Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐☐   **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) $\dfrac{1}{8!} + \dfrac{1}{7!} = \dfrac{x}{8}$, 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 <1,3,9,27…>

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

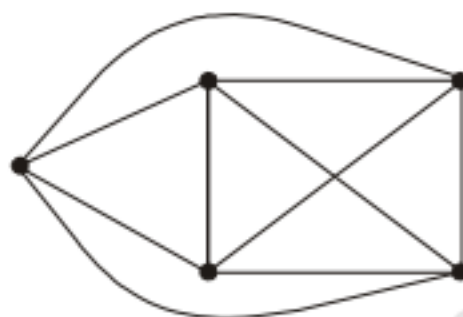11) Determine whether the following graph is Hamiltonian? If yes, find the Hamiltonian cycle.

FIG.1

12) Find the number of arrangements of the letters of the word INDEPENDENCE. In how many of these arrangements

   a) all the vowels always occur together.

   b) 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.