ICSE Paper 2013 Computer Applications

(Two Hours)
Answers to this Paper must be written on the paper provided separately.
You will not be allowed to write during the first 15 minutes.
This time is to be spent in reading the question paper.
The time given at the head of this Paper is the time allowed for writing the answers.
This paper is divided into two Sections.
Attempt ***all*** questions from ***Section A*** and ***any four*** questions from ***Section B***.
The intended marks for questions or parts of questions are given in brackets [ ].

Section 'A' (40 Marks)

*(Attempt **all** questions)*

Question 1:
(a) What is meant by precedence of operators ? **[2]**
(b) What is a literal ? **[2]**
(c) State the Java concept that is implemented through: **[2]**
(i) a superclass and a subclass.
(ii) the act of representing essential features without including background details.
(d) Give a difference between a constructor and a method. **[2]**
(e) What are the types of casting shown by the following examples ? **[2]**
(i) double x = 15.2;
int y = (int) x;
(ii) int x = 12;
long y = x;

Answer:
(a) Operator Precedence determines the order in which expression are evaluated, Precedence can be changed by placing parentheses around the expression that needs to be evaluated first.

(b) Literals also called constants which are data items that remain fixed during the execution of a Program.

(c) (i) Inheritance
(ii) Abstraction

(d)

Method	Constructor
A method is a code sequence designed to do a specific task.	A Constructor is a special code sequence which is called automatically when object is created.
A method can be invoked by specifying method name followed by the argument.	A constructor is called automatically.

(e) (i) explicit type casting
(ii) implicit type casting.

Question 2:
(a) Name any two wrapper classes. **[2]**
(b) What is the difference between a break statement and a continue statement when they occur in a loop ? **[2]**
(c) Write statements to show how finding the length of a character array char [ ] differs from finding the length of a String object str. **[2]**
(d) Name the Java keyword that :
(i) indicates that a method has no return type.
(ii) stores the address of the currently-calling object. **[2]**
(e) What is an exception ?

Answer:
(a) (i) Integer
(ii) Character

(b)

Break Statement	Continue Statement
Break statement is a Jump statement. It is used to terminate a switch/for/while and do while statement.	Continue statement transfer the control to the beginning of the loop and skips the rest of the loop body
Break followed by the label name is used to break out of the loop with the label by it.	Continue statement is used to force an early Iteration of a loop.

(c) For finding length of character array char [ ] we use, a.length
Ex: char [ ] a = {‘a’, ‘b’};
r = a.length;
output: 2

For finding length of string object str, we use, str.length ( );
Ex : String str = “My”;
int k = str.length ( );
output: 2

(d) (i) Void Keyword
(ii) This Keyword

(e) An Exception is an abnormal condition that arises in a code sequence at runtime. Error might be because of :

- a programming mistake
- bad input data
- problems in network connectivity
- problems in resource allocation

Question 3:
(a) Write a Java statement to create an object mp 4 of class digital. **[2]**

(b) State the values stored in the variables str 1 and str 2
String s1 = “good”; Strings s2 = “world / matters”;
String str 1 = s2. substring (5). replace (‘t’, ‘n’);
String str 2 = s1. concat (str 1); **[2]**

(c) What does a class encapsulate ? **[2]**

(d) Rewrite the following program segment using the if ..else statement
comm = (sale >> 15000) ? Sale × 5/100 : 0; **[2]**

(e) How many times will the following loop execute ? What value will be returned ?
int x = 2, y = 50;
do {
++ x;
y – = x ++;
} while (x < = 10);
return y; **[2]**

(f) What is the data type that the following library functions return ?
(i) isWhitespace (char ch)
(ii) Math.random() **[2]**

(g) Write a Java expression for ut + $\frac{1}{2}$ at^2. **[2]**

(h) If int n [ ] = {1, 2, 3, 5, 7, 9, 13, 16}, what are the values of x and y ?
x = Math.pow (n[4], n [2]);
y = Math.sqrt (n[5]+n[7]; **[2]**

(i) What is the final value of ctr when the iteration process given below, executes ?
int ctr = 0;
for (int i = 1; i < = 5; i ++)
for (int j=1; j < = 5; j + = 2)
++ ctr; **[2]**

(j) Name the methods of Scanner class that:
(i) is used to input an integer data from the standard input stream
(ii) is used to input a String data from the standard input stream. **[2]**

Answer:
(a) digital mp4 = new digital ( );

(b) str1 = /manners
str2 = good/manners

(c) Java provides an access control mechanism whereby classes can restrict or allow access to it's variables and methods. A class should protect variables against direct manipulation by other objects if those manipulation could change the object state.

(d) if (sale > 15000)
comm = sale*5/100;
else
comm = 0;

(e) 5.
15.

(f) (i) This method returns a boolean.
(ii) This method returns a double value.

