

This question paper contains 4 printed pages]

ND—10—2023

FACULTY OF SCIENCE & TECHNOLOGY

B.Sc. (C.S.) (Second Year) (Third Semester) EXAMINATION

NOVEMBER/DECEMBER, 2023

(CBCS/Revised Pattern)

MATHEMATICAL TECHNIQUES IN COMPUTER SCIENCE

(Friday, 1-12-2023)

Time : 2.00 p.m. to 5.00 p.m.

Time—Three Hours

Maximum Marks—75

N.B. :— (i) All questions are compulsory.

(ii) Figures to the right indicate full marks.

(iii) Assume suitable data, if required.

(iv) Each question carries equal marks.

1. Attempt any *five* of the following :

15

(a) Explain Venn diagrams.

(b) State divisibility test of 3 and 4.

(c) Describe matrix.

(d) Explain determinant of matrix.

- (e) Explain complete graph.
- (f) Describe axioms of probability.
- (g) Explain equivalence relation.

2. Attempt any *three* of the following :

15

- (a) Explain properties of sets.
- (b) State and verify *two* associative properties of set union and intersection with help of suitable example.
- (c) Describe H.C.F. and L.C.M.

(d) If sets :

$$A = \{3, 5, 6, 8, 9\},$$

$$B = \{0, 2, 4, 7, 8\},$$

$$C = \{1, 3, 4, 5, 8\}$$

$$U = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$$

then find :

- (i) $(A \cup C) \cap B$
 - (ii) $(C \cap B) \cup A$
 - (iii) $C - B$
 - (iv) $A - C$
 - (v) $A' \cup B$
- (e) A car is running at a speed of 108 kmph. What distance will it cover in 15 seconds ?

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(3)

ND—10—2023

3. Attempt any *three* of the following : 15

(a) Explain arithmetic and geometric progressions.

(b) If :

$$A = \begin{bmatrix} 5 & -4 & 1 \\ -2 & 3 & 2 \\ 4 & -1 & 4 \end{bmatrix}$$

then find the inverse of matrix A.

(c) Find H.C.F. and L.C.M. of 120, 150 and 175.

(d) Find the adjoint of matrix :

$$A = \begin{bmatrix} 5 & 3 & -1 \\ 4 & 1 & 0 \\ 6 & 2 & -2 \end{bmatrix}$$

(e) A does a work in 8 days and B does the same work in 12 days. In how many days they together will do the same work ?

4. Answer any *three* of the following : 15

(a) Explain event.

(b) Two dice are thrown together. What is the probability that the number obtained on one of the dice is multiple of number obtained on the other dice ?

P.T.O.

- (c) From a pack of 52 cards, three cards are drawn at random. Find the probability that each card is from different suit.
- (d) Explain relation.
- (e) Describe operation on set.

5. Attempt any *three* of the following :

15

- (a) Explain degree of vertices.
- (b) Describe walk and path.
- (c) Write a note on isomorphism of graphs.
- (d) Prove that the number of vertices of odd degree in a graph is always even.
- (e) Determine whether relation R in the set $A = \{1, 2, 3, 4, 5, 6\}$ as $R = (x, y) : y \text{ is divisible by } x$ is reflexive, symmetric and transitive.