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**GF—13—2023**

**FACULTY OF SCIENCE AND TECHNOLOGY**

**B.Sc. (CS) (Second Year) (Third Semester) EXAMINATION**

**APRIL/MAY, 2023**

**(CBCS/Revised Pattern)**

**COMPUTER SCIENCE**

**(Mathematical Techniques in Computer Science)**

**(Friday, 21-4-2023)**

**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) Write a note on complement of a set.
  - (b) State divisibility test of 5 and 7.
  - (c) Describe equality of matrices.
  - (d) Explain transpose of a matrix.
  - (e) Explain self-loop and parallel edges.
  - (f) Describe probability.
  - (g) Explain relation on sets.

P.T.O.

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

- (a) Explain types of sets.
- (b) State and verify two distributive properties of set union and intersection with the help of suitable example.
- (c) Describe arithmetic progression and geometric progression.
- (d) If sets

$$A = \{a, b, e, i, o, u, x, y\},$$

$$B = \{c, d, e, f, k, m, u, w, z\} \text{ and}$$

$$U = \{a, b, c, \dots\dots\dots, x, y, z\}$$

then find :

- (i)  $A \cup B$
- (ii)  $A \cap B$
- (iii)  $A - B$
- (iv)  $B - A$
- (v)  $A' \cup B$
- (e) Rohit runs 175 meters race in 25 seconds. His speed is in km/hr is how much ?

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

- (a) Explain Time and Work, Time and Distance.
- (b) If

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

then find :

(i)  $A + B$

(ii)  $A.B$

(c) Find H.C.F. and L.C.M. of

$$2^4 \times 3^4 \times 5^3; 2^3 \times 3^2 \times 5^2 \times 7^2 \text{ and } 2^2 \times 3^5 \times 5 \times 6^3 \times 7^2$$

(d) Verify that :

$$A \cdot \text{adj } A = |A| \cdot I;$$

given that :

$$A = \begin{bmatrix} 1 & 1 & 2 \\ 2 & -1 & 1 \\ 2 & 2 & 1 \end{bmatrix}.$$

(e) A and B together can complete a piece of work in 6 days and A can complete the same work alone in 10 days. In how many days can B alone complete the work ?

4. Attempt any *three* of the following :

15

(a) Explain sample space.

(b) A coin is thrown 3 times, what is the probability that at least one head is obtained ?

(c) What is the probability of getting a sum of numbers on upper faces is 7, when two dice are thrown ?

(d) Explain types of relation.

(e) Describe properties of relation.

P.T.O.

5. Attempt any *three* of the following :

15

- (a) Explain subgraph.
- (b) Describe walk, path and circuit.
- (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 Z of all integers defined as :

$$R = \{(x, y) : x - y \text{ is an integer}\}$$

is reflexive, symmetric and transitive.