47753/BO230

Reg. No. ☐☐☐☐☐☐☐☐

II Semester B.C.A. 6 Degree Examination, September/October - 2023
DISCRETE MATHEMATICS
(Regular/Repeater)

Time : 2 Hours

Maximum Marks : 60

Instructions to Candidates:

1) All Sections are Compulsory.
2) Draw diagrams and graphs if necessary.

Answer any Six questions.

(6×2=12)

1. a) Define logical connectives.

   b) If $U = \{1,2,3,4,5,6,7,8\}$ and $A = \{1,2,3,4\}$ $B = \{3,4,7\}$ then find $\overline{A \cup B}$.

   c) Find the number of Permutations of the letter of the word "GAME".

   d) Find the first five terms of a sequence from the recursive formula $a_n = 3a_{n-1} - 1$ $n \geq 1$, with the initial condition $a_0 = 2$.

   e) Define equivalence relation.

   f) State well - ordering principle

   g) Define Graphs.

   h) Define Hamilton Paths.

2. Answer any Three questions.

(3×4=12)

   a) If   P: A circle is conic,

   q: $\sqrt{5}$ is a real number.

   r: exponential series is convergent.

   Express the following compound propositions in words :

   i) $[p \wedge (\sim q)]$

   ii) $[(\sim p) \vee r]$

   iii) $[p \rightarrow (q \vee r)$

   iv) $[\sim p \rightarrow q) \wedge r]$

[P.T.O.

b) Prove the following Proposition is a tautology $[(p \to q) \land (q \to r)] \to [p \to r]$

c) Test the validity of Argument. "If Ram goes out with friends then his father becomes angry. His father not angry. There fore Ram has not gone out with friends".

d) Prove that by Indirect method.

"If m is an odd integer. then MTF is an even integer".

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

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

b) In an examination a student has to answer 6 out of 8 questions in Part - A and 3 out of 4 questions in Part - B in how many ways he can select his questions?

c) Explain the principle of Inclusion -exclusion

d) Explain Divide and conquer Algorithm.

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

a) Prove by the mathematical Induction that $1^2 + 2^2 + 3^2 + \dots + n^2 = \dfrac{n(n+1)(2n+1)}{6}$

b) Write a note on properties of Relations.

c) Let A = {1,2,3,4,} & R = {(1,1) (1,2) (2,3) (3.4)} & S = {(3.1) (4.4) (2.4) (1.4)} be relations on A. Determine the relations RoS, SoR. R^2 & S^2.

d) Let A = {a,b,c,d} and

R = {(a,a) (a,b) (b,a) (b,b) (c,a) (c,c) (a,c) (d,a) (dd)} be a relation on A.

Is R is an equivalence relation?

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

a) Define finite and Infinite graph. Pseudo graph. With example.

b) Explain any four operations on set.

c) Let $A = \{1,2,3,4,\}$ and R be relation on a A defined by x R y if and only if

"x divides y" written x/y

i) Write down R as a set of ordered pairs.

ii) Draw digraph of R

iii) Determine In-degrees and out degrees of vertices in digraph.

d) Define Eular graph and graph Isomorphism.

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