U-1655

M. A. / M. Sc.
(Previous) Examination, 2021

MATHEMATICS

Paper - V
Discrete Mathematics & Numerical Analysis

Time allowed : **Three Hours**

Maximum Marks : **100**

This question paper contains three sections as under :

SECTION - A

1 (i) Define Pigeon hole principle.

(ii) Define planer graph.

(iii) Define Lattice.

(iv) Define partial ordered set.

(v) Write least square principle.

(vi) Write the N-R method for Non-linear equation.

(vii) Write the cholesky formula.

(viii) Define eigen value.

(ix) Write the predictor corrector method.

(x) Define Boundary value problem.

SECTION - B

UNIT - I

2 If 20 processors are interconnected, then show that at least two processors are sprectely connected to the same number of processors.

3 Show that a graph G is bipartile if and only if it has no cycle of odd length.

UNIT - II

4 Construct XOR and XNOR grates with corresponding truth table.

5 Show that the dual of a complemented lattice is also a complemented lattice.

UNIT - III

6 Find the Rate of convergence of N-R method.

7 Find multiple root of the equation

$$x^3 - 8.4x^2 + 23.04x - 20.48 = 0$$

UNIT - IV

8 Solve the system of equations

$$2x_1 - x_2 + x_3 = 5$$
$$x_1 + 2x_2 + 3x_3 = 10$$
$$x_1 + 3x_2 - 2x_3 = 7$$

by Jacobi iteration method (three attraction)

https://www.uokonline.com

9 Using Jocobi method and eigen values of

$$\begin{bmatrix} 2 & 1 & 0 \\ 1 & 4 & 1 \\ 0 & 1 & 4 \end{bmatrix}$$

UNIT - V

10 Using Euler's modified method solve the O.D.E. to get $y(0.1)$ and $y(0.2)$

$$dy/dt = 1 + y^2 \quad y(0) = 0$$

11 Solve the boundary value problem :

$y'' = xy$,

$y(0) + y'(0) = 1$ and $y(1) = 1$,

with step size $h = 1/3$.

https://pyqlelo.com

SECTION - C

12 (a) State and prove principle of inclusion exclusion for three sets.

(b) Show that a graph G is connected iff it has a spanning tree.

13 (a) Represent the following Boolean function in their disjunctive Normal form

$$f(a,b,c)=(ab'+ac)'+a'$$

(b) Show that Boolean algebra can not have exactly three distinct elements.

14 (a) Find the increase of matrix

$$\begin{bmatrix} 3 & 2 & 1 \\ 2 & 3 & 2 \\ 1 & 2 & 2 \end{bmatrix}$$

Using Partition method.

(b) Find the eigen values of $\begin{bmatrix} 2 & -i & 0 \\ i & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$.

15 Using Fourth-order Runge-kutta method solve

(a) The equation $\frac{dy}{dt}=ty$, $y(1)=2$ on interval $[1,1.4]$ with $h=0.2$

(b) Write short note on convergence and stability of numerical methods.

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