Code: 15A54301 **R15**

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)

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

(a) Show that the matrix $A = \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$ is skew-symmetric.

(b) Obtain a real symmetric matrix of the quadratic form $3x_1^2 - 2x_2^2 - x_3^2 - 4x_1x_2 + 12x_2x_3 + 8x_1x_3$.

(c) Evaluate a formula for finding the reciprocal of a number using Newton Raphson formula.

(d) Give an iterative formula for method of false position.

(e) Define interpolation.

(f) Write Bessel's formula.

(g) Write the normal equations to the exponential curve.

(h) State Trapezoidal rule.

(i) State Picard's method of successive approximations.

(j) 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:

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

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 $cosx - xe^x = 0$ by Regula Falsi method.

OR

5 Solve by using triangularisation method;

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

UNIT - III

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

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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