events, event sources , event classes, event Listeners, Relationship between event sources and Listeners Delegation event model, Examples: handling a button click, handling mouse

events, Adapter classes. Applets – Inheritance hierarchy for applets, differences between applets and applications ,life cycle of an applet, passing parameters , applet security issues.

TEXT BOOK:

1. Java Fundamentals – A comprehensive Introduction, Herbert Schildt and Dale Skrien, TMH.

REFERENCE BOOKS:

1. Java for Programmers, P.J.Deitel and H.M.Deitel, Pearson education (OR) Java: How to Program P.J.Deitel and H.M.Deitel, PHI.
2. Object Oriented Programming through Java, P.Radha Krishna, Universities Press.
3. Thinking in Java, Bruce Eckel, Pearson Education
4. Programming in Java, S.Malhotra and S.Choudhary, Oxford Univ. Press.

NPTEL Web Course:

https://nptel.ac.in/courses/106106147/3
https://nptel.ac.in/courses/106106147/2
https://nptel.ac.in/courses/106106147/5

NPTEL Video Course:

https://www.youtube.com/watch?v=50qVLKubX2w
https://www.youtube.com/watch?v=zTpqC_Ivkck

Relevant syllabus for GATE: Not Applicable

Relevant syllabus for IES: Not Applicable

Course Plan

No.	WEEK	UNIT	bject pics / Sub-Topics	urse Learning Outcomes	ferences xt Books urnals ebsites
1	1	1	Data abstraction, encapsulation, inheritance, benefits of inheritance,.	**Understand** Data abstraction, encapsulation, inheritance, benefits of inheritance	T1, R2
2		1	Polymorphism, classes and objects, procedural	**Understand** polymorphism, classes and objects, procedural	T1,R2
3		1	Object oriented programming paradigm	**Understand** object oriented programming paradigm	T1, R2
4		1	History of java, comments data types	**Understand** History of java, comments data types	T1, R2
5	2	1	Variables, constants, scope, life time of variables, operators	**Understand** variables, constants, scope, life time of variables, operators	T1, R2
6		1	Operator hierarchy, expressions, type conversion	**Understand** operator hierarchy, expressions, type conversion	T1, R2
7		1	Casting, enumerated types, control flow – block scope	**Understand** casting, enumerated types, control flow – block scope	T1 R2

8		1	Conditional statements ,loops, break and continue statements	**Understand** conditional statements ,loops, break and continue statements	T1 R2
9	3	1	Simple java stand alone programs, arrays, console input and output	**Use** simple java stand alone programs, arrays, console input and output	T1
10		1	Formatting output, constructors ,methods	**Use** formatting output, constructors ,methods	T1, R2
11		1	Parameter passing, static fields and methods	**Use** parameter passing, static fields and methods	T1, R2
12		1	Access control, this reference, overloading methods	**Use** access control, this reference, overloading methods	T1, R2
13	4	1	Constructors, recursion, garbage collection, building strings, exploring string class.	**Use** constructors, recursion, garbage collection, building strings, exploring string class.	T1, R2
14		2	Inheritance – Inheritance hierarchies super and subclasses	**Relate** Inheritance – Inheritance hierarchies super and subclasses	T1
15		2	Member access rules, super keyword	**Explain** member access rules, super keyword	T1
16		2	Preventing inheritance: final classes and methods	**List** preventing inheritance: final classes and methods	T1
17	5	2	The object class and its methods	**List** the object class and its methods	T1
18		2	Dynamic binding, method overriding	**List** dynamic binding, method overriding	T1
19		2	Abstract classes and methods	**List** abstract classes and methods	T1
20		2	Interface – Interfaces VS Abstract classes	**Relate** Interface – Interfaces VS Abstract classes	T1
21	6	2	Defining an interface, implement interfaces	**Relate** defining an interface, implement interfaces	T1
22		2	Accessing implementations through interface references, extending interface.	**Relate** accessing implementations through interface references, extending interface.	T1
23		2	Inner classes – Uses of inner classes, local inner classes	**Explain** Inner classes – Uses of inner classes, local inner classes	T1
24		2	Anonymous inner classes, static inner classes, examples	Anonymous inner classes, static inner classes, examples	T1, R1
25	7	2	Packages – Defining, creating and accessing a package	**Define** Packages – Defining, creating and accessing a package	T1
25		2	Understanding CLASSPATH, importing packages	**Define** understanding CLASSPATH, importing packages	T1

