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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

First Semester MCA (2 Year) Degree Examination December 2020

Course Code: 20MCA101

Course Name: MATHEMATICAL FOUNDATIONS FOR COMPUTING

Max. Marks: 60 Duration: 3 Hours

PART A

Answer all questions, each carries 3 marks. Marks

1 Let A= {1,2,3,4} and B= {p, q, r, s} and if R = {(1,p),(1,q),(1,r),(2,q),(2,r),(2,s)} is a relation from A to B. Write the matrix representation of R. (3)

2 Show that $(A \cup B)' = A' \cap B'$ (3)

3 Use Euclidean algorithm to obtain x and y satisfying gcd (752,1000) = 752x+1000y. (3)

4 Solve the recurrence relation $6a_n - 7a_{n-1} = 0; n \geq 1, a_3 = 343.$ (3)

5 Define planar and non-planar graphs. (3)

6 A connected planar graph has 5 vertices having degrees 4,3,3,2,2. Find the number of edges and faces. (3)

7 Find the Eigen values of the matrix (3)

$$A = \begin{bmatrix} 2 & 1 & 1 \\ 1 & 2 & 1 \\ 0 & 0 & 1 \end{bmatrix}$$

8 Show that the vectors (1, -1,0), (1,3, -1), (5,3, -2) are linearly dependent. (3)

9 Define scatter diagram. Describe the various types of correlation using scatter diagram. (3)

10 State the principle of least squares. (3)

PART B

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

Module I

11 Define Equivalence relation. Prove that for $x, y \in Z$ the relation defined by R= {(x, y);5 divides x-y} is an equivalence relation. (6)

OR

12 Using Warshall's algorithm to find the transitive closure of the relation {(1,2), (2,3), (3,4), (2,1)} on {1,2,3,4} (6)

Module II

13 Solve the linear Diophantine equation 24x+138y=18 (6)

OR

14 Solve the recurrence relation $a_n = 7a_{n-1} - 12a_{n-2},\ with\ a_0 = 3,\ a_1 = 11.$ (6)

Module III

15 Prove that a connected graph G is a Euler graph if all vertices of G are of even degree. (6)

OR

16 Prove that for a planar v - e + r = 2, where |V| = v; |E| = e; r = number of regions (6)

Module IV

17 Find the values of $\lambda\ and \mu$ for which the system of equations (6)

$$2x + 3y + 5z = 9$$

$$7x + 3y - 2z = 8$$

$$2x + 3y + \lambda z = \mu$$

has (i)no solution (ii) a unique solution (iii) infinite solution

OR

18 Find the eigen values and eigen vectors of (6)

$$\begin{bmatrix} 3 & -1 & 1 \\ -1 & 5 & -1 \\ 1 & -1 & 3 \end{bmatrix}$$

Module V

19 Compute the correlation coefficient from the following data. (6)

x	9	8	7	6	5	4	3	2	1
y	15	16	14	13	11	12	10	8	9

OR

20 Obtain the two regression equations from the following data: (6)

x	3	5	6	7	10	11
y	8	12	11	14	16	17

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