

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 :

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

- (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 : $342x \equiv 5 \pmod{13}$

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 ?

- (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 :	16	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

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