27		3	Exception handling – Dealing with errors, benefits of exception handling	**Illustrate** exception handling – Dealing with errors, benefits of exception handling	T1,R2
		3	The classification of exceptions , exception hierarchy	**Understand** the classification of exceptions , exception hierarchy	T1,R2
	8	3	Checked exceptions and unchecked exceptions	**Understand** checked exceptions and unchecked exceptions	T1,R2
30		3	Usage of try, catch, throw, throws and finally	**Understand** usage of try, catch, throw, throws and finally	T1,R2
31		3	Rethrowing exceptions, exception specification	**Understand** rethrowing exceptions, exception specification	T1,R2
32		3	Built in exceptions, creating own exception sub classes	**Understand** built in exceptions, creating own exception sub classes	T1,R2
33	9	3	Multithreading – Differences between multiple processes and multiple threads	**Define** Multithreading – Differences between multiple processes and multiple threads	T1
34		3	Thread states, creating threads, interrupting threads	**Analyze** thread states, creating threads, interrupting threads	T1,R2
35		3	Thread priorities, synchronizing threads	**Analyze** thread priorities, synchronizing threads	T1,R2
36		3	Inter – thread communication	**Analyze** inter – thread communication	T1,R2
37	10	3	Producer consumer pattern	**Analyze** producer consumer pattern	T1,R2
38		4	Collection Framework in java – Introduction to java collections, overview of java collection frame work	**Explain** Collection Framework in java – Introduction to java collections, overview of java collection frame work	T1,R2
39		4	Generics, commonly used collection classes- Array List	**Define** Generics, commonly used collection classes- Array List	T1
40		4	Vector ,hash table, stack, enumeration, iterator	**State** Vector ,hash table, stack, enumeration, iterator	T1
41	11	4	String tokenizer ,random ,scanner	**Describe** String tokenizer ,random ,scanner	T1,R2
42		4	Calendar and properties	**Describe** Calendar and properties	T1,R2
43		4	Files – streams – byte streams, character stream	**Explain** Files – streams – byte streams, character stream	T1,R2
44		4	Text input/output, binary input/output	**Understand** Text input/output, binary input/output	T1

45	12	4	Random access file operations, file management using file class.	**Identify** Random access file operations, file management using file class.	T1
46		4	Connecting to Database – JDBC Type 1 to 4 drivers, connecting to a database	**Relate** Connecting to Database – JDBC Type 1 to 4 drivers, connecting to a database	T1,R2
47		4	Querying a database and processing the results	**Manage** Querying a database and processing the results	T1, R2
48		4	Updating data with JDBC.	**Understand** Updating data with JDBC.	R2
49	13	5	GUI Programming with Java – The AWT class hierarchy, introduction to swing	**Understand** GUI Programming with Java – The AWT class hierarchy, introduction to swing	R2
50		5	Swing Vs AWT, hierarchy for swing components	**Classify** Swing Vs AWT, hierarchy for swing components	T1
50		5	Containers- jframe, japplet, jdialog	**List** Containers- jframe, japplet, jdialog	T1
52		5	Jpanel, overview of some swing components – jbutton	**Explain** Jpanel, overview of some swing components – jbutton	T1
53	14	5	Jlabel, jtextfield, jtextarea	**Explain** Jlabel, jtextfield, jtextarea	T1
54		5	Java lab course description simple applications	**Explain** Java lab course description simple applications	T1
		5	Layout management – Layout manager types – border, grid and flow	**Explain** Layout management – Layout manager types – border, grid and flow	T1
56		5	Event Handling: Events, Event sources, Event classes	**Apply** Event Handling: Events, Event sources, Event classes	T1,R2
57	15	5	Event Listeners, Relationship between Event sources	**Apply** Event Listeners, Relationship between Event sources	T1,R2
58		5	Listeners, Delegation event model	**Explain** Listeners, Delegation event model	T1
59		5	Example: handling a button click, handling mouse events, Adapter classes.	**Explain** Example: handling a button click, handling mouse events, Adapter classes.	T1
60		5	Applets – Inheritance hierarchy for applets	**Explain** Applets – Inheritance hierarchy for applets	T1
61	16	5	Differences between applets and applications	**Explain** Differences between applets and applications	T1
62		5	Life cycle of an applet, passing parameters to applets, applet security issues.	**Understand** Life cycle of an applet, passing parameters to applets, applet security issues.	T1

Mapping Course Outcomes Leading to the Achievement of Program Outcomes and Program Specific Outcomes:

Course Outcomes	Program Outcomes (PO)												Program Specific Outcomes (PSO)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	3	1	2	2	1	-	2	-	2	1	3	3
CO2	3	2	3	2	3	2	2	2	-	2	-	1	-	3	3
CO3	2	3	2	2	3	2	2	1	-	1	-	1	-	2	2
CO4	2	3	2	2	3	2	2	1	-	1	-	1	-	3	3
CO5	3	2	3	3	1	2	2	1	-	2	-	2	-	3	3

