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B040230

Reg. No. | | | | | | | | |

II Semester B.C.A. 6 (NEP) Degree Examination, August/September - 2024

DISCRETE MATHEMATICALS

(Regular/Repeater)

Time : 2 Hours **Maximum Marks : 60**

Instructions to Candidates :

1) Question Paper has Five questions.
2) Answer all Five questions.

Answer any **Six** questions. **(6×2=12)**

1. a. If A={1, 2, 4, 6, 8} and B={2, 4, 5, 9}. Find A-B.

   b. If p, q and r propositions are false then find the truth value of $(p \vee q) \rightarrow r$.

   c. Find the number of permutations of the letters of the word "INSTITUTION".

   d. Write the recursive formula for the sequence 3, 7, 11, 15, 19, 23, ...

   e. Define symmetric relation.

   f. Define Pigeon hole principle.

   g. Define Multi-Graph.

   h. Define Euler path.

Answer any **Three** questions. **(3×4=12)**

2. a) Prove the Logical Equivalence using Laws of Logic. $(p \vee q) \wedge \neg(\neg p \wedge q) \Leftrightarrow p$.

   b) 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.

   c) Give a direct proof of the statement.

   "If 'n' is an odd integer then n^2 is an odd integer".

   d) Write a note on Rules of Inference.

[P.T.O.

Answer any **Three** questions. **(3×4=12)**

3. a) Find the number of permutations of the letters of the word "ASSASSINATION" and also find in how many of these 3A's are together.

b) A committee of 8 members is to be choosen from 9 teachers and 4 students. In how many ways can this be done if there is to be a majority of teachers.

c) In a sample of 100 chips, 23 have a defect D_1, 26 have a defect of D_2, 30 have a defect of D_3, 7 have defects of D_1 and D_2, 8 have defect of D_1 and D_3, 10 have defects of D_2 and D_3 and 3 have all the three defects. Find the number of chips having:

i) Atleast one defect

ii) No defect.

d) Write a note on Divide and Conquer Algorithms.

Answer any **Three** questions. **(3×4=12)**

4. a) Prove by Mathematical Induction that for all positive integers $1+2+3+....+n=\frac{n(n+1)}{2}$

b) Let A={a, b, c, d} and let R be a relation on A, that has the matrix $M_R = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 1 & 1 & 1 & 0 \\ 0 & 1 & 0 & 1 \end{bmatrix}$

Construct the diagraph of R and list in-degrees and out-degrees of all vertices.

c) Let A={1, 2, 3, 4} and B={a, b, c}.

Let R={(1, a), (1, b), (2, b), (2, c), (3, b), (4, a)} and

Let S={(1, b), (2, c), (3, b), (4, b)}. Compute $\bar{R}$, $R \cap S$, $R \cup S$, and R^{-1}

d) Let A={1, 2, 3, 4} where R{(1, 1),(1, 4),(2, 4)}

and S={(1, 4), (2, 3), (2, 4), (3, 4)}. Find RoS, SoR, RoR and SoS.

Answer any **Three** questions. **(3×4=12)**

5. a) Define Null graph, Simple Graph, Connected and Disconnected graphs.

b) Define a Planar graph and graph Isomorphism.

c) Write a note on Properties of Relations.

d) Define one-to-one function. The function $f: R \to R$ is defined by $f(x)=3x+2$ for all $x \in R$. Verify that f is one-to-one function.