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Reg. No.

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II Semester B.C.A.6. (NEP) Degree Examination, September/October - 2022

## DISCRETE MATHEMATICAL STRUCTURES

(Regular)

Time : 2 Hours

Maximum Marks : 60

*Instructions to Candidates :* Question paper has 5 questions. Answer all 5 questions.

1. Answer any Six questions. (6×2=12)
- Define Tautology.
  - If  $A = \{1, 2, 3, 4\}$  and  $B = \{4, 5, 6, 7, 8\}$  then find
    - $A \cup B$
    - $A \cap B$
  - Define permutation.
  - Define pigeonhole principle.
  - State well ordering principle.
  - Define equivalence relation.
  - Define euler path.
  - Define planar graphs.
2. Answer any Three questions. (3×4=12)
- Define
    - Converse and
    - Inverse. Write the converse and inverse of "If two triangles are congruent then they are similar".
  - Show by means of truth table that
    - $\sim (p \vee q) \leftrightarrow \sim p \wedge \sim q$ .
    - $\sim (p \wedge q) \leftrightarrow \sim p \vee \sim q$ .
  - Test the validity of the Argument. "If you work hard, then you will pass the course. If you pass the course, then you get a job. Therefore, if you work hard, then you get a job".
  - Prove by Direct Method. "If  $x$  is an even integer then  $x^2$  is an even integer".

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3. Answer any **Three** questions. (3×4=12)
- Find the number of permutations of the word "KARNATAKA" and permutation if all A's together.
  - Out of 17 players, 5 are bowlers how many ways a Cricket team can be formed using atleast 3 bowlers.
  - In a class of 52 students, 30 are studying AI, 28 are studying M.L and 13 are studying both subjects. How many in the class are studying atleast one of the subject? How many are studying neither of these subjects.
  - Write a note on divide and conquer algorithms.
4. Answer any **Three** questions. (3×4=12)
- Prove by the method of Mathematical Induction.  
$$1 + 2 + 3 + \dots + n = \frac{n(n+1)}{2}$$
  - Let  $A = \{a, b, c, d\}$  where  $R = \{(a, a), (a, d), (b, d)\}$  and  $S = \{(a, d), (b, c), (b, d), (c, d)\}$ . Find  $RoS$ ,  $SoR$ ,  $R^2$  and  $S^2$ .
  - Let  $A = \{1, 2, 3, 4\}$  and  $R = \{(1, 1), (1, 2), (1, 3), (2, 1), (2, 2), (3, 1), (2, 3), (3, 2), (3, 3), (4, 4)\}$  S.T. 'R' is an Equivalence Relation.
  - Write note on Properties of Relation.
5. Answer any **Three** questions. (3×4=12)
- Define a planar graph and graph Isomorphism.
  - Define simple graph, Multi - graph, Directed and undirected graph.
  - Write the Recursive formula for the sequence 3, 7, 11, 15, 19, 23,..... (2)
    - Define In-Degree and Out - Degree. (2)
  - Mention  $A \cup B$  &  $A \cap B$  operations on sets with Mathematical notation and Venn Diagram for each operation.
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