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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

B.Tech II Year II Semester Regular Examinations October-2022

DISCRETE MATHEMATICS

(Common to CSE, CSIT, CSM & CIC)

Time: 3 hours

Max. Marks: 60

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

UNIT-I

- 1 a Explain in degree and out degree of a graph. Also explain about the adjacency matrix representation of graphs. Illustrate with an example? L2 6M
b Draw the graph represented by given adjacency matrix

$$(i) \begin{bmatrix} 1 & 2 & 0 & 1 \\ 2 & 0 & 3 & 0 \\ 0 & 3 & 1 & 1 \\ 1 & 0 & 1 & 0 \end{bmatrix} \quad (ii) \begin{bmatrix} 1 & 0 & 2 & 1 \\ 0 & 1 & 1 & 2 \\ 2 & 1 & 1 & 0 \\ 1 & 2 & 0 & 1 \end{bmatrix}$$

L2 6M

OR

- 2 Explain Depth- First-Search, Breadth-First-Search Algorithm. L2 12M

UNIT-II

- 3 a Define Converse ,Inverse & Contra positive with examples. L1 6M
b Show that $(P \vee Q) \rightarrow R \equiv (P \rightarrow R) \wedge (Q \rightarrow R)$ L2 6M

OR

- 4 a Define Quantifiers and types of Quantifiers with examples. L1 6M
b Show that $\sim P$ is a valid conclusion from the premises $\sim(P \wedge \sim Q)$, $\sim Q \vee R$, $\sim R$ L2 6M

UNIT-III

- 5 a Define a binary relation with an example. Let R be the relation from the set $A = \{1, 3, 4\}$ on itself and defined by $R = \{(1, 1), (1, 3), (3, 3), (4, 4)\}$ then Find the matrix of R and draw the graph of R L3 6M
b Let $f: A \rightarrow B$, $g: B \rightarrow C$, $h: C \rightarrow D$ then show that $h \circ (g \circ f) = (h \circ g) \circ f$ L1 6M

OR

- 6 a Show that the set of all positive rational numbers forms an abelian group under the composition defined by $a * b = (ab) / 2$ L2 6M
b Explain homomorphism and isomorphism of groups with examples. L1 6M

UNIT-IV

- 7 a How many ways can we get a sum of 8 when two indistinguishable dice are rolled? L2 6M
b Out of 5 men and 2 women, a committee of 3 is to be formed. In how many ways can it be formed if at least one woman is to be included. L3 6M

OR

- 8 a Explain Pigeon hole principle and give an example. L3 6M
b Find the minimum number of students in a class to be sure that 4 out of them are born on the same month? L3 6M

UNIT-V

- 9 a Find the sequence generated by the following generating functions

L3 6M

(i) $(2x-3)^3$ (ii) $\frac{x^4}{1-x}$

- b Solve the recurrence relation $a_r = a_{r-1} + a_{r-2}$ using generating function.

L3 6M**OR**

- 10 Solve $a_n - 4a_{n-1} + 4a_{n-2} = (n+1)^2$ given $a_0 = 0, a_1 = 1$

L3 12M***** END *****