1: Slight (Low)	2: Moderate (Medium)	3: Substantial (High)	- : None

Question Bank

Descriptive Questions

Unit-1

Short Answer Questions-

S.No	Question	Blooms Taxony level	Course outcome
1	Define oops ?	understand	2
2	Define inheritance, polymorphism ?	understand	3
3	List of advantages and disadvantages of oops	understand	2
4	Define Inheritance and constructor ?	understand	2

5	Write history of java ?	understand	3

Unit-1

Long Answer Questions-

S.No	Question	Blooms Taxony level	Course outcome
1	What are the components of Java Architecture? Explain in detail	understand	2
2	What is object oriented programming? How is it different from procedure-oriented programming?	understand	3
3	What are constructors and destructor functions? Explain different types of constructors?	understand	1
4	Explain the constructor method. How it differs from other member function?	understand	5
5	Explain the following JAVA key words : (i) static (ii) final	understand	3

Unit-2

Short Answer Questions-

S.No	Question	Blooms Taxony level	Course outcome
1	What is inheritance? Explain the member access mechanism in inheritance with an example	understand	2
2	What is Inheritance? Discuss the differences in inheritances in C++ and java.	understand	4
3	Discuss different types of Inheritances in Interfaces	understand	2
4	Write java program to implement the multilevel Inheritance.	understand	3
5	What is the use of "this" Keyword explain with an example.	understand	1

Unit-2

Long Answer Questions-

S.No	Question	Blooms Taxony level	Course outcome

1	Differentiate between composition and inheritance.	analyze	4
2	Differentiate between method overloading and method overriding	understand	5
3	Discuss about Hybrid Inheritance with a suitable example.	understand	1
4	Explain about final classes, final methods and final variables	understand	4
5	Explain about the abstract class with example program?	understand	2

Unit-3
Short Answer Questions-

S.No	Question	Blooms Taxony level	Course outcome
1	What is the role of stack in exception handling	understand	2
2	Give the classification of exceptions	understand	3
3	List out various classes in \Java.util" and explain them clearly	understand	4
4	What is Synchronization? Explain with suitable example	understand	2
5	Write a program that generates a user defined Exception	understand	1

Unit-3
Long Answer Questions-

S.No	Question	Blooms Taxony level	Course outcome
1	What are the Java's built-in exceptions? List the checked exceptions defined in the Java:lang and explain them clearly with suitable examples.	understand	4
2	List out the classes in Java.util Package along with their purpose	understand	3
3	Write a Java Program to implement Runnable class to create a thread	understand	1
4	Explain the following Thread related exceptions with examples: IllegalMonitorStateException IllegalThreadStateException	understand	2

5	What is the difference between unchecked and checked exceptions in java?	understand	1

Unit-4
Short Answer Questions-

S.No	Question	Blooms Taxony level	Course outcome
1	Write about various Stream Classes in java.	understand	3
2	Discuss about the File Input stream and File Output Stream in java with examples	understand	5
3	Write short notes on java.io package and java.lang package	understand	1
4	Write about the various Character Streams in java	understand	2
5	Explain the process of connecting to a database	understand	4

Unit-4
Long Answer Questions-

S.No	Question	Blooms Taxony level	Course outcome
1	Write short notes on collections frame work of java	understand	2
2	Write about the various Byte Streams in java?	understand	3
3	Write about the various Character Streams in java.	understand	5
4	write a program illustrating following collections framework ArrayList Vector	understand	2
5	write a program illustrating following collections framework HashTable Stack	understand	3

Unit-5
Short Answer Questions-

S.No	Question	Blooms Taxony level	Course outcome

1	Write a stand-alone AWT based application which) creates a frame window that responds to mouse clicks and key strokes.	understand	1
2	What is the functionality supported by java related to drawing ellipses and circles	understand	3
3	What is the functionality supported by java related to drawing arcs.	understand	4
4	What is the functionality supported by java related to colours	understand	4
5	What are the components and other graphical user interface elements that can act as source of events?	understand	3

Unit-5

Long Answer Questions-

S.No	Question	Blooms Taxony level	Course outcome
1	With the help of an example program explain how you handle all mouse related events.	understand	3
2	Explain different event classes supported by Java	understand	2
3	How using different fonts improves the user interface.	understand	4
4	What is an adapter class? Describe about the Mouse adapter class.	understand	3
5	What is an adapter class? Describe about the Mouse adapter class.	understand	2

Objective-Type Questions

JNTUH

1) Unchecked exceptions are checked at compile-time rather they are checked at runtime.

