

Roll No. 

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Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (CSE/IT) (Sem.-3)

**DISCRETE STRUCTURE**

Subject Code : CS-203

M.Code : 56502

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTIONS TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A****Write briefly :**

- 1) Find chromatic number of complete graph with 5 vertices.
- 2) A graph G having 4 vertices a,b,c,d with degrees 3, 2, 3,2 respectively. Find the number of edges.
- 3)  $\frac{1}{8!} + \frac{1}{7!} = \frac{x}{8}$ , find x.
- 4) If A and B are two non-empty sets prove that  $A-B = A \cap B$
- 5) Find the generating function for the sequence  $\langle 1, 3, 9, 27, \dots \rangle$
- 6) Define a semigroup. Give suitable examples.
- 7) Define a normal subgroup of G.
- 8) Define a quotient ring.
- 9) Define a permutation group.
- 10) Let  $a, b$  be elements in a Boolean Algebra, prove that  $a + a*b = a$

### SECTION-B

- 11) Determine whether the following graph is Hamiltonian? If yes, find the Hamiltonian cycle.

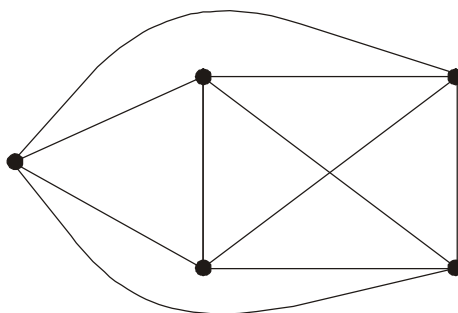


FIG.1

- 12) Find the number of arrangements of the letters of the word INDEPENDENCE. In how many of these arrangements
- all the vowels always occur together.
  - vowels never occur together.
- 13) If  $L = \{1, 2, 395, 10, 30\}$  Determine whether  $L$  is a partial ordered set w.r.t. the relation 'divides' ?
- 14) Let  $Q$  be the set of rational numbers. Let  $*$  be the operation on  $Q$  defined by  $a * b = a + b - ab$ . Is  $(Q, *)$  a commutative group?
- 15) Prove that a finite integral domain is a field.

### SECTION-C

- 16) a) Find the solution of the Recurrence relation :  $a_n - 7a_{n-1} + 12a_{n-2} = 3^n + n$   
b) If  $G$  is an Euler graph prove that degree of every vertex is even.
- 17) a) Design a logic circuit diagram for Boolean Expression  
 $E = xyz + xyz' + x'yz' + x'y'z' + x'yz$   
b) Suppose  $f(t) = t^3 - 2t^2 - 6t - 3$  has an integer root, find all its roots.
- 18) a) Prove that if  $J$  is an ideal in a commutative ring  $R$  with unity element 1. If any unit  $u \in J$  then prove that  $J = R$   
b) Let  $H$  be normal subgroup of  $G$ . Then prove that the coset of  $H$  in  $G$  form a group under coset multiplication defined by:  $(aH)(bH) = abH$

**NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.**