

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

FIRST YEAR

B.A./B.Sc. SECOND SEMESTER (January – June) 2015

Mid-Semester Examination, March 2015

Date : 19/03/2015

COMPUTER SCIENCE (General)

Time : 12 noon – 1 pm

Paper : II

Full Marks : 25

[Use a separate answer book for each group]

Group – A

(Answer any one question)

1. a) Consider a matrix A of size 25×4 whose base address is 200 and space required by each element is 4 words. Find the address of A[12][3] using—
 - i) Row major order
 - ii) Column major order[2+2]
- b) Compare and contrast between linear and non-linear data structure. [2+5]
- c) What do you mean by Exponential time and Polynomial time algorithm? Describe briefly the properties of an algorithm. [2+4]
2. a) Show that the time complexity of the following algorithm is $\theta(n^2)$.
Algo_mat_add (A, B, n)
 { Sum = 0
 for (i = 1 to n)
 {
 for (j = 1 to n)
 {
 c[i] [j] = a[i] [j] + B[i] [j]
 Sum = Sum + a[j] [j]
 }
 }
 }
 }
 return c
}
if each variable consumes 1 word per memory cell, then what will be the space complexity of the above algorithm. [6+2]
- b) If $f(n)$ is in $O(g(n))$ and $g(n)$ is in $O(z(n))$ then, prove that $f(n)$ is in $O(z(n))$. [3]
- c) Arrange the following complexities in ascending order :
 $O(n \lg n)$, $O(2^n)$, $O(n^3)$, $O(\lg n)$, $O(n^{2^n})$ [1+5]

Group – B

(Answer any one question)

3. a) Represent $(-20)_{10}$ in 16-bit 2's complement representation. [2]
- b) Explain arithmetic overflow with an example. [2+1+5]
- c) Differentiate between EPROM and EEPROM. [2]
- d) Represent $(-14.25)_{10}$ in IEEE standard double precision format. [3]
- e) What is early restart? [2]

4. a) Multiply 2_{10} and -3_{10} using Booth's algorithm. [4]
b) What is the advantage of floating point representation in normalized form? [1]
c) What is spatial locality of reference? [2]
d) Differentiate between SRAM and DRAM. [2+5]
e) Differentiate between L1 cache and L2 cache. [1]
f) "Write through protocol results in unnecessary write operations" —Justify. [2]

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