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SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)
COIMBATORE-641 035



B.E/B.Tech- INTERNAL ASSESSMENT - II

Department of Mathematics

Academic year 2023-24 (ODD)/ FIFTH SEMESTER

19MAT301 - DISCRETE MATHEMATICS

(Common to CSE, IT & AIML)

(REGULATION 2019)

| |
|---|
| B |
|---|

TIME: 1.5 HOURS

MAXIMUM MARKS: 50

ANSWER ALL QUESTIONS

PART A — (5 x 2 = 10 Marks)

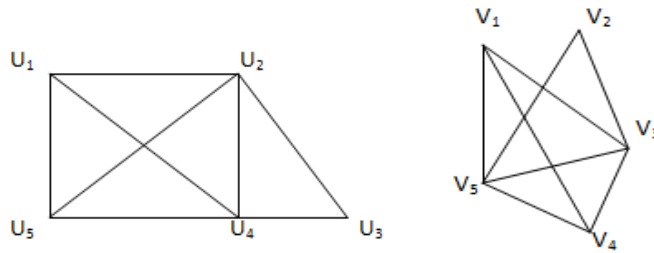
- | | CO | BL | |
|--|-----|-----|---|
| 1. Form the recurrence relation for the sequence $S(n) = 6(-5)^n, n \geq 0$ | CO2 | Und | 2 |
| A survey of 500 from a school produced the following information. 200 play | | | |
| 2. volley ball, 120 play hockey. 60 play both volleyball and hockey. How many are not playing either volleyball or hockey? | CO2 | Und | 2 |
| 3. How many edges are there in a graph with ten vertices each of degree six? | CO3 | Und | 2 |
| 4. State Complete graph with examples. | CO3 | Rem | 2 |
| 5. Construct the graph for the following adjacency matrix | CO3 | App | 2 |

$$\begin{pmatrix} 0 & 1 & 0 & 1 \\ 1 & 0 & 1 & 1 \\ 0 & 1 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{pmatrix}$$

PART B — (13 + 13 + 14 = 40 Marks)

- | | | | |
|--|-----|-----|---|
| 6. (a) (i) Solve linear non homogeneous recurrence equation $a_n - 2a_{n-1} - 3a_{n-2} = 4^n + 6.$ | CO2 | App | 8 |
| (ii) In a survey of 100 students it was found that 30 studied mathematics, 54 studied statistics and 25 studied Operations Research. 1 studied all the three subjects. 20 studied mathematics and statistics, 3 studied mathematics and operations research and 15 studied statistics and operations research. | CO2 | App | 5 |
| i) How many students studied none of the subjects? | | | |
| ii) How many students studied only mathematics? | | | |
| (OR) | | | |
| (b) (i) Use the method of generating function to solve the recurrence equation $a_n = 3a_{n-1} + 1, n \geq 1$ given $a_0 = 1.$ | CO2 | App | 8 |
| (ii) How many positive integers not exceeding 1000 are divisible by 7 or 11? | CO2 | App | 5 |

7. (a) (i) Establish the isomorphism for the following pair of graphs.



CO3 App 7

(ii) State and prove Handshaking theorem and prove in an undirected graph the number of odd degree vertices are even.

CO3 App 6

(OR)

(b) (i) Prove that a connected graph is Eulerian if and only if every vertex are of even degree.

CO3 App 7

(ii) Illustrate an example for a graph which is

- i) Eulerian but not Hamiltonian
- ii) Hamiltonian but not Eulerian
- iii) Both Eulerian and Hamiltonian
- iv) Neither Eulerian nor Hamiltonian

CO3 App 6

8. (a) (i) Solve the recurrence relation for Fibonacci Sequence.

CO2 Ana 7

(ii) Determine the number of integers between 1 to 300 that are divisible by

- 1) At least one of 3, 5, 7.
- 2) 3 and 5 but not by 7.
- 3) 5 but not by 3 and 7.

CO2 App 7

(OR)

(b) (i) Construct the complete graph K_5 with vertices A, B, C, D and E and draw all the complete sub graphs of K_5 with 4 vertices.

CO3 Ana 7

(ii) A simple graph with 'n' vertices and 'k' components cannot have more than $\frac{(n-k)(n-k+1)}{2}$ edges. Justify the statement with a proof.

CO3 App 7

Blooms Taxonomy Abbreviations: Rem-Remembrance, Und-Understanding, App- Apply, Ana-Analyze, Eva-Evaluate, Cre-Create
