Chapter 12: Arrays (Computer Applications, Sumita Arora)

Part I, Theory

Q1. Define
- (i)   Array (Pg. 384 Top)
- (ii)   Subscript or Index (Pg 385 Top)
- (iii)   Types of Arrays (Pg 385 Mid)
- (iv)   Base Type (Pg 385 Bottom)
- (v)   Initializer List (Page 391 Bottom)
- (vi)   Index out-of-bounds exception (Page 392 Top)

Q2. What is the two step process before we can use an array? (Pg. 386 top)

Q3. Correct the following program segment which is supposed to initialize the first 5 prime numbers in an array and then display them.

```
int arr[]={ 2,3,5,7,11};
System.out.println(arr);
```
Answer hint: Run a loop from 0 to arr.length-1 and say System.out.println(arr[i]);

Q4.   (a) How will you give values to the array created below?

```
int arr[]=new int[5];
```
Answer hint: Run a loop from 0 to arr.length-1 and say arr[i]=Integer.parseInt(br.readLine()) in it.

(b) Without using a loop or any input statement, store the 5 vowels in uppercase in an array.

Say char c[]={ 'A', 'E'…};

Q5. What is the difference between an array and a vector? (Pg 390 Top)

Q6. What do you understand by the statement "An array occupies contiguous memory locations"?

Array is stored in consecutive memory cells and not scattered all around the memory.

Q7. What does the instance variable "length" of the array object hold? (Pg 391 Top)

Q8. How is a 2D array difference from a 1D array? (Pg 393)

Q9. How many bytes will the following array occupy in the computer's memory?

```
double a[][]=new double[5][2]
```
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Q10. Differentiate between linear/sequential search and binary search. (Pg 395 onwards)

Q11. Differentiate between selection sort and bubble sort. (Pg 401 onwards)

Q12. For an array which contains {6, 3, 2, 9, 1, 5, 4} Give the values after 3 passes of
- (i)   Selection Sort
- (ii)   Bubble Sort.

Q13. State any two advantages and two disadvantages of arrays. (Page 408)

1D: Arrays

Q1. Input 10 numbers in an array and display the average of the even numbers stored in it.

Q2. Input 10 words in an array and display the longest word in it.

Q3. Store the monthly salary of 10 employees in an array and display the total annual salary payable by the employer.

Q4. Store 10 student names and the percentage in 2 different 1D arrays. Now input the name of a student and display the corresponding percentage.

Searching/Sorting

Q1. Input 10 names from the user and sort them using the bubble sort technique.

Q2. Input 10 numbers from the user and sort them in descending order using the selection sort technique.

Q3. Initialize 10 values in an array. Now input a search value and display if it present in the array or not. Use the linear/ sequential search method.

Q4. Initialize 10 values in descending order in an array. Now input a search value and display if it present in the array or not. Use the binary search method.

2D Arrays

Q1. Initialize (use an initializer list) a 2D array with 4 rows and 3 columns with numbers from 1 to 12. Now display them in a tabular format.

Q2. Store marks in physics, chemistry and biology of 5 students in a 2D array. Display the percentage marks obtained by each student. Assume that the maximum marks are 300. Now display the average of each subject.

Q3. Ask the size of a square matrix from the user and input values in it. Now display the sum of both the diagonals.

Q4. A rack has four shelves with two columns on each. Store the items kept as shown below in an array.

	Column 1	Column 2
Shelf 1	ERASER	PEN
Shelf 2	REGISTER	PENCIL
Shelf 3	DIARY	RULER
Shelf 4	CHART	WHITENER

Now input an item name from the user and display in which shelf and column is it present (or display not found).

[END OF QUESTION]

Answer 1D Arrays, Q1.

```java
import java.io.*;
public class Test3
{
public static void main(String args[])throws IOException
{   BufferedReader br=new BufferedReader(new InputStreamReader(System.in));
    int arr[]=new int[10];
    System.out.println("Enter 10 numbers");
    for(int i=0; i<arr.length; i++)
    {   arr[i]=Integer.parseInt(br.readLine());
    }
    int sum=0;
    int count=0;
    for(int i=0; i<arr.length; i++)
    {   if(arr[i]%2==0)
        {   sum+=arr[i];
            count++;
        }
    }
    int avg=sum/count;
    System.out.println("Average of even nos ="+avg);
}//main
}//class
```

