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

Question Paper Code: 45021

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2020

Fifth Semester

Computer Science and Engineering

14UMA521 - DISCRETE MATHEMATICS

(Regulation 2014)

(Common to IT Branch)

Duration: 1.15 hrs Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

(Answer any six of the following questions)

1. Let $P(x): x < 32$ and $Q(x): x$ is a multiple of 10 with universe of discourse as all positive integers. Then the truth value of $(\exists x)(P(x) \rightarrow Q(x))$is
   (a) True (b) False (c) 10 (d) 20

2. $P \rightarrow Q$is equivalent to
   (a) $\neg Q \rightarrow P$ (b) $Q \rightarrow P$ (c) $P \rightarrow \neg Q$ (d) $\neg Q \rightarrow \neg P$

3. In how many different ways can the letters of the word 'LEADING' be arranged in such a way that the vowels always come together?
   (a) 620 (b) 710 (c) 720 (d) 610

4. The numbers of ways in which 6 boys and 4 girls be arranged in a straight line so that no two girls are together is
   (a) 10^{P_6} (b) 604800 (c) 720 (d) 17280

5. A vertex of degree one is called
   (a) Isolated vertex (b) Unit vertex (c) Pendant vertex (d) Proper vertex

6. The number of vertices in a regular graph of degree 4 with 10 edges is
   (a) 4 (b) 10 (c) 6 (d) 5

7. A ring with identity $(R, +, .)$ is a field if
   (a) $(R, +)$ is commutative
   (b) Every non-zero element has a multiplicative inverse
   (c) Both (a) and (b)
   (d) Only (b) not (c)

8. The necessary and sufficient condition for a non-empty subset H of a group G to be a subgroup when $a, b \in H$is
   (a) $a^{-1} * h * a \in H$ (b) $a^{-1} * b \in H$
   (c) $a^{-1} * b^{-1} \in H$ (d) $(a * b)^{-1} \in H$

9. The value of $(a.b)' + (a + b)'$ is
   (a) $a'.b'$ (b) $a' + b'$ (c) 0 (d) 1

10. The value of $(\mathrm{a.b})' + (\mathrm{a} + \mathrm{b})'$ is
   (a) $a'.b'$ (b) $a' + b'$ (c) 0 (d) 1

PART – B (3 x 8= 24 Marks)

(Answer any three of the following questions)

11. Obtain the principal disjunctive and principal conjunctive normal forms of $\big(P \to (Q \wedge R)\big) \wedge \big(\sim P \to (\sim Q \wedge \sim R)\big)$. (8)

12. Solve the recurrence relation $y_{n+2} - 6y_{n+1} + 9y_n = 0,\ y_1 = 4\ and\ y_0 = 1$. (8)

13. Find the adjacency matrix of the following graph *G*.

    Find $A^2, A^3$and $Y = A + A^2 + A^3 + A^4$. What is your observation of entries in A^2andA^3? (8)

14. Let $*$ be defined on R by $x * y = x + y + 2xy\ \forall x, y \in R$. Check whether $(R,*)$ is a monoid (or) not. Is it commutative? Also find the inverses of $(R,*)$. (8)

15. Prove that De Morgan's laws hold good for a complemented distributive lattice. (8)