Register No.: .... Name: ....

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FIRST SEMESTER M.C.A DEGREE EXAMINATION (Regular), DECEMBER 2022

(2021 SCHEME)

Course Code: **21CA101**

Course Name: **Mathematical Foundations for Computing**

Max. Marks: **60** **Duration: 3 Hours**

PART A

(Answer all questions. Each question carries 3 marks)

1. State De Morgan's law for two sets.
2. Given an example of a relation which is reflexive and transitive but not symmetric.
3. Using Euclidean algorithm to find gcd of 1025 and 35.
4. Solve the recurrence relation $a_{n+2} - 4a_{n+1} + 4a_n = 0, n \geq 0$.
5. Define Planar Graph.
6. Draw a 3-regular Graph.
7. Prove that the vectors (1,-1, 1), (0, 1, 2) and (3, 0,-1) are linearly independent.
8. Find the eigenvalues of the matrix $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$
9. State the principle of least squares.
10. What are the normal equations for fitting of a straight line y = a + bx.

PART B

(Answer one full question from each module, each question carries 6 marks)

MODULE I

11. a) Define Partial Order relation (2)

    b) Show that the divisibility relation '/' is a partial ordering on the set of positive integers (4)

OR

12. Show that the relation R in the set {1,2,3} given by R={(1,1),(2,2),(3,3)(1,2),(2,3) is reflexive but neither symmetric nor transitive. (6)

MODULE II

13. Find the gcd of 595 and 252 and express it in the form 252m+595n. (6)

OR

14. Solve the recurrence relation $a_n - 3a_{n-1} = 5(3^n), n \geq 1 and\ a_0 = 2$. (6)

MODULE III

15. a) Define Complete Graph. (2)

b) Show that a complete graph with n vertices has $\frac{n(n-1))}{2}$ edges. (4)

OR

16 Define Graph isomorphism and draw a pair of isomorphic graphs. (6)

MODULE IV

17. By reducing to echelon form, find the rank of the matrix

$$A = \begin{bmatrix} 1 & 0 & 2 & 1 \\ 0 & 1 & -2 & 1 \\ 1 & -1 & 4 & 0 \\ -2 & 2 & 8 & 0 \end{bmatrix}$$ (6)

OR

18. Find the eigen values and eigen vectors of the matrix $A = \begin{bmatrix} 1 & 0 & -1 \\ 1 & 2 & 1 \\ 2 & 2 & 3 \end{bmatrix}$ (6)

MODULE V

19 Calculate Karl Pearson's correlation Coefficient from the following data (6)

x	11	10	9	8	7	6	5
y	20	18	12	8	10	5	4

OR

20. Fit a straight line to the following data (6)

x	1	3	4	6	8	9	11	14
y	1	2	4	4	5	7	8	9

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