

B.Tech II Year I Semester (R15) Regular & Supplementary Examinations November/December 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)

- (a) Find the Eigen values of the matrix $A = \begin{bmatrix} 2 & 3+4i \\ 3-4i & 2 \end{bmatrix}$.
- (b) Define Skew-Hermitian matrix with proper example.
- (c) Find a real root of $f(x) = x^3 - 4x - 9 = 0$.
- (d) Find $\sqrt{5}$ using Newton's formula.
- (e) Find the missing term in the following data.

x	0	1	2	3	4
y	1	3	9	?	81

- (f) List the applications of Lagrange's formulae.
- (g) Find a straight line to the following data:

x	0	1	2	3	4
y	1	1.8	3.3	4.5	6.5

- (h) Write the formula of Simpson's $3/8^{th}$ formula.
- (i) Using Taylor's series, find $y(0.1)$ correct to three decimal places given $y' - 2y - 3e^x = 0$, $y(0) = 0$.
- (j) Using Euler's method, find an approximate value of y corresponding to $x = 0.3$ given $y' - y - x = 0$, $y(0) = 1$.

PART - B

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

UNIT - I

2 Determine A^{-1}, A^{-2} if $A = \begin{bmatrix} 4 & 6 & 6 \\ 1 & 3 & 2 \\ -1 & -4 & -3 \end{bmatrix}$ using Cayley-Hamilton theorem.

OR

3 Reduce the quadratic form $6x^2 + 3y^2 + 3z^2 - 4xy - 2yz + zx$ to the canonical form also find rank, index, and signature of the quadratic form.

UNIT - II

4 Define algebraic and transcendental equation and also compute a real root of the equation $3x = \cos x + 1$ by Bisection method.

OR

5 Find a real root of $x \log_{10} x = 1.2$ correct to five decimal places by Newton's method.

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UNIT - III

- 6 Using Stirling formula, find $y(1.22)$ from the following table.

x	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8
y	0.8414	0.89121	0.93204	0.96356	0.98545	0.99749	0.99957	0.99385	0.97385

OR

- 7 The following table gives the values of x and y.

x	1.2	2.1	2.8	4.1	4.9	6.2
y	4.2	6.8	9.8	13.4	15.5	19.6

Find the values of corresponding to $y = 12$ using Lagrange's technique.

UNIT - IV

- 8 Fit a curve $y = ax^b$ to the following data:

x	1	2	3	4	5	6
y	2.98	4.26	5.21	6.10	6.80	7.50

OR

- 9 Evaluate $\int_0^{\frac{\pi}{2}} \sin x \, dx$ by:
- Trapezoidal rule.
 - Simpson's $\frac{1}{3}$ and compare with exact value.

UNIT - V

- 10 Find $y(0.3)$ given $\frac{dy}{dx} + y + xy^2 = 0$, $y(0) = 1$ by taking $h = 0.1$ using Runge-Kutta method.

OR

- 11 Use Picard's method of approximation to find y when $x = 0.1, 0.2$ given $\frac{dy}{dx} = x + y^2$, $y(0) = 0$.

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