14MA301
BT/CE/CH/CS/EC/EE/EI/IT/ME 211

Hall Ticket Number:

II/IV B.Tech (Regular / Supplementary – Repeat Exam) DEGREE EXAMINATION

January, 2021 — **Common to all Branches**

Third Semester — **Engineering Mathematics -III**

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

Answer ALL Questions from PART-A. (1X12 = 12 Marks)
*Answer **ANY FOUR** questions from PART-B.* (4X12=48 Marks)

Part - A

1. Answer all questions (1X12=12 Marks)
   a) Define Fourier cosine transform.
   b) Find the Fourier transform of e^{-x}.
   c) Write the complex form of Fourier integral.
   d) Write the initial condition of D-Alembert's solution of wave equation.
   e) Write the one dimension wave equation.
   f) Solve Uxy= -Ux.
   g) Write Newton's forward ward interpolation formula.
   h) What is the order of the Newton iteration method?
   i) State Newton's divided divided difference formula.
   j) Write the normal equations for y = a + bx +$cx^2$by least squares method.
   k) Define Laplace equation.
   l) Write the diagonal 5-point formulas for u_{ij}.

Part - B

2. a) Find the Fourier integral representation of the function $\int_0^\infty f(x) = \begin{cases} 1, & if \quad |x| < 1 \\ 0, & if \quad |x| > 1 \end{cases}$ 6M

   b) Find the Fourier cosine transform of $f(x) = \begin{cases} -1, & if \quad 0 < x < 1 \\ 1, & if \quad 1 < x < 2 \\ 0, & if \quad x > 2 \end{cases}$ 6M

3. a) Using fourier integrals show that $\int_0^\infty \frac{\cos xw + w \sin xw}{1+w^2} dw = \begin{cases} 0, & if \quad x < 0 \\ \pi/2, & if \quad x = 0 \\ \pi e^{-x}, & if \quad x > 0 \end{cases}$ 6M

   b) Find the Fourier sine transform of $f(x) = e^{-ax}$. 6M

4. a) Find the deflection U(x ,t) of a vibrating string of unit length with fixed ends starting with initial velocity zero for f(x)=K[1-cos2πx] Where K=0.01. 6M
   b) Find the solution u(x ,y) of $u_{xx} - u_{yy} = 0$ by separating the variables. 6M

5. Solve the general solution of one dimensional wave equation 12M

P.T.O.

6. a) Find $y(25)$ given that $y(20) = 24,\ y(24) = 32,\ y(28) = 35,\ y(32) = 40$ using Newton's Forward interpolation formula. 6M

b) Find the Lagrange's interpolation polynomial from the following data and hence find y(4) 6M

x	0	1	2	3
y	2	3	12	147

7. a) Evaluate $\int_0^1 \frac{1}{1+x^2}dx$ using Simpsons's rule by taking h =0.2. 6M

b) Using Newton's divided difference formula evaluate y(9) given 6M

x	5	7	11	13	17
y	150	392	1452	2366	5202

8. a) Solve the system of equations by using Gauss-seidel method
$2x + y + z = 4,\ x + 2y + z = 4,\ x + y + 2z = 4$. 6M

b) Solve $2x + 4y - 6z = -4,\ x + 5y + 3z = 10,\ x + 3y + 2z = 5$ using LU decomposition method. 6M

9. a) Compute $y(0.1)$ *and* $y(0.2)$ by Runge-Kutta method of fourth order for the differential equation $\frac{dy}{dx} = x + y, y(0) = 1$. 6M

b) Compute y(1) in steps of 0.1 using Euler's method $\frac{dy}{dx} = (y - x)^2, y(0) = 0,\ h = 0.1$. 6M