Enrollment No......................................

Faculty of Engineering
End Sem (Odd) Examination Dec-2017
IT3CO01 Introduction to Problem Solving and Programming

Programme: B.Tech.   Branch/Specialisation: IT

Duration: 3 Hrs.   **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1 i.   Thing to keep in mind while solving a problem is   **1**
          (a) Input data (b) Output data   (c) Stored data (d) All of these

     ii. Last step in process of problem solving is to   **1**
          (a) Design a solution   (b) Define a problem
          (c) Practicing solution   (d) Organizing data

     iii. Numbers that are written with base 16 are classified as: **1**
          (a) Octal Number   (b) Decimal Number
          (c) Real Number   (d) None of these

     iv. What is simple uniform hashing?   **1**
          (a) Every element has equal probability of hashing into any of the slots
          (b) A weighted probabilistic method is used to hash elements into the slots
          (c) All of the mentioned
          (d) None of the mentioned

     v.   A user-defined event: **1**
          (a) Allows a programmer to create her own events that can be raised depending on other actions within a program.
          (b) Allows object to communicate without being coupled.
          (c) Can expand a classes abilities beyond the built-in events
          (d) All of the above.

vi. A structure is the same as a class except that **1**
(a) There are no member functions
(b) All members are public
(c) Cannot be used in inheritance hierarchy
(d) It does have a this pointer

vii. Which is not true about the arrows used in a flowchart? **1**
(a) Direction of arrow shows the flow in a flowchart.
(b) Arrows are used show the sequence of the problem solving
(c) Arrows are used to connect boxes in a flowchart
(d) Arrows can be used to represent an input

viii. Part of algorithm which is repeated for fixed number of times is classified as **1**
(a) Iteration   (b) Selection   (c) Sequence   (d) Reverse action

ix. The complexity of linear search algorithm is **1**
(a) O(n)   (b) O(log n)   (c) O(n2)   (d) O(n log n)

x. Pseudo code is also known as: **1**
(a) Program design language   (b) Hardware language
(c) Software language   (d) Algorithm

Q.2   i.   What is Problem? Describe the types of Problem. **2**
      ii. What is a heuristic solution to a problem? **3**
      iii. Name three current problems in your life that could be solved through an algorithmic process. Explain why each of these problems is algorithmic in nature. **5**
OR   iv. A part-time employee worked 20 hours in the first week and 15 hours in the second week of a two-week pay period. He is paid a weekly salary based on a 40-hour week. What is his full-time equivalent for the two weeks based on a 40-hour week (i.e., what percentage of full time did he work)? Write a general equation that could be used to express and store the full-time equivalent of any hours worked per week. **5**

Q.3   i.   Write stepwise process to compute the average of n numbers. **3**
      ii. Give the solution for the problem: To handle conversions to decimal where the input character string may contain a decimal point. **7**

OR   iii. Organise the solution to compute the prime factors of an integer. **7**

Q.4   i.   What is the difference between a procedural solution and an object-oriented solution to a problem? **4**
      ii. A video store needs to track video rentals. I need to track customers, videos and, rental and late fees. **6**
           (a) Design the classes you would use to create the application.
           (b) What methods would be needed for the classes?
OR   iii. Elaborate top down and bottom up approach in programming paradigm. Explain each with suitable examples. **6**

Q.5   i.   What is flowchart? Describe symbols used in flowchart. Write one suitable example. **4**
      ii. Using first positive and then negative logic, draw the flowcharts for the following set of conditions: **6**
           $R = 50$ for $S < = 1000$
           $R = 100$ for $S = 1001–4000$
           $R = 250$ for $S = 4001–8000$
           $R = 75$ for $S > 8000$
OR   iii. What is decision table? What are the rules to create decision tables? Explain decision tables using suitable example. **6**

Q.6   Attempt any two:
      i.   Elaborate steps to write an algorithm. Give one example to explain it. **5**
      ii. Express an algorithm to get two numbers from the user (dividend and divisor), testing to make sure that the divisor number is not zero, and displaying their quotient using pseudo code. **5**
      iii. Write a short note on asymptotic notations used in algorithm analysis. **5**

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Marking Scheme

Q.1 i. (d)   **1**
     ii. (c)   **1**
     iii. (d)   **1**
     iv. (a)   **1**
     v. (d)   **1**
     vi. (c)   **1**
     vii. (d)   **1**
     viii. (a)   **1**
     ix. (a)   **1**
     x. (d)   **1**

Q.2 i. Problem – **1 mark**   **2**
       Types of Problem – **1 mark**   (1+1 = 2)
     ii. Heuristic solution to a problem – **3marks**   **3**
     iii. Three current problems an algorithmic process – **2 marks**   **5**
       Problems is algorithmic in nature **– 3 marks**
OR   iv. General equation - **2 marks**   **5**
       Store the full-time equivalent of any hours worked per week-**3 marks**

Q.3 i. Stepwise process to compute the average of n numbers. **3 marks**   **3**
     ii. Solution for the problem   **7**
OR   iii. Develop an algorithm to compute the prime factors of an integer   **7**

Q.4 i. 1 marks for each difference (**1 * 4 = 4 marks**)   **4**
     ii. (a) Design the classes you would use to create the application- **3 marks**   **6**
       (b) **M**ethods needed for the classes – **3 marks**
OR   iii. Top down and bottom up approach – **2 marks**   **6**
       Examples - **4 marks**

Q.5 i. Flowchart – **1 mark**   **4**
       Symbols used in flowchart – **1 mark**
       Suitable example- **2 marks**

     ii. First positive flowcharts - **3 marks**   **6**
       Negative logic flowcharts - **3 marks**
OR   iii. Decision table - **1 mark**   **6**
       Rules to create decision tables – **2 marks**
       Decision tables using suitable example – **3 marks**

Q.6   Attempt any two:
     i. Steps to write an algorithm – **2 marks**   **5**
       One example to explain - **3 marks**
     ii. Algorithm to get two numbers from the user   **5**
     iii. Notation description   **5**

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