Code: 13A54301 **R13**

B.Tech II Year I Semester (R13) Supplementary Examinations June 2017

MATHEMATICS – II

(Common to CE and ME)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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

(a) What is the symmetric matrix? Give proper example.

(b) Determine the rank of $\begin{pmatrix} 0 & 1 & -3 & -1 \\ 1 & 0 & 0 & 1 \\ 3 & 1 & 0 & 2 \\ 1 & 1 & -2 & 0 \end{pmatrix}$

(c) What is the formula for Newton's backward interpolation formula?

(d) Use the method of false position to find the root of the equation $x^3 - 18 = 0$, given it lies between 2 and 3. Write down the procedure.

(e) What is the formula of Simpson's 1/3 rule?

(f) Solve by Taylor's series method the equation $\frac{dy}{dx} = \log(xy) \quad for \quad y(x)$, given y(1) = 2.

(g) Write Linear Property of Fourier transform.

(h) What is the formula of Fourier cosine transform?

(i) Derive a partial differential equation by eliminating the arbitrary function from the relation:

$$2z = \frac{x^2}{a^2} + \frac{y^2}{b^2}$$

(j) What is the One Dimensional Wave Equation (Vibration of a stretched string)?

PART – B

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

UNIT – I

2 Find the characteristic equation of the matrix A = $\begin{bmatrix} 4 & 3 & 1 \\ 2 & 1 & -2 \\ 1 & 2 & 1 \end{bmatrix}$ hence find A^{-1}.

OR

3 Find a matrix P which transform the matrix A= $\begin{bmatrix} 1 & 0 & -1 \\ 1 & 2 & 1 \\ 2 & 2 & 3 \end{bmatrix}$ to diagonal form.

UNIT – II

4 Find the real root of the equation $x^4-x-9=0$ by Newton-Raphson method, correct to three places of decimal.

OR

5 Given the values:

x	5	7	11	13	17
f(x)	150	392	1492	2366	5202

Evaluate f(9) use Lagrange's formula.

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UNIT – III

6 Use Simpson's 1/3rd rule to find $\int_0^{0.6} e^{-x^2}\,dx$, by taking seven ordinates.

OR

7 Using Runge-Kutta Method of fourth order, find an approximate value of y when x = 0.2, given that $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$ with y(0) = 1.

UNIT – IV

8 Obtain Fourier series expansion for f(x) defined as follows:

$f(x) = x + \pi, \quad 0 \le x \le \pi$

$f(x) = -\pi - x, \quad -\pi \le x < 0$

OR

9 Find Fourier transform of $f(x) = \begin{cases} 1 & for\ |x| < 1 \\ 0 & for\ |x| > 1 \end{cases}$ and hence find $\int_0^{\infty} \frac{\sin x}{x}\,dx = \frac{\pi}{2}$

UNIT – V

10 Form the partial differential equation (by eliminating the arbitrary constants a, b) from:

$(x-a)^2 + (y-b)^2 + z^2 = k^2$

OR

11 Using the method of separation of variables, solve $\frac{\partial u}{\partial x} = 2\frac{\partial u}{\partial t} + u$ where $u(x, 0) = 6e^{-3x}$.

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