Code: 15A54301 **R15**

B.Tech II Year I Semester (R15) Supplementary Examinations June 2018

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) Find the rank of the matrix $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 2 & 3 & 4 & 5 \\ 3 & 4 & 5 & 6 \\ 4 & 5 & 6 & 7 \end{pmatrix}$.

(b) Express the matrix $A = \begin{pmatrix} 1+i & 2 & 5-5i \\ 2i & 2+i & 4+2i \\ -1+i & -4 & 7 \end{pmatrix}$ as the sum of Hermitian matrix and Skew-Hermitian matrix.

(c) State the underlying principle of false position method.

(d) Find the Newton-Raphson iterative formula for $\frac{1}{N}$.

(e) State Gauss's forward interpolation formula.

(f) State Stirling's interpolation formula.

(g) Reduce $y = a.x^b$ into linear form and write its normal equation.

(h) Write down the formula for $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at any point that are derived from Newton's forward interpolation formula.

(i) Explain Picard's method.

(j) Find $y(0.1)$ if $\frac{dy}{dx} = x - y^2,\ y(0) = 1$ by Euler's method.

PART – B

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

UNIT – I

2 Diagonalise the matrix $A = \begin{pmatrix} 2 & 1 & -1 \\ 1 & 1 & -2 \\ -1 & -2 & 1 \end{pmatrix}$.

OR

3 Reduce the quadratic form $x_1^2 + 2x_2^2 + x_3^2 - 2x_1x_2 + 2x_2x_3$ to canonical form and also find its corresponding linear transform.

UNIT – II

4 (a) Find the root of $x^3 - 2x - 5 = 0$ by Regula-Falsi method.

(b) Solve the system of equations using Gauss-Seidel method:

$x + y + 54z = 110;\quad 27x + 6y - z = 85;\quad 6x + 15y + 2z = 72$

OR

5 (a) Find the real root of $3x - cosx - 1 = 0$ by Newton's Raphson method.

(b) Solve the system of equation by Crout's method:

$3x + y + z = 4;\quad x + 4y - z = -5;\quad x + y - 6z = -12$

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UNIT – III

6 (a) From the following data find $y(43)$.

x:	40	50	60	70	80	90
y:	184	204	226	250	276	304

(b) Find $f(0.37)$ using Bessel's formula from the following data:

x:	0.1	0.2	0.3	0.4	0.5
y:	0.0998	0.1986	0.2955	0.3894	0.4794

OR

7 (a) Use Lagrange's method find $y(40)$.

x:	30	35	45	55
y:	148	96	68	34

(b) Find the value of y at $x = 2.9$ from the following data using Gauss's backward formula.

x:	2.0	2.5	3.0	3.5	4.0
y:	246.2	409.3	537.2	636.3	715.9

UNIT – IV

8 (a) Find the straight line that best fits the following data:

x:	1	2	3	4	5
y:	14	27	40	55	68

(b) Obtain the value of $f'(105)$ using the following data:

x:	60	75	90	105	120
$f(x)$:	28.2	38.2	43.2	40.9	37.7

OR

9 (a) Fit a second degree parabola to the following data:

x:	10	12	15	23	20
y:	14	17	23	25	21

(b) Evaluate $\int_0^1 \frac{dx}{1+x}$ by trapezoidal rule dividing the range into eight equal parts.

UNIT – V

10 (a) Given $\frac{dy}{dx} = 3x + \frac{y}{2}$, $y(0) = 1$ find $y(0.1)$ using Taylor's series method.

(b) Given $\frac{dy}{dx} = \frac{y-x}{y+x}$, $y(0) = 1$ find $y(0.2)$ by Runge-Kutta method.

OR

11 Solve $U_{xx} + U_{yy} = 0$ in $0 \le x \le 4$, $0 \le y \le 4$ given that $u(0,y) = 0$; $u(4,y) = 12 + y$, $u(x,0) = 3x$ and $u(x,4) = x^2$, take h = k = 1.

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