

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

FIRST YEAR

B.A./B.SC. SECOND SEMESTER (January – June) 2014

Mid-Semester Examination, March 2014

COMPUTER SCIENCE (Honours)

Date : 24/03/2014

Time : 11 am – 1 pm

Paper : II

Full Marks : 50

[Use a separate Answer Book for each group]

Group – A

(Answer Question No. 1 and any two from the rest)

1. Answer any one from the following :
 - a) Given an array of n integers, outline an algorithm for reversing the contents of the array without using another array. You may use one temporary variable. [5]
 - b) What do you mean by Abstract Data Type? Write the value definition and operator definition for ADT FRACTION? [2+3]
2.
 - a) Let P be a problem and I & R be two algorithmic solution in which first one is non-recursive and second one is recursive. Which solution will you choose and why? Consider all possible scenarios. [3]
 - b) Suppose we have n elements and we have to store those elements in an efficient way such that an item can be found using minimum number of comparison operations. Suggest the basic concept to solve this problem. [No algorithm required] [2]
 - c) Outline an algorithm to create a singly linked list so that elements in the list are stored in ascending manner. [5]
3.
 - a) What do you mean by ‘inch-worm’ effect? State how can you implement a queue data structure using stack.[No algorithm required] [2+3]
 - b) Consider the following arithmetic expression P, written in infix notation, Convert it into its equivalent postfix notation and depict the stack for each step of your algorithm:
 $(a + b) * c * d / e \wedge f - g \wedge y \wedge q + (v * u * k / (m / n \wedge p))$ [5]
4.
 - a) How a Run-time stack handles a nested procedure call? Illustrate [3]
 - b) “Tail recursion is generally replaced with iteration” – Critically comment on it. [2]
 - c) Outline an algorithm to delete an item from any position of the linked list except the last node in O(1) time. Take necessary assumptions. [5]

Group – B

(Answer Question No. 5 and any two from the rest)

5. Answer any one from the following :
 - a) Find the number of significant figures in appropriate values, where true value is given as 1.5923 and its relative error as 0.1×10^{-3} . [5]
 - b) Establish the relation between difference operator Δ and $D(=\frac{d}{dx})$ of differential calculus. [2+3]
6.
 - a) Using suitable interpolation formula find the value of f(1.02) having given values as :

x :	1.00	1.10	1.20	1.30
f(x) :	0.8415	0.8912	0.9320	0.9636

Explain the reason behind your choice of interpolation formula. [4+1]
 - b) Using appropriate interpolation formula find value of $\log_{10} 3.5$, where given table as :

x :	2	3	5	7
$\log_{10} x$:	0.301	0.477	0.699	0.845

 [5]

7. a) Describe the Newton Raphson method with geometrical representation to find a root of given function. [4]
 b) Explain the convergence of method of Bisection to find the root of a given equation. [2]
 c) Estimate the missing term in the following table : [4]
- | | | | | | |
|--------|---|---|---|---|----|
| x : | 0 | 1 | 2 | 3 | 4 |
| f(x) : | 1 | 3 | 9 | – | 81 |
8. a) Calculate the value of $\int_0^1 \frac{x}{1+x} dx$ correct up to three significant figures, taking five intervals. Explain the reason behind your choice of integration formula used. [4+1]
 b) Explain the geometrical interpretation of Trapezoidal rule with formula for given two points. [3]
 c) Write down the procedural difference between Regula-Falsi and Secant method. [2]

