

UNIT - IV

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

$$a_n = 7a_{n-1} - 10a_{n-2} \text{ for } n \geq 2 \text{ with } a_0 = 0 \text{ and } a_1 = 3$$

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

$$1 + 4 + 7 + \dots + (3n - 2) = \frac{n(3n - 1)}{2}, \text{ for all } n \in \mathbb{N}$$

9. (a) Show that g.c.d of  $a + b$  and  $a - b$  is either 1 or 2 if  $(a, b) = 1$ .
- (b) Solve the congruence  $15x \equiv 12 \pmod{21}$
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Roll No. ....

97667

BCA 2nd Semester

Examination - July, 2021

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 :** Attempt *five* questions in all, selecting *one* question from each Unit. Question No. 1 is *compulsory*. All questions carry equal marks.

1. (a) Find the arithmetic mean of the marks obtained by 10 students of a class given as :  
29, 77, 85, 48, 55, 79, 90, 45, 34, 76
- (b) Find the mode of the following series :  
3, 5, 6, 2, 5, 4, 5, 9, 5
- (c) What is binary search algorithm ?
- (d) Define time complexity of an algorithm.

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(e) What is complete binary tree ?

(f) What is postorder traversal algorithm ?

(g) What is Fibonacci sequence ?

(h) Find the first four terms of a sequence from the formula  $a_n = 3a_{n-1}$  where  $n \geq 1$  with initial condition  $a_0 = 2$

### UNIT - I

2. (a) In the following frequency distribution the frequency of the class interval 40-50 is missing. It is known that the mean of the distribution is 52. Find the missing frequency.

Class Interval :	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency :	5	3	4	?	2	6	13

(b) The following table gives the daily expenditure of 100 families. Find the median of daily expenditure.

Daily Expenditure (Rs.) :	0-10	10-20	20-30	30-40	40-50
No. of Families :	14	23	27	21	15

3. (a) The mean and standard deviation of 20 items is found to be 10 and 2 respectively. It was later discovered that one item 12 was wrongly recorded as 8. Calculate the correct mean and standard deviation.

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

X :	5	10	15	20	22	25	30
Y :	10	12	8	7	6	5	3

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### UNIT - II

4. (a) What are the various characteristics of an algorithm ? Write an algorithm to find the smallest of three numbers.

(b) What do you mean by best case and worst case time complexity of an algorithm ? Explain in detail.

5. (a) Define loops and parallel edges with the help of example.

(b) Define complete graph with the help of example.

(c) Define Euler graph with the help of example.

(d) Explain matrix representation of graphs with the help of example.

### UNIT - III

6. (a) Prove that in any tree (with two or more vertices), there are at least two pendant vertices.

(b) What is spanning tree ? Explain various methods for constructing spanning tree for a connected simple graph.

7. (a) (i) Convert the decimal number 74.125 into its binary equivalent.

(ii) Convert the binary number 11011101 into its decimal equivalent.

(b) Sort the following list : 7, 8, 4, 6, 1, 0, 9 using insertion sort.

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