Answer 1D Arrays, Q2.

```java
import java.io.*;
public class Test3
{
public static void main(String args[])throws IOException
{   BufferedReader br=new BufferedReader(new InputStreamReader(System.in));
    String arr[]=new String[10];
    System.out.println("Enter 10 words");
    for(int i=0; i<arr.length; i++)
    {   arr[i]=br.readLine();
    }
    String longest="";
    for(int i=0; i<arr.length; i++)
    {   if(arr[i].length() > longest.length())
        {   longest=arr[i];
        }
    }
    System.out.println("Longest word ="+longest);
}//main
}//class
```

Answer 1D Arrays, Q3.

```java
import java.io.*;
public class Test3
{
public static void main(String args[])throws IOException
{   BufferedReader br=new BufferedReader(new InputStreamReader(System.in));
    int arr[]=new int[10];
    System.out.println("Enter monthly salary");
    for(int i=0; i<arr.length; i++)
    {   arr[i]=Integer.parseInt(br.readLine());
    }
    int sum=0;
    for(int i=0; i<arr.length; i++)
    {   sum+=(arr[i]*12);
    }
    System.out.println("Total annual salary ="+sum);
}//main
}//class
```

Answer 1D Arrays, Q4.

```java
import java.io.*;
public class Test3
{
public static void main(String args[])throws IOException
{   BufferedReader br=new BufferedReader(new InputStreamReader(System.in));
    String name[]=new String[10];
    int per[]=new int[10];
    System.out.println("Enter 10 names and percentages");
    for(int i=0; i<name.length; i++)
    {   name[i]=br.readLine();
        per[i]=Integer.parseInt(br.readLine());
    }
    System.out.println("Enter name to search");
    String search=br.readLine();
    int found=0;
    for(int i=0; i<name.length; i++)
    {   if(search.equalsIgnoreCase(name[i]))
        {   System.out.println("Percentage is = "+per[i]);
            found=1;
        }
    }
    if(found==0) System.out.println("Not found");
}//main
}//class
```

Answer Searching/Sorting, Q1.

```
import java.io.*;
public class Test3
{
public static void main(String args[])throws IOException
{  BufferedReader br=new BufferedReader(new InputStreamReader(System.in));
   String arr[]=new String[10];
   System.out.println("Enter 10 names");
   for(int i=0; i<arr.length; i++)
   {   arr[i]=br.readLine();
   }
   for(int i=0; i<arr.length-1; i++)
   {   for(int j=0; j<arr.length-1-i; j++)
      {   if(arr[j].compareTo(arr[j+1])>0)
         {   String t=arr[j];
            arr[j]=arr[j+1];
            arr[j+1]=t;
         }
      }
   }
   System.out.println("Sorted names");
   for(int i=0; i<arr.length; i++)
   {   System.out.println(arr[i]);
   }

}//main
}//class
```

Answer Searching/Sorting, Q2.

```
import java.io.*;
public class Test3
{
public static void main(String args[])throws IOException
{  BufferedReader br=new BufferedReader(new InputStreamReader(System.in));
   int arr[]=new int[10];
   System.out.println("Enter 10 numbers");
   for(int i=0; i<arr.length; i++)
   {   arr[i]=Integer.parseInt(br.readLine());
   }
   for(int i=0; i<arr.length-1; i++)
   {   int largest=arr[i];
      int pos=i;
```

```
        for(int j=i+1; j<arr.length; j++)
        {   if(arr[j]>largest)
            {   largest=arr[j];
                pos=j;
            }
        }
        int temp=arr[i];
        arr[i]=arr[pos];
        arr[pos]=temp;
    }
    System.out.println("Values in descending order");
    for(int i=0; i<arr.length; i++)
    {   System.out.println(arr[i]);
    }
}//main
}//class
```

Answer Searching/Sorting, Q3.

```
import java.io.*;
public class Test3
{
public static void main(String args[])throws IOException
{   BufferedReader br=new BufferedReader(new InputStreamReader(System.in));
    int arr[]={1,2,3,10,20,30,100,150,250};
    System.out.println("Enter value to search");
    int search=Integer.parseInt(br.readLine());
    int found=0;
    for(int i=0; i<arr.length; i++)
    {   if(search==arr[i])
        {   System.out.println("Value present at index "+i);
            found=1;
        }
    }
    if(found==0) System.out.println("Value Not present");
}//main
}//class
```

