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

Question Paper Code: 45021

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

Fifth Semester

Computer Science and Engineering

01UMA521 – DISCRETE MATHEMATICS

(Common to Information Technology)

(Regulation 2013)

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) $\urcorner Q \rightarrow P$ (b) $Q \rightarrow P$ (c) $P \rightarrow \urcorner Q$ (d) $\urcorner Q \rightarrow \urcorner P$

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. A Lattice $(L, \wedge, \vee)$ is said to be modular if for $a \leq c$, then

(a) $a \vee b = b \vee c$
(b) $a \vee (b \vee c) = a \wedge (b \wedge c)$
(c) $a \wedge (b \wedge c) = a \vee (b \wedge c)$
(d) $a \vee (b \wedge c) = (a \vee b) \wedge c$

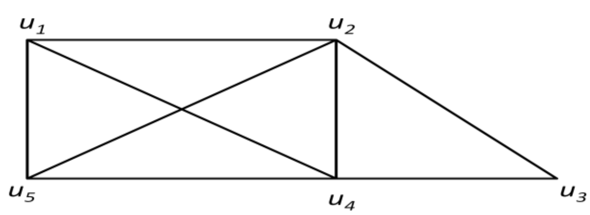
PART – B (3 x 8= 24 Marks)

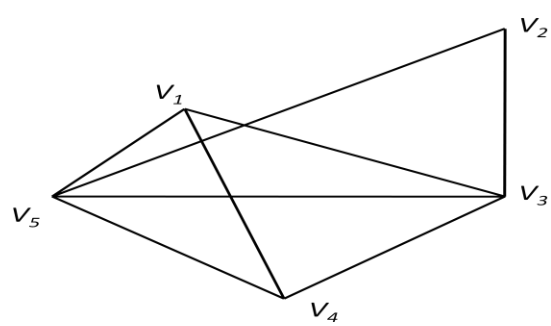
(Answer any three of the following questions)

11. Show that $(p \to q) \wedge (r \to s), (q \to t) \wedge (s \to u), \urcorner(t \wedge u) and \ (p \to r) \Rightarrow \urcorner p$. (8)

12. Use the method of generating function to solve the recurrence relation $a_n = 4a_{n-1} - 4a_{n-2} + 4^n$; $n \geq 2$ given that $a_0 = 2$ and $a_1 = 8$. (8)

13. Determine whether the following pairs of graphs are isomorphic. (8)





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14. Prove that the intersection of two subgroups of a group G is also a subgroup of G. (8)

15. Show that the complement of every element in a Boolean algebra is unique. (8)