

Roll No. :

Total No. of Questions : 11]

[Total No. of Printed Pages : 3

BPMS-528

M.Sc. (Previous) Examination, 2023

COMPUTER SCIENCE

Paper - MCS-106

(Mathematics for Computer Science)

Time : 3 Hours]

[Maximum Marks : 50

Section-A

(Marks : 2 × 10 = 20)

Note :- Answer all *ten* questions (Answer limit **50** words). Each question carries **2** marks.

Section-B

(Marks : 3 × 5 = 15)

Note :- Answer all *five* questions. Each question has internal choice (Answer limit **200** words). Each question carries **3** marks.

Section-C

(Marks : 5 × 3 = 15)

Note :- Answer any *three* questions out of five (Answer limit **500** words). Each question carries **5** marks.

Section-A

1. (i) Write the expression for binomial theorem and explain the terms.

BRI-887

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BPMS-528 P.T.O.

- (ii) What is the major difference between permutation and combination ?
- (iii) Find the dot product of the following vectors :

$$\vec{x} = \hat{i} + \hat{j} + \hat{k}$$

$$\vec{y} = \hat{i} - \hat{k}$$

- (iv) Write the truth table for conditional statement.
- (v) Define finite automata as model of computation.
- (vi) Define any *two* extremal elements of a poset.
- (vii) Give an example of one-to-one function.
- (viii) What do you mean by continuous random variable ?
- (ix) Give an example of Eulerian circuit.
- (x) What is the main difference between a path and a circuit ?

Section-B

2. Suppose you forget the pin for your ATM card. Suppose the pin is of four digits. How many different permutations (maximum) you will have to use, to find the correct pin ?

Or

Find the expansion of the following :

$$(2x - 5y)^7$$

3. Find the vector product of the following vectors :

$$\vec{a} = \hat{i} - 5\hat{k}$$

$$\vec{b} = \hat{i} - 6\hat{j}$$

Or

Explain different types of quantifiers with suitable examples.

4. Explain the procedure to find the transitive closure.

Or

Find the Hasse diagram of divisibility relation on set (5, 10, 11, 25, 33).

5. Find the equation of line passing through the points (0, 2) and (-5, 7).

Or

Considering a suitable example, explain the concept of conditional probability.

6. How do you find the chromatic number of a graph ?

Or

Write any *three* applications of travelling salesman problem.

Section-C

7. How many different words are possible using the letters of 'EXAMINATION' ?
8. Prove the following using Mathematical induction :

$$\sum_{k=1}^n K^3 = \left(\frac{n(n+1)}{2} \right)^2$$

where n is a natural no.

9. Explain different types of grammars as per Chomsky hierarchy.
10. Find the equation of circle with centre (2, 5) and passing through (-2, 0).
11. Describe the concept of rooted and binary trees with suitable examples.