Answer Searching/Sorting, Q4.

```
import java.io.*;
public class Test3
{
public static void main(String args[])throws IOException
{   BufferedReader br=new BufferedReader(new InputStreamReader(System.in));
    int arr[]={100,90,80,70,60,50,40,30,20,10};
    System.out.println("Enter value to search");
```

```
    int search=Integer.parseInt(br.readLine());
    int beg=0;
    int end=arr.length-1;
    while(beg<=end)
    {   int mid=(beg+end)/2;
       if(search==arr[mid])
       {   System.out.println("Value present at index "+mid);
          break;
       }
       if(search>arr[mid])
       {   end=mid-1;
       }
       if(search<arr[mid])
       {   beg=mid+1;
       }
    }
    if(beg>end) System.out.println("Value Not present");
}//main
}//class
```

Answer 2D Arrays, Q1.

```
public class Test3
{
public static void main(String args[])
{   int arr[][]= {  {1,2,3},
            {4,5,6},
            {7,8,9},
            {10,11,12} };
   for(int i=0; i<4; i++)
   {   for(int j=0; j<3; j++)
      {   System.out.print(arr[i][j]+"\t");
      }
      System.out.println();
   }
}//main
}//class
```

Answer 2D Arrays, Q2.

```
import java.io.*;
public class Test3
{
public static void main(String args[])throws IOException
{   BufferedReader br=new BufferedReader(new InputStreamReader(System.in));
   int arr[][]= new int[5][3];
```

```java
    for(int i=0; i<5; i++)
    {   System.out.println("Enter marks for student "+(i+1));
        for(int j=0; j<3; j++)
        {   arr[i][j]=Integer.parseInt(br.readLine());
        }
    }
    System.out.println("Percentage of each stduent");
    for(int i=0; i<5; i++)
    {   int sum=0;
        for(int j=0; j<3; j++)
        {   sum+=arr[i][j];
        }
        double per=sum/3.0;
        System.out.println("Per. of student "+(i+1)+" = "+per);
    }
    System.out.println("Average of each subject");
    for(int i=0; i<3; i++)
    {   int sum=0;
        for(int j=0; j<5; j++)
        {   sum+=arr[j][i];
        }
        double avg=sum/5.0;
        System.out.println("Avg. of subject "+(i+1)+" = "+avg);
    }
}//main
}//class
```

Answer 2D Arrays, Q3.

```java
import java.io.*;
public class Test3
{
public static void main(String args[])throws IOException
{   BufferedReader br=new BufferedReader(new InputStreamReader(System.in));
    System.out.println("Enter size of the square matrix");
    int size=Integer.parseInt(br.readLine());
    int arr[][]=new int[size][size];
    System.out.println("Enter values");
    for(int i=0; i<size; i++)
    {   for(int j=0; j<size; j++)
        {   arr[i][j]=Integer.parseInt(br.readLine());
        }
    }
    int diag1=0;
```

```
    int diag2=0;
    for(int i=0; i<size; i++)
    {   for(int j=0; j<size; j++)
        {   if(i==j) diag1=diag1+arr[i][j];
            if(i+j==size-1) diag2=diag2+arr[i][j];
        }
    }
    System.out.println("Sum of diagonal 1 = "+diag1);
    System.out.println("Sum of diagonal 2 = "+diag2);
}//main
}//class
```

Answer 2D Arrays, Q4.

```
import java.io.*;
public class Test3
{
public static void main(String args[])throws IOException
{   BufferedReader br=new BufferedReader(new InputStreamReader(System.in));
    String arr[][]= { { "eraser", "pen" },
                { "register", "pencil"},
                { "diary", "ruler"},
                { "chart", "whitener" } };
    System.out.println("Enter search item ");
    String search=br.readLine();
    int found=0;
    for(int i=0; i<4; i++)
    {   for(int j=0; j<2; j++)
        {   if(search.equalsIgnoreCase(arr[i][j]))
            {   System.out.println("Found at");
                System.out.println("Shelf   "+(i+1));
                System.out.println("Column  "+(j+1));
                found=1;
            }
        }
    }
    if(found==0)
    {   System.out.println(" Not found ");
    }

}//main
}//class
```

[END OF PROGRAMMING SOLUTIONS]