

B.Sc. (Honours) Examination 2018
Semester-II
Computer Science
Course : CC-3
(Programming in Java)

Time : 3 Hours

Full Marks : 40

Questions are of value as indicated in the margin

Answer Question No.1 and **any four** from the rest

1. i) Short Questions (1 mark):

- a) What are the differences between JRE and JVM?
- b) Is there any difference between `int []a` and `int a[]`?
- c) What is the difference between ‘&’ ‘&&’ operator in Java?
- d) How can we declare constants in java?

ii) Write a Java program to draw a rectangle filled with pattern using applet. 4+4

2. With example discuss data type widening conversion and type casting in Java. With example, discuss the enhanced form of ‘for’ loop to iterate over an array in java. Why switch statement is more efficient than if-else-if statement. (1.5+1.5)+3+2=8

3. Euler’s Totient function, $\phi(n)$, is used to determine the count of number less than n which are relatively prime (two numbers are “relatively prime” when they have no common factors other than 1) to n . For example, as 1, 2, 4, 5, 7, and 8, are all less than nine and relatively prime to nine, $\phi(9)=6$.

n	Relatively prime	$\phi(n)$	$n/\phi(n)$
2	1	1	2
3	1, 2	2	1.5
4	1, 3	2	2
5	1, 2, 3, 4	4	1.25
6	1, 5	2	3
7	1, 2, 3, 4, 5, 6	6	1.666...
8	1, 3, 5, 7	4	2
9	1, 2, 4, 5, 7, 8	6	1.5
10	1, 3, 7, 9	4	2.5

It can be seen that $n = 6$ produces a maximum $n/\phi(n)$ for $n \leq 10$.

Write a JAVA Program to find the value of $n \leq 1,000$ for which $n/\phi(n)$ is a maximum.

8

4. a) Write a java program to represent the stock of books in the departmental seminar library – and provide search functionality with either book title or author name or both. 5

b) `public static void main(String[] args)` – what does this definition imply? 3

P.T.O.

(2)

5. Define a base class to represent a 2D-shape, with position in x-y co-ordinate and perimeter of the shape as members. Define a constructor of this class.

Derive two classes for circle and polygon respectively from this base class. The circle should have the radius as a private member, and the position in the base class should be used as co-ordinate of its centre. The polygon should have the co-ordinates of each vertex clockwise; with the position in the base class representing the left-bottom vertex. Define methods to calculate perimeter of the shapes. 8

6. a) Design a screen in Java which accepts text in text box and there is submit button. If the button is clicked, convert the supplied text to uppercase.

b) What is the difference between abstract class and interface 6+2=8

7. Design a screen in an applet which takes a positive integer of three digit in text box. It will separate the digits in ascending order and draw concentric circle according to the values of the digit. 8
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