32323/C 230

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

III Semester B.C.A. 3 Degree Examination, Nov./Dec. 2018
(Repeater)
DISCRETE MATHEMATICAL STRUCTURES

Time : 3 Hours | Max. Marks : 80

Instructions : ***1) Answer the questions as per instructions.***
2) Simple calculators are allowed.
3) Answer all questions.

SECTION – A

I. Answer **any ten** questions : **(10×2=20)**

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

b) Define combination with example.

c) Give counter example to disprove the statement "Only odd numbers are prime".

d) Define quantifier.

e) State induction principle.

f) If p is true and q is false, then find the truth value of $p \wedge (\sim p \vee q)$.

g) Find the number of positive divisors of 960.

h) Define reflexive relation.

i) If A = {a, b, c} and B = {c, d,e} find (A – B) × (A ∩ B).

j) Let A = {1, 2, 3, 4} and let R be the relation on A defined by aRb if and only if a > b.

k) Let a function f : R → R defined by $f(x) = X^4 + 5x + 1$. Determine the image of subset $A_1 = \{-1, 4\}$ of R.

l) Consider the functions f and g defined by $f(x) = X^2$ and $g(x) = X^3+2$ $\forall x \in R$ find gof.

SECTION – B

II. Answer **any four** questions : **(4×5=20)**

2) Find the number of permutations of :

a) All the letters

b) With all P's together of the word "PEPPER".

3) For any three sets prove that $A \cap (B \cap C) = (A \cap B) \cap C$.

4) Give direct proof of the statement "If m and n is odd then m + n is even and mn is odd".

5) Prove by the method of mathematical induction that $1+2+3+4+.... + n = \frac{1}{2}n(n+1)$.

6) Find the GCD of 595 and 252 and express it in the form 595m + 252 n.

7) Let A = {1, 2, 3, 4} and R = {(1, 1) (1, 2), (2, 1) (2, 2) (2,3), (2, 4) (3, 4), (4,1)} draw the diagraph of R and matrix representation of R.

P.T.O.

SECTION – C

III. Answer **any four** questions : **(4×10=40)**

8) a) Prove that addition principle using Venn diagram.

b) A fair die is thrown (tossed) twice. Find the probability that :

i) Even numbers occur on both throws and

ii) An even numbers occurs in at least one throw. **(5+5=10)**

9) a) Prove that $p \rightarrow (q \rightarrow r) \Leftrightarrow (p \wedge q) \rightarrow r$.

b) State any five rules of inference along with their names. **(5+5=10)**

10) 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) Find the number and sum of all positive divisors of 5445. **(5+5=10)**

11) a) Explain operations on relations.

b) Consider sets A = {a, b, c} and B = {1, 2, 3} and the relation R = {(a, 1), (b, 1), (c, 2), (c, 3} and S = {(a, 1), (a, 2), (b, 1), (b, 2)} from A to B. Determine $\overline{R}, \overline{S}, R \cup S$ and $R \cap S$. **(5+5=10)**

12) Write a short notes :

a) Pigeon hole principle

b) Logical connectives and truth table

c) Function

d) Quantifiers and their types. **10**