

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**

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

$$F_s(n) = \frac{\cos\left(\frac{2n\pi}{3}\right)}{(2n+1)^3} \text{ in } (0,1)$$
- f) Find the Fourier transform of $f(x) = \begin{cases} 1 & \text{if } 0 < x < 1 \\ -1 & \text{if } 1 < x < 2 \\ 0 & \text{if } x > 2 \end{cases}$ (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 $\sin 45^\circ = 0.7077$, $\sin 50^\circ = 0.766$, $\sin 55^\circ = 0.8192$, $\sin 60^\circ = 0.866$ find $\sin 55^\circ$ 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 $1/3^{\text{rd}}$ rule (iii) Simpson's $3/8^{\text{th}}$ 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 $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots = \frac{\pi^2}{8}$

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) $u(x, \infty) = 0, 0 \leq x \leq a$
- (iv) $u(x, 0) = kx, 0 \leq x \leq a$