(g) (u * t) + (1/2 * a * t * t).

(h) x = 343
y = 5

(i) The final value of ctr = 15

(j) (i) Byte Stream
(ii) Character Stream

Section 'B' (60 Marks)

Attempt **any four** questions from this Section.
The answers in this Section should consist of the Programs in either Blue J environment or any program environment with Java as the base.
Each program should be written using Variable descriptions/Mnemonic Codes so that the logic of the program is clearly depicted.
Flow-Charts and Algorithms are not required.

Question 4:
Define a class named Fruit Juice with the following description: **[15]**
Instance variables / data members :

int product_code — stores the product code number
String flavour — stores the flavour of the juice (E.g. orange, apple, etc.)
String pack_type — stores the type of packaging (E.g. tetra-pack, PET bottle, etc.)
in pack_size — stores package size (E.g. 200 ml, 400 ml, etc.)
in product_price — stores the price of the product

Member methods :

(i) FruitJuice() — Default constructor to initialize integer data members to 0 and String data members to.
(ii) void input( ) — To input and store the product code, flavour, pack type, pack size and product price.
(iii) void discount( ) — To reduce the product price by 10.
(iv) void display() — To display the product code, flavour, pack type, pack size and product price.

Answer:

```
import java.io.*;
import java.util:*;
public class FruitJuice
{
private int product_code, pack_size, product_price;
private String flavour, pack_type;
public FruitJuice ( )
{
product_code = 0;
pack_size = 0;
product_price = 0;
flavour = " ";
pack_type = " ";
}
public void Input ( ) throws IOException
{
InputStreamReader reader = new InputStreamReader (System.in);
BufferedReader input = new BufferReader (reader);
System.out println ("Enter Product Code");
Product_Code = Integer.parseInt(input.readLine ( ));
System.out.println ("Enter size of Pack :");
Pack_size = Integer.parseInt (input.readLine ( ));
System.out.println ("Enter price :");
Product_Price = Integer.parseInt(input.readLine ( ));
System.out.println ("Enter flavour :");
Flavour = input.readLine ( );
System.out.println ("Enter pack type :");
Pack_Type = input.readLine ( );
}
public void discount ( )
{
product_price – = 10;
}
```

```
public void display ( )
{
System.out.println("Product code is :" + Product_code, "Product flavour" +
                    flavour," "Pack type is :" + Pack_Types + "Pack size is :" +
                   Pack_size + "Product price :" + Product_Price);
public static void main ( ) throws IOException
{ FruitJuice FJ = new Fruit Juice ( );
FJ.Input ( );
FJ.discount ( );
FJ.display ( );
}
}
```

Question 5:
The International Standard Book Number (ISBN) is a unique numeric book identifier which is printed on every book. The ISBN is based upon a 10-digit code. The ISBN is legal if:

$1 \times digit_1 + 2 \times digit_2 + 3 \times digit_3 + 4 \times digit_4 + 5 \times digit_5 + 6 \times digit_6 + 7 \times digit_7 + 8 \times digit_8 + 9 \times digit_9 + 10 \times digit_{10}$ is divisible by 11.

Example : For an ISBN 1401601499

Sum = 1×1 + 2×4 +3×0 + 4×1 + 5×6 + 6×0 + 7×1 + 8×4 + 9×9 + 10×9 = 253 which is divisible by 11.

Write a program to :

(i) Input the ISBN code as a 10-digit integer.

(ii) If the ISBN is not a 10-digit integer, output the message, "Illegal ISBN" and terminate the program.

(iii) If the number is 10-digit, extract the digits of the number and compute the sum as explained above.
If the sum is divisible by 11, output the message, "Legal ISBN". If the sum is not divisible by 11, output the message, "Illegal ISBN". **[15]**

Answer:

```
import java.io.*;
class ISBN
{
public static void main (String args [ ]) throws IOException
{
Bufferreader br = new BufferedReader (new Input StreamReader (System.in));
System.out.println ("Enter a 10 digit code :");
String s = br.readLine () ;
int len = s.length ( );
if (len! = 10)
System.out.println ("Output : Invalid Input");
else
{
string ch;
int dig = 0, sum = 0, k = 1;
for (int i = 0; i < len, i++)
{
ch = character.toString(s.charAt (i));
dig = Integer.parseInt (ch);
sum = sum + dig * k;
k++;
}
System.out.println ("Output : Sum = " + Sum);
if (sum % 11 == 0)
System.out.println ("Leaves No. Remainder – Valid ISBN Code");
else
System.out.println ("Leaves Remainder <196> Invalid ISBN Code");
}
}
}
```

Question 6:

Write a program that encodes a word into Piglatin. To translate word into a Piglatin word, convert the word into uppercase and then place the first vowel of the original word as the start of the new word along with the remaining alphabets. The alphabets present before the vowel being shifted towards the end followed by "AY".

