(2½ hours)

Total Marks: 75

N. B.: (1) **All** questions are **compulsory**.
(2) Make**suitable assumptions** wherever necessary and **state the assumptions** made.
(3) Answers to the **same question** must be **written together**.
(4) Numbers to the **right** indicate **marks**.
(5) Draw **neat labeled diagrams** wherever **necessary**.
(6) Use of **Non-programmable** calculators is **allowed**.

Note :

- **This answer key is an outline for the distribution of marks and brief concept of the answer. The actual explanation can be taken from any prescribed text book.**
- **For Questions like 2e, 3d, 3f , These statements have to be explained in two aspects. One is the syntax and the other one is their functionality and concept. The aim is to test whether the student can interpret random and short code snippets.**

1.	**Attempt *any three* of the following:**	**15**
a.	Write a short notes on java's architecture and its components. **Ans)** Explain JVM (3m) Explain jdk , jre and the association between them (2m)	
b.	Write in detail about different types of operators in java , category-wise quoting their functionality , operands and return type. Give one example statement for each. **Ans)** Minimum 3 different categories have to be explained (arithmetic , relational , logical , bitwise , others) Eg : Arithmetic / Addition / + / operands : numeric / return type : numeric / Eg: k=a+b; Relational /equals to / == / return type : boolean value	
c.	What are the primitive data types in java? Briefly explain their size, range and other details. **Ans)** quoting all types (integer types , float types , char and boolean) (1m) Each one's size and range (4m)	
d.	Explain the terms : narrowing , widening , instantiation , auto boxing **Ans)** : Narrowing : when a larger data type is assigned to a smaller one then type casting is required. This conversion is known as 'narrowing'. The two types must be compatible for conversion. **(2m)** Widening : when a smaller data type is assigned to a larger one then automatic conversion takes place in java. This is known as 'widening' . The two types must be compatible for conversion.**(1m)** Instantiation : creating an instance of a class. i.e., object **(1m)** Auto boxing : The process by which primitive type is automatically encapsulated into its equivalent type wrapper whenever an object of that type is required. (2m)	
e.	Briefly explain : (i) Type annotations **(2m)** (ii) Lambda expressions.**(3m)** **Ans)** Lambda expressions are introduced in Java 8. Lambda expression facilitates functional programming, and simplifies the development a lot.The important characteristics of a lambda expression. Optional type declaration , Optional parenthesis around parameter ,	

	Optional curly braces , Optional return keyword	
f.	Briefly explain the salient features of java. **Ans)** brief explanation of any 5 features: (few are given below) • Robust and secure • Platform-independent • Portable • Simple, small and familiar • Compiled and interpreted • Multithreaded and interactive • Dynamic and extensible • High performance	
2.	**Attempt *<u>any three</u>* of the following:**	**15**
a.	Write a short notes on access specifiers in java. **Ans)** Explain public , private , protected and default access specifiers' behavior w.r.t individual class and w.r.t inheritance as well. (1m for each specifier) Tabular representation is preferable along with the explanation. (1m)	
b.	Write a comparative note on overloading and overriding in java. **Ans)** definition of overloading , overriding (1m) Explanation of functionality and difference (1m) One code example for each(2m)	
c.	Explain the functionality of different types of iterative statements in java , using suitable examples. **Ans)** Explain the functionality of 'for'& 'for each , 'while' and 'do-while' statements (3m) Example code segments (2m)	
d.	Explain : (i) Varargs (ii) this (iii) super **Ans)** definitions : varargs(1m) , this (2m) and super(2m)	
e.	Demonstrate the behavior of static members in java using a suitable example. **Ans)** explaining static data member's behavior (2m) Explaining static method's behavior (1m) A short example code (1m)	
f.	Explain the semantics and functionality of the given statements : (i) Rectangle rec = new Rectangle(a,b); The above statement represents instatiation of an object using a parameterized constructor. Here , Rectangle is a class name and rec is an object of class being created. new is the keyword for instantiation and a,b are the arguments sent for the constructor. (2m) (ii) break out; This is the labeled jump statement. Here 'break' is the keyword and 'out' is the label name. this statement shifts the control flow to the statement to the statement which is labeled as 'out'.(1m) (iii)public static void main(String ag[]) {.. } The above code line represents brief outline of the main method in java. Here the access specifier public indicates says that it is accessible to all classes. Keyword static indicates that it belogs to the entire class but not of any objects of that class. main() must always be declared as static. Void indicates that it doesn't retuen any value. String ag[] indicates the commandline parameters' array. (2m)	

3.	**Attempt *any three* of the following:**	**15**
a.	Write a comparative note on abstract classes and interfaces in java. **Ans)** similarities and differences (4m) Define in java code (1m)	
b.	Quote the different kinds of inheritance available in java. Explain them using suitable code segments. **Ans)** explain single , Multi-level , hierarchical with short block diagrams. (3m) Short code segments as examples (2m)	
c.	Explain the terms/keywords : final , finally , finalize()	

d.	Explain the below given code and the concept(s) it represents :
	1) Shape gen = new Shape();
	2) Rect r = new Rect(); Circ c = new Circ();
	3) int k = Integer.parseInt(args[0]) ; // reading a number from commandline
	4) if (k==1) gen = r; else gen=c;
	5) gen.showdata();
	
