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10MTP11

First Semester M.Tech. Degree Examination, December 2012
Applied Mathematics

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions.

- 1 a. Convert $(58)_{10}$ to the corresponding binary number. (06 Marks)
 b. Find the solution of the system of equations using Cramer's rule.
 $x_1 + 2x_2 - x_3 = 2$, $3x_1 + 6x_2 + x_3 = 1$, $3x_1 + 3x_2 + 2x_3 = 3$. (07 Marks)
 c. Solve the system of equations:
 $10x_1 - x_2 + 2x_3 = 4$
 $x_1 + 10x_2 - x_3 = 3$
 $2x_1 + 3x_2 + 20x_3 = 7$ using Gauss elimination method. (07 Marks)

- 2 a. Find the inverse of the matrix $A = \begin{bmatrix} 2 & -1 & 1 \\ 4 & 3 & -1 \\ 3 & 2 & 2 \end{bmatrix}$ using Gauss Jordan elimination method. (10 Marks)

- b. Find the solution of the following set of complex equations:

$$\begin{bmatrix} 2+i & 1-4i \\ 4+2i & 5+3i \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 3+2i \\ 2-2i \end{bmatrix}$$

(10 Marks)

- 3 a. Using the Jacobi method find all the eigen values and eigen vectors of the matrix.

$$A = \begin{bmatrix} 1 & \sqrt{2} & 2 \\ \sqrt{2} & 3 & \sqrt{2} \\ 2 & \sqrt{2} & 1 \end{bmatrix}$$

(10 Marks)

- b. Find the numerically largest eigen value and the corresponding eigen vector of the matrix

$$A = \begin{bmatrix} 4 & 1 & -1 \\ 2 & 3 & -1 \\ -2 & 1 & 5 \end{bmatrix}$$

using power method taking initial vectors as $[1, 0, 0]^T$.

(10 Marks)

- 4 a. Given :

x	1	1.2	1.4	1.6	1.8	2.0
y	2.72	3.32	4.06	4.96	6.05	7.39

find y^I and y^{II} at $x = 1.2$. (10 Marks)

- b. If f is a function of x and y , find the finite difference approximations to the partial derivatives $\frac{\partial^2 f}{\partial x^2}$, $\frac{\partial^2 f}{\partial y^2}$, $\frac{\partial^2 f}{\partial x \partial y}$ and evaluate these for $f(x, y) = 2x^4 y^3$ at $x = 1$, $y = 1$ with

$$\Delta x = \Delta y = 0.1$$

(10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.