Reg No.: TVE22MCA-2023 Name:

0520MCA101122003

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

First Semester MCA (Two Year) Degree (R,S) Examination December/January 2022-23

**Course Code: 20MCA101**

**Course Name: MATHEMATICAL FOUNDATIONS FOR COMPUTING**

Max. Marks: 60 Duration: 3 Hours

**PART A**

***Answer all questions, each carries3 marks.*** Marks

1 Prove that $(A \cup B)' = A' \cap B'$ (3)

2 If A = {1,2,3,4,5} and B= {1,2,3,8,9} and the function f:A→B and g:A→A defined by f = {(1,8),(3,9), (4,3),(2,1),(5,2)} and g = {(1,2), (3,1), (2,2), (4,3), (5,2)}. Find: (1) f o g (2) g o g (3)

3 Define GCD. Find GCD ( 2406 , 654 ) (3)

4 Solve the recurrence relation (3)

$a_{n+2} = 4a_{n+1} - 4a_n$ , $a_0 = 1$, $a_1 = 3$

5 (3)


Check whether the following graphs are isomorphic.

6 Define complete Bipartite graph. Draw the graph $K_{2,4}$ . (3)

7 Determine the rank of $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & 3 \\ 1 & 2 & 5 \end{bmatrix}$ (3)

8 Solve using Gauss elimination method : $x_1+x_3=0$ , $x_2+x_3=0$ , $x_1+x_2+x_3=0$ (3)

9 Explain principle of least square. (3)

10 Fit a straight line y=a+bx to the following data by the principle of least squares: (3)

| x: | 0 | 1 | 3 | 6 | 8 |
|---|---|---|---|---|---|
| y: | 1 | 3 | 2 | 5 | 4 |

## PART B

*Answer any one question from each module. Each question carries 6 marks.*

### Module I

11 Define Equivalence Relation (6)

Prove that the relation R on the set of integer Z defined by R = {(x,y) | x-y is divisible by 6} is an equivalence relation

**OR**

12 Explain closure of relations. Using Warshalls Algorithm find the transitive closure of the relation R= {(1,2)(2,3)(3,3)} on the set A = {1,2,3} (6)

### Module II

13 Solve the linear Diophantine Equation $60x + 33y = 9$ (6)

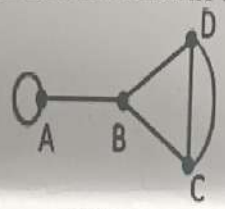
**OR**

14 Solve the recurrence equation (6)

$a_{n+2} - 4a_{n+1} + 3a_n = -200$ , $a_0 = 0$ , $a_1 = 1$

### Module III

15 Give the adjacency matrix and incidence matrix for the following graph is (6)




**OR**

16 Define Hamiltonian cycle and Euler circuit with example. (6)

### Module IV

17 Find the eigenvalues and eigenvectors of $\begin{bmatrix} 4 & 2 & -2 \\ 2 & 5 & 0 \\ -2 & 0 & 3 \end{bmatrix}$ (6)

**OR**

18 What kind of conic section is given by the quadratic form $4x_1^2 + 6x_1x_2 - 4x_2^2 = 10$. (6)

### Module V

19 Fit a parabola to the following data. (6)

| X | 1.0 | 1.5 | 2.0 | 2.5 | 3.1 | 4.0 |
|---|---|---|---|---|---|---|
| Y | 1.1 | 1.3 | 1.6 | 2.0 | 3.4 | 4.2 |

**OR**

20 The marks secured by 9 students in Mathematics, English are as given below (6)

Calculate the rank correlation coefficient.

| X | 10 | 15 | 12 | 17 | 13 | 16 | 24 | 14 | 22 |
|---|---|---|---|---|---|---|---|---|---|
| Y | 30 | 42 | 45 | 46 | 33 | 34 | 40 | 35 | 39 |

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