R20

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
MCA I Year I Semester Regular & Supplementary Examinations May-2022
DISCRETE MATHEMATICS

Time: 3 hours

Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

UNIT-I

1 a Define converse, inverse contra positive with an example. **L3** **6M**

   b Prove that $(P \wedge Q) \Leftrightarrow (\neg P \vee \neg Q)$ is a contradiction. **L3** **6M**

OR

2 a Verify the validity of the following arguments: Lions are dangerous animals, there are lions. Therefore, there are dangerous animals. **L4** **6M**

   b Show that $(\exists x)\, M(x)$ follows logically from the premises $(\forall x)(H(x) \to M(x))\ and\ (\exists x)H(x)$. **L1** **6M**

UNIT-II

3 a Define an equivalence relation? If R be a relation in the set of integers Z defined by $R = \{(x, y): x \in Z, y \in Z, (x - y)\,is\,divisible\,by\,6\}$. Then prove that R is an equivalence relation. **L1** **6M**

   b Draw the Hasse diagram representing the positive divisors of 36. **L1** **6M**

OR

4 a Define abelian group, homomorphism and isomorphism. **L1** **6M**

   b For a group G, prove that the function $f : G \to G\ defined\ by\ f(a) = a^{-1}$ is an isomorphism if and only if G is abelian. **L4** **6M**

UNIT-III

5 a A group of 8 scientists is composed of 5 psychologists and 3 sociologists. **L1** **6M**
   i) In how many ways can a committee of 5 be formed?
   ii) In how many ways can a committee of 5 be formed that has 3 psychologists and 2 sociologists?

   b The question paper of mathematics contains two questions divided into two groups of 5 questions each. In how many ways can an examine answer six questions taking at least two questions from each group. **L1** **6M**

OR

6 a If $x > 2, y > 0, z > 0$, then find the number of solutions of $x + y + z + w = 21$. L1 6M

b Show that there must be at least 90 ways to choose 6 numbers from 1 to 15 so that all the choices have the same month. L1 6M

UNIT-IV

7 a Find the generating function of $n^2 - 2$. L6 6M

b Find the coefficient of x^n in the function $(x2 + x^3 + x^4 + \ldots)^4$. L6 6M

OR

8 Solve the recurrence relation $a_n + 4a_{n-1} + 4a_{n-2} = 8$ for $n \geq 2$, and $a_0 = 1, a_1 = 2$. L6 12M

UNIT-V

9 a How many edges does a graph have if it has vertices of degree 4, 3, 3, 2, 2? Draw such a graph. L1 6M

b If G is non-directed graph with 12 edges, suppose that G has 6 vertices of degree 3 and the rest have degree less than 3. Determine the minimum number of vertices. L2 6M

OR

10 a Show that in any graph the number of odd degree vertices is even. L4 6M

b Write difference between Hamiltonian graphs and Euler graphs. L1 6M

*** END ***