Sample input (1) : London, Sample output (1) : ONDONLAY

Sample input (2) : Olympics, Sample output (2) : OLYMPICSAY **[15]**

Answer:

```
class Piglatin
{
public static void main (String s)
{
char ch;
String word = " ", str = " " ;
int i ;
s = s.trim ( ); // removing leading and trailing blanks
s = " "+ s + " "; // adding a single blank space in the beginning and at the end.
for (i = 1; i < s.length ( ); i ++)
{
ch = s.charAt (i);
if (ch ! = ' ')
word + = ch;
else if (s.charAt (i-1) ! = (' ') // to account for more than one blank space
between words
String Buffer sb = new string Buffer (word);
sb.append (sb.charAt (0)); // adding first character at the end of the word.
sb.append ("ay"); //adding ay and a blank space at the end of the word
sb.delete charAt (0); deleting first letter of the word
word = " " ;
str + = sb.toString ( ); // adding changed words to form a sentences
}
}
System.out:println ("Original string is :");
System.out.println (s);
System.out.println ("Sentence is Piglatin is");
System.out.println (str).
}
}
```

Question 7:
Write a program to input 10 integer elements in an array and sort them in descending order using the bubble sort technique. **[15]**

Answer:

```
public class Bubble sort
{
public static void main (string [ ] args)
{
int [ ] array =  {41, 15, 25, 77, 45, 37, 23, 70, 27, 9}
System.out.println ("Initially.array is : ");
for (int i = 0; i < array.length; ++ i)
System.out.print (" " + array [i]);
System.out.println ( );
bubble_sort (array);
System.out.println ("After Bubble sort, array indescending order is : ");
for (int i = 0; i = array.length ; ++ i);
System.out.print (" "+ array [i]);
System.out.println ( );
}
public static void bubble_sort (int [ ] num)
{
int j;
int temp; // holding variable
for (int i = 0; i < num.length –1; i++)
{
for (j = 0; j < num.length – i–1; j++)
{
if (num [j] < num [j+1])          // Change to > for ascending sort
{
temp = num [j];                   // Swap elements
num [j] = num. [j+1];
num [j+1] = temp;
}
}
}
}
}
```

Question 8:

Design a class to overload a function series ( ) as follows :

(i) double series (double n) with one double argument and returns the sum of the series,

$$sum = \frac{1}{1} + \frac{1}{2} + \frac{1}{3} + ... + \frac{1}{n}$$

(ii) double series (double a, double n) with two double arguments and returns the sum

of the series. **[15]**

$$sum = \frac{1}{a^2} + \frac{4}{a^5} + \frac{7}{a^8} + \frac{10}{a^{11}} + \ldots\ldots + to\ n\ terms$$

Answer:

```
public class series
{
public double series (double n)
{
int a;
double s = 0;
for (a = 1; a < = n; a ++)
s = s+1/a;
return s;
}
public double series (double a, double n)
{
int a, i;
double sum = 0,. b = 1;
double c = 1/(a*a);
sum = sum + c;
for (i = 5; i < = n; i+ = 3)
sum = sum + ((b+3)/Math.pow (a, i));
return s;
}
};
```

Question 9:

Using the switch statement, write a menu driven program :

(i) To check and display whether a number input by the user is a composite number or not (A number is said to be a composite, if it has one or more than one factor excluding 1 and the number itself).

Example : 4, 6, 8, 9

(ii) To find the smallest digit of an integer that is input.

Sample inputs: 6524

Sample output: Smallest digit is 2

For an incorrect choice, an appropriate error message should be displayed. **[15]**

Answer:

(i)

```
// To check composite number
import java.io.*;
public class composite
{
public static void main (String args [ ]) throws IOException
{
InputStreamReader read = new InputStreamReader (System.in);
BufferedReader in = new BufferedReader (read);
int m, n, p, q, k;
System.out.println ("Enter choice :");
int ch = Integer. parseInt (in.readLine);
switch (ch)
{
case 1 :
System.out.println ("Enter a number");
m = Integer.parseInt (in.readLine () );
k = m;
P = 2; q = 0;
do
{
if (m% p = = 0)
{
q = q+1;
}
p = p+1;
} while (p < = m/2);
if (q > 1)
System.out.println (k + "is a composite number");
else.
System.out.println (k + "is not a composite number");
break;
```

(ii)
```
case 2 :
int i, j, p, r;
System.out.println ("The smallest digit is":);
for (i = 0; i < 10, i ++)
{
p = n;
while (p ! = 0)
{
r = p%10;
if (r == i)
{
System.out.println (r+ " , ");
}
}
System.out.println ( );
}
break;
default : System.out.println ("wrong choice");
}
}
}
```