

Roll No.

Total Pages : 4

204203

May 2019

BCA-IIInd Semester

**MATHEMATICAL FOUNDATIONS OF
COMPUTER SCIENCE**

(BCA-17-108)

Time : 3 Hours]

[Max. Marks : 75

Instructions :

- (i) *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
- (ii) *Answer any four questions from Part-B in detail.*
- (iii) *Different sub-parts of a question are to be attempted adjacent to each other.*

PART-A

1. (a) What do you mean by correlation? (1.5)
- (b) Define coefficient of variance. (1.5)
- (c) Differentiate between homogeneous and non-homogeneous recurrence relations. (1.5)
- (d) Discuss mathematical notation of Big oh. (1.5)

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- (e) What is chromatic number for a complete graph? (1.5)
- (f) What is the difference between wheel graph and cyclic graph? (1.5)
- (g) Define recursion. (1.5)
- (h) State true or false : $n! = O(n^n)$ and justify your answer (1.5)
- (i) Write down the recursive relation for converting decimal number to binary number. (1.5)
- (j) What is the importance of euclidean algorithm? (1.5)

PART-B

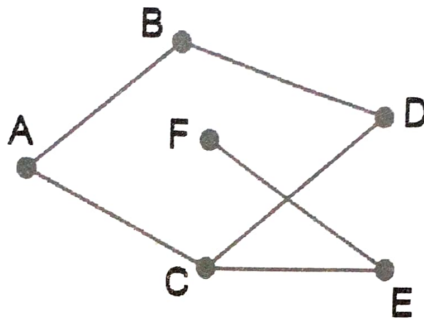
2. (a) Find the mean, median, mode and standard deviation for the following table where assumed mean is found to be 55 :

Marks	No. of students	Marks	No. of students
Above 0	80	Above 60	28
Above 10	77	Above 70	16
Above 20	72	Above 80	10
Above 30	65	Above 90	8
Above 40	55	Above 100	0
Above 50	43		

(10)

- (b) There are 300 students in a class and mean marks obtained by them in physics subject is 45. Mean of the top 100 of them was found to be 70 and the mean of the last 100 was found to be 20. What is the mean of the remaining 100 students? (5)

- (a) Write down the adjacent and incidence matrices for the given graph. (5)



- (b) Explain binary search algorithm and its complexity with the help of an example. (10)

4. Sort the given array A using merge sort and insertion sort :

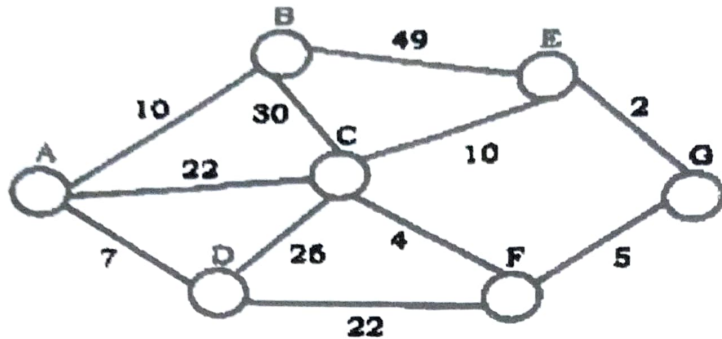
38	5	42	43	10	19	11	23	22	21
A[0]	A[1]	A[2]	A[3]	A[4]	A[5]	A[6]	A[7]	A[8]	A[9]

(15)

5. (a) Prove by induction that

$$1^3 + 2^3 + 3^3 + \dots + n^3 = \frac{n^2(n+1)^2}{4}. \quad (5)$$

- (b) Define trees. What is the minimum weight spanning tree of the following graph using prim's algorithm? Consider 'C' as the source vertex.



(10)

6. (a) Solve the recurrence relation :

$$a_n + 4a_{n-1} + 3a_{n-2} = 0$$

$$a_0 = 1, a_1 = 2$$

(8)

- (b) Explain briefly equivalence relation. Let $A = \{1, 2, 3, \dots, 9\}$ and let $\$$ be a relation on $A \times A$ defined by $(a, b) \$ (c, d)$ if $a + d = b + c$. Determine whether $\$$ is an equivalence relation and justify your answer.

(7)

7. Explain briefly :

- (a) Public key encryption schemes.
- (b) Complete bipartite Graph.
- (c) Regular Graph.
- (d) Complement of a graph.
- (e) Isomorphic graph.

(15)