25131

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

II Semester B.Voc. (IT) Degree Examination, September - 2021
DISCRETE MATHEMATICAL STRUCTURES
(CBCS Scheme)
Paper : 201

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates: Answer All sections.

SECTION-A

Answer any **TEN** questions : **(10×2=20)**

1. If $A = \{1,2,3\}$ and $B = \{3,4,5\}$, find A-B.
2. If $A = \{x : x \in N \text{ and } x < 4\}$ and B = {4,5} Find $A \cup B$.
3. If $A = \{x^2 - 5x + 6 = 0 \text{ and } x \in N\}$ and B = {3,4} Find $A \times B$.
4. Write the truth table for $\sim p \rightarrow q$.
5. If $p \vee q$ is false then write the truth values of p and q.
6. Define logical equivalence.
7. If $f : R \rightarrow R$ is defined by $f(x) = 2x + 5$ then find $f^{-1}(x)$.
8. Write the two types of quantifiers.
9. Negate the statement "All teachers teach well and some students pass".
10. Define Universal quantifier.
11. Define Homomorphism.
12. Define weighted graph and spanning tree?

SECTION-B

Answer any **FIVE** of the following. **(5×10=50)**

13. a. If A = {1,2}, B = {5,7} and C = {3,7}, then verify $A \times (B \cap C) = (A \times B) \cap (B \times C)$. **(5)**

    b. In a group of 80 people, 42 like coffee, 60 like tea and each person like at least one of the two kinds. Find how many people like both coffee and tea? **(5)**

[P.T.O.

14. a. Prove that $\sim (p \leftrightarrow q) \equiv [(\sim p \wedge q) \vee (\sim q \wedge p)]$. (5)

b. Write the truth table for $[(p \wedge q) \wedge \sim (p \vee q)]$. (5)

15. a. Establish the validity of the following statement by means of truth table and determine which rows of the table are crucial for assessing the validity of the argument and which row can be ignored. (5)

b. With usual notation prove that $\sim [\forall x\, p(x) \cap q(x)] \equiv \sim \exists x\, p(x) : q(x)$ where p(x) and q(x) be two open sentences with same replacement set. (5)

16. a. Prove by Mathematical induction

$$1+2+3+4+5+\ldots\ldots = \frac{n(n+1)}{2}$$ (5)

b. Prove that $10^{2n-1}+1$ is divisible by 11. (5)

17. a. If $f : R \to R$ is defined by $f(x) = 5x - 7$ prove that f is one - one and onto. (5)

b. If $f(x) = 4x + 3$ and $g(x) = x^2 - 1$ find *fog and gof* . (5)

18. a. Give the Spanning Tree Alogrithm. (5)

b. Write the chromatic polynomial of a connected graph on three vertices. (5)

19. a. If f is a homomorphism of a ring R into ring R' then prove that is $f(0) = 0'$ where 0 is the zero element of R and $0'$ is the zero element of R'.

ii) $f(-a) = -f(a) \forall a \in R$. (5)

b. If $(Z, +, \bullet)$ be the ring of integers and $(2Z, +, \bullet)$ be the ring of even integers. Define $f : Z \to 2Z$ by $f(x) = 2x \forall x \in Z$ is not a homomorphism. (5)

20. Prove that every homomorphic to some residue class ring there of. (10)