Code: 13A54301

R13

B.Tech II Year I Semester (R13) Supplementary Examinations November/December 2016

MATHEMATICS – II

(Common to CE and ME)

Time: 3 hours | Max. Marks: 70

PART – A

(Compulsory Question)

*****

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

(a) Define rank of a matrix.

(b) State Cayley Hamilton theorem.

(c) Define Transcendental Equation and give one example.

(d) Explain about Newton's Formulae for Interpolation.

(e) Apply Euler's method to solve $y' = x + y$, $y(0) = 1$ and find y(0.2) taking step size h = 0.1.

(f) Write formula for Simpsons 3/8 rule.

(g) Write Linear Property of Fourier transform.

(h) Write Dirichlet conditions for Fourier Expansion.

(i) Solve $u_{xx} - u_y = 0$ by separation of variable.

(j) Form the partial Differential Equation by eliminating arbitrary constants a and b from: $z = ax + by + a^2 + b^2$

PART – B

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

UNIT – I

2 Test for consistency and solve the following system of equations:

$$x + 2y + z = 3$$
$$2x + 3y + 2z = 5$$
$$3x - 5y + 5z = 2$$
$$3x + 9y - z = 4$$

OR

3 Reduce the quadratic form $3x^2 + 5y^2 + 3z^2 - 2yz + 2zx - 2xy$ to canonical form by orthogonal reduction.

UNIT – II

4 (a) Find the root of the equation $xe^x = 2$ using Newton Raphson method correct to three decimal places.

(b) By the method of least squares, find the straight line that best fits the following data:

x	1	3	5	7	9
y	1.5	2.8	4.0	4.7	6.0

OR

5 (a) Find the cubic polynomial which takes the following values

X	0	1	2	3
f(x)	1	0	1	10

Hence calculate f(4).

(b) Using Lagrange Interpolation formula find the value of y corresponding to x = 10 from the following table.

X	5	6	9	11
Y	12	13	14	16

Contd. in page 2

UNIT – III

6 (a) Given that

x	1.0	1.1	1.2	1.3	1.4	1.5	1.6
y	7.989	8.403	8.781	9.129	9.451	9.750	10.031

Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at x = 1.1

(b) A rocket is launched from the ground. Its acceleration is measured every 5 seconds and is tabulated below. Find the velocity and the position of the rocket at t = 40 seconds. Use Trapezoidal rule.

t(sec)	0	5	10	15	20	25	30	35	40
a(t)(cm/sec^2)	40.0	45.25	48.50	51.25	54.35	59.48	61.5	64.3	68.7

OR

7 (a) Solve $y' = x - y^2, y(0) = 1$ using Taylor's series method and compute y(0.1) & y(0.2).

(b) Apply the fourth order Runge-Kutta method, to find an approximate value of y when x = 1.2 in steps of 0.1, given that $y' = x^2 + y^2, y(1) = 1.5$

UNIT – IV

8 Obtain the Fourier series in $(-\pi, \pi)$ for the function $f(x) = \begin{cases} 0, -\pi < x < 0 \\ \sin x, 0 < x < \pi \end{cases}$

OR

9 Find the Fourier Cosine Transform of f(x) defined by $f(x) = \frac{1}{1+x^2}$ and hence find Fourier sine Transform of $f(x) = \frac{x}{1+x^2}$.

UNIT – V

10 A tightly stretched string of length l with fixed end points is initially in an equilibrium position. It is set vibrating by giving each point a velocity $v_0 \sin^3\left(\frac{\pi x}{l}\right)$. Find the displacement y(x, t).

OR

11 An infinitely long plane uniform plate is bounded by two parallel edges and an end at right angles to them. The breadth is π; this end is maintained at a temperature u_0 at all points and the other edges are at zero temperature. Determine the temperature at any point of the plate in the steady state.

*****