Hall Ticket Number:

II/IV B.Tech (Supplementary) DEGREE EXAMINATION

November, 2019 **Common to All Branches**

Third Semester **Engineering Mathematics-III**

Time: Three Hours **Maximum:** 60 Marks

Answer Question No.1 compulsorily. (1X12 = 12 Marks)

Answer ONE question from each unit. (4X12=48 Marks)

1 Answer all questions (1X12=12 Marks)

a) Write Fourier Integral Theorem

b) Find f(x), if the Fourier Sine transform of $f(x) = \frac{1-cosn\pi}{n^2\pi^2}$, $(0 \leq x \leq \pi)$

c) Define Convolution of two functions.

d) Solve $u_{xy} = u_y$

e) Write the solution of Wave equation

f) Write the solution of Laplace equation.

g) State Newton's divided difference formula

h) Write Lagrange's Inverse Interpolation formula.

i) Write the iterative formula for $\sqrt{N}$ using Newton-Raphson method.

j) Reduce $A = \begin{bmatrix} 8 & 5 \\ 2 & 3 \end{bmatrix}$ as LU-factorization

k) Explain Euler's method.

l) State Poisson's equation.

UNIT I

2 a) Write the Fourier integral representation for $f(x) = \begin{cases} 1-x^2, for\ |x| \leq 1 \\ 0 \quad\quad , for\ |x| > 1 \end{cases}$ 6M

b) Find the Fourier transform of $e^{-a^2x^2}, a < 0$. Hence write Fourier transform of $e^{-x^2/2}$ is Self reciprocal 6M

(OR)

3 a) Express the function $f(x) = \begin{cases} 1-x^2\ , for\ |x| \leq 1 \\ 0 \quad\quad , for\ \ |x| > 1 \end{cases}$ as Fourier integral. 6M

b) Find the Fourier Sine and Cosine transforms of e^{-ax} 6M

UNIT II

4 a) Solve $y^2u_{yy} + 2yu_y - 2u = 0$ 6M

b) Find the deflection of a vibrating string of unit length having fixed ends with initial velocity zero and initial deflection $f(x) = k(sinx - sin2x)$. 6M

(OR)

5 a) Find the temperature distribution in the rod at time t, if the ends A and B of a rod 20cm long have the temperature at 30^0c and 80^0c until steady state prevails. The temperature of the ends are changed to 40^0c and 60^0c respectively. Find the temperature distribution in the rod at time t. 6M

b) Solve the Laplace equation $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ subject to the conditions 6M

$u(0,y) = u(l,y) = u(x,0) = 0\ and\ u(x,a) = sin\frac{n\pi x}{l}$

P.T.O.

UNIT III

6 a) Find by Newton's Method, the real root of the equation $3x = cosx + 1$ 6M

b) The area A of a circle of diameter d is given for the following values 6M

d	80	85	90	95	100
A	5026	5674	6362	7088	7854

Calculate the area of a circle of diameter 105.

(OR)

7 a) Use Lagrange's formula to find the form of f(x), given 6M

x	0	2	3	6
f(x)	648	704	729	792

b) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by applying (i) Trapezoidal rule, (ii) Simpson's rule. 6M

UNIT IV

8 a) Apply Gauss-Seidel Iterative method to solve 6M

$$2x + y + 6z = 9, 8x + 3y + 2z = 13, x + 5y + z = 7.$$

b) Using Cholesky's method solve 6M

$$10x + y + z = 12, 2x + 10y + z = 13, 2x + 2y + 10z = 104.$$

(OR)

9 a) Apply Runga-Kutta forth order, Solve $\frac{dy}{dx} = x + y \; with \; y(0) = 1 \; at \; x = 0.2$ 6M

b) Solve the partial differential equation $\nabla^2 u = -10(x^2 + y^2 + 10)$over the square with sides $x = 0 = y, x = 3 = y \; with \; u = 0$ on the boundary and mesh length 1. 6M