

7. (a) (i) Convert the decimal number  $(413.75)_{10}$  into binary number.
- (ii) Convert the binary number  $(1001.1101)_2$  into decimal number.
- (b) Explain merge sort and sort these elements by using merge sort 14, 72, 20, 9, 16, 27, 19 in increasing order.

**UNIT - IV**

8. (a) Solve the recurrence relation subject to given initial conditions :

$$a_n = 5a_{n-1} - 6a_{n-2}, n > 2, a_1 = 1.5, a_2 = 3$$

- (b) Using principle of mathematical induction, prove that :

$$1 + 3 + 3^2 + 3^3 + \dots + 3^{n-1} = (3^n - 1)/2$$

9. (a) Find the g.c.d. of 190 and 34. Also find  $x$  and  $y$ , if g.c.d.  $(190, 34) = 190x + 34y$ .
- (b) Solve the congruences :  $342x = 5 \pmod{13}$

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Roll No. ....

**97667**

**B.C.A. 2nd Semester  
Examination – May, 2019**

**MATHEMATICAL FOUNDATION OF COMPUTER  
SCIENCE**

Paper : BCA-108

*Time : Three Hours ]*

*[ Maximum Marks : 80*

*Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.*

**Note :** Question No. 1 is *compulsory*. Attempt *four* questions by selecting *one* question from each Unit. All questions carry equal marks.

1. (a) Find the median of the following series :  
25, 20, 23, 32, 40, 27, 30, 25, 20, 10, 55, 41
- (b) What do you mean by correlation ?
- (c) Explain the properties of algorithm.
- (d) What is directed graph ?

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- (e) Define all the properties of tree.
- (f) What is bubble sort ?
- (g) Define LHRRWCC.
- (h) Find the first six terms of the sequence  
 $a_n = 8a_{n-1}, n > 1, a_1 = 7.$

### UNIT - I

2. (a) Find the Geometric mean of the following series :

x :	8	10	12	14	16	18
f :	5	10	20	18	15	11

- (b) Calculate the mode for the following frequency distribution :

Class Interval :	5-15	15-25	25-35	35-45	45-55	55-65
Frequency :	4	6	10	5	3	2

3. (a) The mean of 5 observations is 4 and variance is 5.2. If three of the five observations are 1, 2 and 6, find the other two observations.

- (b) Calculate Karl Pearson's coefficient of correlation for the data given below :

x :	20	13	18	21	11	12	17	14	19	15
y :	17	22	23	25	14	18	19	21	22	19

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### UNIT - II

4. (a) Define algorithm. Write an algorithm to find whether given number is prime or not.
- (b) Define Binary search algorithm. Find the number of comparisons required to search 8 in the sequence 2,4,5,7,8,10,12,18 using binary search.

5. (a) Find the adjacency matrix of the following graphs :

- (i)  $K_4$   
 (ii)  $K_{2,3}$   
 (iii)  $K_{1,4}$

- (b) Define Bipartite, Complete Bipartite and Planar graph with example.

### UNIT - III

6. (a) What is spanning tree ? Explain the depth first search (DFS) method for constructing spanning tree for a connected simple graph.

- (b) Draw the binary tree for the following in-order and post-order traversals :

In order : H E A F B J G D C I

Post-order : H A B J F E C I D G

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