	Ans) The given code reflects the concept of dynamic dispatch of method in java.
	Here , the reference of base class Shape (gen) is assigned with either the object of Rect ,(r) or the object of Circ (c) depending on the user's input (that means , it is at run time) so , the behavior of the statement 5) gen.showdata() is decided at run time. Hence it is dynamic dispatch of the method. (4m)
	
	It can also be said that concepts of Wrapper class methods and commandline arguments are represented because of the code line (3) (2m)	

e.	How do you create your own package and import it in a java program? Explain the procedure step-wise using a suitable example. **Ans)** The procedure should be explained step-wise giving any example code.	
f.	Explain the below given code fragments : (i) interface values extends demoval { … } Ans) This code is the definition of an interface in java. Here defined interface is 'values' which is extended from another interface 'demoval'. Here 'interface' and 'extends' are keywords. (2m) (ii) class sample extends dsamp implements dval { .. } Ans) In the above java code , 'sample' and 'dsamp' are class names and 'dval' is an interface. (1m) Hence we can explain it as below : This is the definition of a class 'sample' which is extended from another class dsamp and implements an interface 'dval' (2m)	
4.	**Attempt *any three* of the following:**	**15**
a.	What is a vector? List out any five vector methods and quote their functionality. Write one example for each. Ans) definition of vector (1m) Any five vector methods with a one line explanation of their functionality (4m)	
b.	Write in detail about the life cycle of a thread in java. Ans) : diagram of the life cycle (1m) Brief explanation of all 5 states (new born , runnable, running , blocked and terminated) (4m)	
c.	Explain any 3 different cases of exception handling. Ans) brief explanation with short code segments from any three of the below cases 1) one try – one catch block 2) one try – many catch blocks	

	3) one try – many catch – finally 4) nested try-catch 5) throwing your own exception	
d.	Explain the semantics and functionality of the given statements : (i) FileReader ins = new FileReader(inf); Ans) this (ii) dos.writeDouble(27.36);	
e.	Explain the difference between the following using a suitable example. **(1m for each)** (i) equals() , compareTo() , equalsIgnoreCase() Ans) **equals()** : checks equality and returns Boolean value **compareTo()** : compares and gives the numeric difference of first non-equal characters **equalsIgnoreCase()** : checks for equality, but ignores case differences and returns Boolean value. substring(k) : gives substring from k th character, subtring(k , j) : gives substring from kth character to jth character (not including j) Ans) : indexof('x') : returns the position of the first occurance of the character 'x' in the string. indexof('x' , n); : returns the position of 'x' after nth position in that string.	
f.	Explain : (i) int k = Integer.parseInt(num); (ii) val = lval.longValue(); (ii) dval = Double.valueOf(s); Ans) : The above code lines are conversions using Wrapper class methods.(1m + 2m + 2m) (i) Integer k is assigned to the converted value of the string num. here Integer is the wrapper class and parseInt() a method in it. (ii) Here object to primitive conversion is done. laval is object of the class Long. The method longValue() converts it to the primitive long type. Hence the variable val is of long type. (iii) Here string to object conversion is done. S is a string. The valueOf() method of the class Double is converting it into primitive double value. This value is assigneed to the variable dval.	
5.	**Attempt *any three* of the following:**	**15**
a.	Briefly explain : Delegation model : the modern approach of handling events in java in which the application logic that processes events is separated from the user interface logic that generates those events. (2m) Event : an object that describes a state change in a source. (1m) Event listener : an object that is notified when an event occurs. (1m) Event sources : An object that generates events. (1m)	
b.	What is an applet? Explain its life cycle in java. Ans) applet definition (1m) Explanation of life cycle with 4 states (born , running, idle, dead) using block diagram. (4m)	
c.	What is a Layout manager? Explain any two layouts. Ans) definition (1m) Explanation about any two layout managers(Flow layout , grid layout , border layout , card layout) (2m for each)	
d.	Write about : Button , Textfield , Label. Ans) usage of each control and at least one of its methods (2m for each)	
e.	Explain the semantics and functionality of the given statements : (i) public void paint(Graphics g) { … }	

	(ii) Ans) This code indicates the definition of paint() method that performs the applet code. It takes the Graphics class object as an argument. (2m) (iii)b.addActionListener(this); Ans) here , The addActionListener method takes the current class object as a parameter. Here current class is the class of object b through which it is called. For eg. B can be an object of Button class. (iv)repaint(); Ans) The repain() method is called to invoke the paint() method. (1m)	
f.	Write about <APPLET> and <PARAM> tags. Ans) <applet> tag usage and attributes (3m) <param> tag usage and attributes (2m)	

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