Code No: R161109 **R16** SET - 1

I B. Tech I Semester Supplementary Examinations, May/June - 2019
MATHEMATICS-II (MM)
(Com. to CSE, IT, Agri E)

Time: 3 hours Max. Marks: 70

Note: 1. Question paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is Compulsory
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1. a) Give an example for Transcendental equation (2M)

   b) Prove that $\nabla = 1 - E^{-1}$ (2M)

   c) Find y(0.1) By Euler's method Given that $\frac{dy}{dx} = x + y^2, y(0) = 1$ (2M)

   d) Find half range sine series of $f(x) = \frac{x}{2}$ in $[0, \pi]$ (2M)

   e) Find the inverse Fourier finite sine transform of f(x) if (2M)

   $$F_S(n) = \frac{\cos\left(\frac{2n\pi}{3}\right)}{(2n+1)^3} \quad in\ (0,1)$$

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

   g) Define one dimension wave equation. (2M)

PART -B

2. a) Find the root of the equation $x^3 - x - 4 = 0$ using Bisection method. (7M)

   b) Find the root of the equation $xe^x = 3$ using Newton Raphson method. (7M)

3. a) Given that $\sin 45^0 = 0.7077$, $\sin 50^0 = 0.766$, $\sin 55^0 = 0.8192$, $\sin 60^0 = 0.866$ find $\sin 55^0$ using Newton's forward difference formula. (7M)

   b) Using Lagrange's formula find y(8) from the following table. (7M)

X	0	2	5	6	10	15
Y	7	11	14	18	24	32

4. a) Evaluate $\int_0^2 \frac{dx}{\sqrt{1+x^2}}$ by (i) Simpson's 1/3rd rule (iii) Simpson's 3/8th Rule. (7M)

   b) Solve $\frac{dy}{dx} = xy^2$ using Modified Euler's method for x=1.2 given y (1)=1. (7M)

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5. a) Find the Fourier series for $f(x)=\begin{cases} x, & \frac{-\pi}{2}<x<\frac{\pi}{2} \\ 0, & \frac{\pi}{2}<x<\frac{3\pi}{2} \end{cases}$ (7M)

Hence deduce that $\frac{1}{1^2}+\frac{1}{3^2}+\frac{1}{5^2}+\ldots=\frac{\pi^2}{8}$

b) Find the half range cosine series of $f(x)=\begin{cases} 0 & -5<x<0 \\ 3 & 0<x<5 \end{cases}$ (7M)

6. a) Find the Finite Fourier cosine transform of $f(x)$ defined by (7M)

$$f(x)=\begin{cases} x & 0<x<\frac{\pi}{2} \\ \pi-x & \frac{\pi}{2}<x<\pi \end{cases}$$

b) Do the Fourier sine and cosine transform exist for e^x (7M)

7. a) Solve the PDE $\frac{\partial u}{\partial x}-2\frac{\partial u}{\partial y}=u$ and $u(x,0)=3e^{-5x}+2e^{-3x}$ (7M)

b) Solve $\frac{\partial^2 u}{\partial x^2}+\frac{\partial^2 u}{\partial y^2}=0$ subject to (7M)

$(i)\ u(0,y)=0\ for\ all\ y$

$(ii)\ u(a,y)=0\ for\ all\ y$

$(iii)\ u(x,\infty)=0\ ,0\le x\le a$

$(iv)\ u(x,0)=kx,\ 0\le x\le a$