N. B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions out of remaining **six** questions.
(3) Answer to **sub** questions of individual questions should be answered **one** below the other.

1. (a) Write short note on   **10**
    (i) JVM (Java Virtual Machine)
    (ii) JDK (Java Development Kit)

   (b) Write a program to accept any string upto 15 characters. Display the elements of   **10**
   string with their element nos. Use toCharArray ( ) function.

2. (a) What is a package ? How do we design a package ? What are the benefits of packages ?   **10**

   (b) The annual examination results of 5 students are tabulated as follows :-   **10**

Roll No.	Subject 1	Subject 2	Subject 3

   Write a program to read the data and determine the following :—
    (i) Total marks obtained by each student
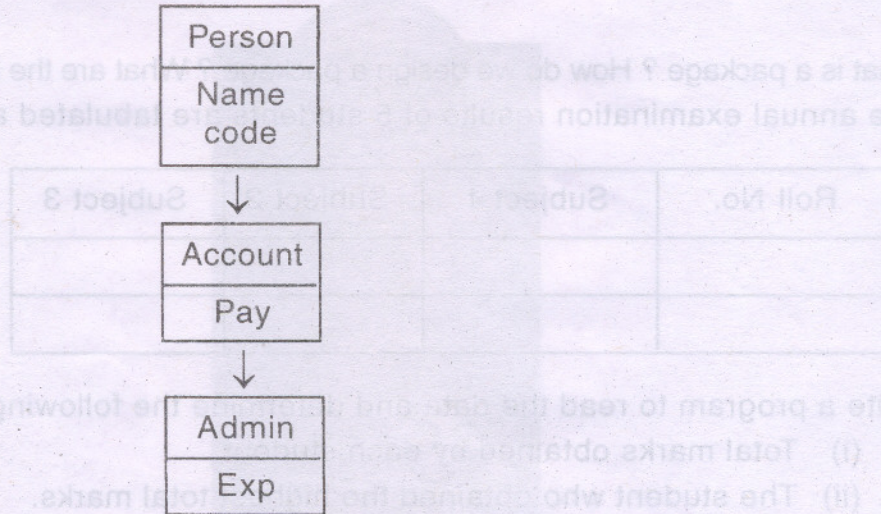   (ii) The student who obtained the highest total marks.

3. (a) What are constructors ? Explain different types of constructor with example.   **10**
   (b) Write a program to display the following pattern.   **10**

4. (a) What is abstract class ? Write a program to display volume of sphere and hemisphere.   **10**
   Make use of abstract class.

   (b) Explain with example :—   **10**
    (i) throw   (ii) catch   (iii) finally.

5. (a) Write a program to illustrate use of isAlive () and join () and sleep () method. Create   **12**
   three classes A, B and C. Create another class "IsaliveJoin" to invoke isAlive ( )
   and join ( ) methods for these 3 child thread.

   (b) Explain static class members with example.   **8**

6. (a) Write a program that accepts a shopping list of items and perform the following 10
operations.

    (i) add an item at a specified location

    (ii) delete an item in the list

    (iii) Print the contents of the vector

(b) Consider a class network given. The class 'Admin' derives information from the 10
class 'Account' which in turn derives information from the 'Person' class. Write a
program to display 'Admin' object.

```
┌──────────┐
│  Person  │
├──────────┤
│  Name    │
│  code    │
└──────────┘
      │
      ▼
┌──────────┐
│ Account  │
├──────────┤
│  Pay     │
└──────────┘
      │
      ▼
┌──────────┐
│  Admin   │
├──────────┤
│  Exp     │
└──────────┘
```

7. Write short note on :— (any **three**) 20

    (i) Life cycle of an applet

    (ii) Call by value and call by reference

    (iii) Difference between array and vector

    (iv) Explain 'Interface' and use of interface.