RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

FIRST YEAR [BATCH 2016-19]

B.A./B.Sc. SECOND SEMESTER (January – June) 2017

Mid-Semester Examination, March 2017

Date : 15/03/2017 **COMPUTER SCIENCE (Honours)**

Time : 11 am– 1 pm Paper : II Full Marks : 50

[Use a separate Answer Book for each group]

Group – A

Answer any five questions : [5×5]

1. a) What are row major and column major representation of an array? [2]
   b) Is it possible to have negative index of an array? [1]
   c) Determine the location of X[10][10] when the array is stored as column major. Given each element of array X[20][20] require 2 bytes. Base address is 1000. [2]

2. a) How do you perform a Stack's Pop operation in constant amount of time using a Singly Linked List. [2]
   b) Given a circular list, show that the list can be used as a queue by writing function to add and delete elements. [3]

3. a) Write a function to split a Doubly Linked List from a specific position. [3]
   b) Convert the expression $A\$B*C-D+E/F*(G+H)$ into postfix expression. [2]

4. Write a function to implement following operations :
   a) Sort a Doubly Linked List [2·5]
   b) Search a Singly Linked List for a particular element. [2·5]

5. a) What is ADT (Abstract Data Type)? [2]
   b) How do you analyse the performance of insertion and deletion operation in a non-contiguous linear list? [2]
   c) What is asymptotic tight bound? [1]

6. a) Write down the real life application of Stack. [2]
   b) If a Singly Linked List perform last insert and last delete operation to maintain a stack then what is time complexity of Stack's Push and Pop operation in that Singly Linked List? [2]
   c) What is the purpose of tail node in a doubly linked list? [1]

Group – B

Answer any five questions : [5×5]

7. a) Discuss about the different type of errors committed in numerical computation. [3]
   b) If $f(x)=2\cos x-5x$, find the relative percentage error in f(x) for x = 0, if the error is x = 0·02. [2]

8. a) Estimate the missing term in the following table : [2·5]

x	:	0	1	2	3	4
f(x)	:	1	3	9	–	81

   b) What is the restriction on Lagrangian functions? State and proof also. [2·5]

9. a) Using suitable interpolation formula find the value of f(1·1) from the following table : [3]

x	:	0	1	2	3
f(x)	:	1	2	11	34

b) If h is very small, prove that $\Delta^{n+1} f(x_0) \approx h^{n+1} f^{n+1}(x_0)$. [2]

10. a) Evaluate the composite Simpson's One-third Rule with the help of general Gauss-Legendre Quadrature formula. [3]

b) Explain the geometrical interpretation of trapezoidal Rule. [2]

11. a) Calculate the value of $\int_0^1 (5x - 3x^2)dx$, taking 10 intervals, by trapezoidal Rule.

Computer the exact value and find the absolute and relative errors in your result. [5]

12. Compute one root of $e^x - 3x = 0$, correct to two decimal places which between 1 and 2, using the bisection method. [5]

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