

Code: 15A54301

B.Tech II Year I Semester (R15) Supplementary Examinations June 2017

MATHEMATICS – III

(Common to CE, CSE, IT, ME, EEE, ECE & EIE)

Time: 3 hours

Max. Marks: 70

PART - A

(Compulsory Question)

1 Answer the following: (10 X 02 = 20 Marks)

- Show that the matrix $A = \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$ is skew-symmetric.
- Obtain a real symmetric matrix of the quadratic form $3x_1^2 - 2x_2^2 - x_3^2 - 4x_1x_2 + 12x_2x_3 + 8x_1x_3$.
- Evaluate a formula for finding the reciprocal of a number using Newton Raphson formula.
- Give an iterative formula for method of false position.
- Define interpolation.
- Write Bessel's formula.
- Write the normal equations to the exponential curve.
- State Trapezoidal rule.
- State Picard's method of successive approximations.
- Give standard fine point formula and diagonal fine point formula.

PART - B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT - I

2 Determine the Eigen values and the corresponding Eigen vectors of the following systems:

$$10x_1 + 2x_2 + x_3 = \lambda x_1; \quad 2x_1 + 10x_2 + x_3 = \lambda x_2; \quad 2x_1 + x_2 + 10x_3 = \lambda x_3$$

OR

3 Reduce the quadratic form $Q = x_1^2 + 3x_2^2 + 3x_3^2 - 2x_2x_3$ to a canonical form.

UNIT - II

4 Find a real root of the equation $\cos x - xe^x = 0$ by Regula Falsi method.

OR

5 Solve by using triangularisation method;

$$2x + 3y + z = 9; \quad x + 2y + 3z = 6; \quad 3x + y + 2z = 8$$

UNIT - III

6 Consider the following data for $g(x) = \frac{\sin x}{x^2}$

x	0.1	0.2	0.3	0.4	0.5
$g(x)$	9.9833	4.9667	3.2836	2.4339	1.9177

Find the value of $g(0.25)$ using Newton's forward interpolation formula.

OR

7 Using Bessel's formula find $\cos(0.17)$ from the following data:

x	0	0.05	0.10	0.15	0.20	0.25	0.30
$\cos x$	1	0.9988	0.9950	0.9888	0.9801	0.9689	0.9553

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UNIT - IV

- 8 Using the method of least squares fit a curve of the form $y = ab^x$.

x	2	3	4	5	6
y	8.3	15.4	33.1	65.2	127.4

OR

- 9 Find the value of $\int_1^5 \log_{10} x \, dx$ taking 8 subintervals correct to four decimal places by Trapezoidal rule. Compare it with exact value.

UNIT - V

- 10 Using Runge Kutta method of fourth order solve $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$ given $y(0) = 1$ at $x = 0.2$.

OR

- 11 Solve $\frac{dy}{dx} = x + y$; given $y(0) = 1$, obtain $y(0.1)$ and $y(0.2)$ using Picard's and check the answer with exact solution.

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