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**Reg. No. :**

**Question Paper Code:45001**

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2017

FifthSemester

Computer Science and Engineering

14UMA521 -DISCRETE MATHEMATICS

(Regulation 2014)

(Common to IT Branch)

Duration: Threehours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. is equivalent to ­­­­­­­­­­­­­­

(a) (b) (c) (d)

2. Let with universe of discourse as all

 positive integers. Then the truth value of is

 (a) True (b) False (c) 10 (d) 20

3. Solve for n:

 (a) 2 (b) 6 (c) 4 (d) 42

4. In how many different ways can the letters of the word 'LEADING' be arranged in such a

way that the vowels always come together?

1. 620 (b) 710 (c) 720 (d) 610

5. The number of vertices in a regular graph of degree 4 with 10 edges is

 (a) 4 (b) 10 (c) 6 (d) 5

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. The set of all real number usual multiplication is not a group, since

 (a) Multiplication is not a binary operation (b) Multiplication is not associative

 (c) Identity element does not exist (d) Zero has no inverse

8. The necessary and sufficient condition for a non-empty subset of a group to be a

 subgroup when is

 (a) (b) (c) (d)

9.A self-complimented, distributive lattice is called

 (a) Modular Lattice (b) Boolean Algebra (c)Complete Lattice (d) Self-Dual Lattice

10. A Lattice is said to be modular if for then

 (a) (b)

 (c) (d)

 PART - B (5 x 2 = 10 Marks)

11. Using truth table, show that is tautology.

12. Show that if seven colours are used to paint 50 bicycles, atleast 8 bicycles will be the same colour.

13. **Give an example of a graph which is both Eulerian and Hamiltonian**?

14. **Draw all the spanning trees of** .

15. Is the poset a lattice?

PART - C (5 x 16 = 80 Marks)

16. (a) (i) **Without using the truth table, find the PCNF and PDNF of the statement .** (8)

(ii) Show that . (8)

Or

(b)(i) Use the indirect method to prove that the conclusion follows from the premises. (8)

 (ii) Show

. (8)

17. (a) (i) Solve the recurrence relation. (8)

(ii) Use the method of generating function to solve the recurrence relation

 given that . (8)

Or

 (b) (i) Find the number of integers between 1 to 250 that are not divisible by any of the

 integers 2,3,5 and 7. (8)

 (ii) From a committee consisting of 6 men and 7 women, in how many ways can we

 select a committee of (8)

 (1) 4 members which has atleast one woman

 (2) 4 members that has at most one man

 (3) 4 members of both sexes.

18. (a) (i) Examine whether the following graphs are isomorphic. (8) Or

(ii) Prove that a connected graph is Eulerian if all vertices are of even degree. (8)

Or

(b) (i) Prove that a simple graph with *n* vertices must be connected if it has more than edges. (8)

 (ii) Find the adjacency matrix of the following graph *G*. Find

 . What is your observation of entries in ? (8)

19. (a) (i) Let be defined on by Check whether

 is a monoid (or) not. Is it commutative? Also find the inverses of

 (8)

 (ii) State and prove Lagrange’s theorem. (8)

Or

(b) (i) Prove that a non-empty subset H of a group G is a subgroup if

 (8)

(ii) Let be a homomorphism of group G with kernel *K*. Then prove that *K* is a normal subgroup of *G* and *G/K* is isomorphic to image of . (8)

20. (a) (i) State and prove DeMargon’s law of lattice. (8)

 (ii) In a complemented, distributive lattice, prove the following: (i) (ii) (8)

Or

(b) (i) State and prove distributive inequality of Lattice. (8)

(ii) In any Boolean algebra, show that (8)