- Published on 19 Oct 15

a. True

b. False

ANSWER: False

2) Which method returns the interrupted flag after that it sets the flag to false if it is true?
- Published on 19 Oct 15
a. isInterrupted()
b. static interrupted()
c. non static interrupted()
d. Both A & C

ANSWER: static interrupted()

3) The PipedInputStream and PipedOutputStream classes can be used to read and write data simultaneously.
- Published on 19 Oct 15
a. True
b. False

ANSWER: True

4) From the following statements which is a disadvantage of an java array?
- Published on 19 Oct 15
a. An array can hold primitive types data
b. An array has its size that is known as array length
c. An array knows only its type that it contains. Array type is checked at the compile-time
d. An array holds only one type of data

ANSWER: An array holds only one type of data

5) The following Syntax is used for?

```
class Subclass-name extends Superclass-name
{
//methods and fields
}
```
- Published on 19 Oct 15
a. Polymorphism
b. Encapsulation
c. Inheritance
d. None of the above

ANSWER: Inheritance

6) ResultSetMetaData interface is useful because it provides methods to get metadata from the ResultSet object.

- Published on 22 Jul 15
a. True
b. False

ANSWER: True

7) Which constructor creates an empty string buffer with the specified capacity as length.
- Published on 22 Jul 15
a. StringBuffer()
b. StringBuffer(String str)
c. StringBuffer(int capacity)
d. None of the above

ANSWER: StringBuffer(int capacity)

8) How many reserved keywords are currently defined in the Java language?
- Published on 22 Jul 15
a. 48
b. 49
c. 50
d. 47

ANSWER: 49

9) Which mechanism is used when a thread is paused running in its critical section and another thread is allowed to enter (or lock) in the same critical section to be executed?
- Published on 22 Jul 15
a. Inter-thread communication
b. Initial-thread communication
c. Mutual Exclusive
d. None of the above

ANSWER: Inter-thread communication

10) Which method is used to change the name of a thread?
- Published on 22 Jul 15
a. public String getName()
b. public void setName(String name)
c. public void getName()
d. public String setName(String name)
ANSWER: public void setName(String name

11The new operator
A returns a pointer to a variable
B creates a variable called new
C obtains memory for a new variable
D tells how much memory is available
Answer: Option [C]

12 Which of the following statement is correct?
A For positive numbers, result of operators >> and >>> are same
B Java provides two operators to do left shift <<< and <<
C >> is the zero fill right shift operator
D >>> is the signed right shift operator
Answer: Option [A]

13 Java language has support for which of the following types of comment ?
A block, line and javadoc
B javadoc, literal and string
C javadoc, char and string
D single, multiple and quote
Answer: Option [A]

Java supports three types of comments.
(i)Single line i.e. line e.g. //comment
(ii)Multi line i.e. block e.g. /*comment*/
(iii)Javadoc comments e.g. /**comment*/
14 Command to execute a compiled java program is :
A javac
B java
C run
D execute
Answer: Option [B]

15 The java compiler
A creates executable
B translates java source code to byte code
C creates classes
D produces java Interpreter
Answer: Option [B]

16The order of the three top level elements of the java source file are
A Import, Package, Class
B Class, Import, Package
C Package, Import, Class
D Random order
Answer: Option [C]

17 The minimum value of char type variable is
A '\u0020'
B '\u00ff'
C '\u0010'
D '\u0000'

Answer: Option [D]

'\u0000' i.e. 0 is the minimum value of the char type varibale in java

18 Java uses ___ to represent characters
A ASCII code
B Unicode
C Byte code
D None of the above
Answer: Option [B]

19 Which one is not supported by OOP?
A Abstraction
B Polymorphism
C Encapsulation
D Global variables
Answer: Option [D]

Four major principles of object oriented programming are Abstraction, Encapsulation, Inheritance and Polymorphism

20 Java programs are
A Platform-dependent
B Interpreter-dependent
C Platform-independent
D Interpreter-independent
Answer: Option [C]

Websites Addresses:

1) http://nptel.iitm.ac.in/video.php?subjectId=106106093
2) *https://www.w3schools.com/java/*
3) http://docs.oracle.com/javase/7/docs/

Expert details:

1) Dr. Ajai jain working in IITKe

2) Prof. D. Janaki Ram working in IIT Madras

Journals (National & International):

1) International Journal of JAVA and c++ (http://www.inderscience.com/jhome.php?jcode=ijiids)

List of topics for student's seminar s:

1. **Basics of a Web application**
2. **Web Contaner and Web Application Project Set up**
3. **Servlets**
4. **Session Management**
5. **JSPs**

Case Studies / Small Projects:

1. **JSP Tag library**
2. Finance Management System