Code No: **R161202** **R16** **SET - 1**

I B. Tech II Semester Supplementary Examinations, January/February - 2023
MATHEMATICS-II (Mathematical Methods)
(Common to AE, AME, Bio-Tech, Chem E, CE, EEE, ME, Metal E, Min E, PCE, PE)

Time: 3 hours Max. Marks: 70

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

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PART –A (14 Marks)

1. a) Find the interval of existence of equation $log_e x = cosx$. [2M]
   b) Find the half range sine series of f(x) = 1 in [0,π]. [2M]
   c) Find the finite Fourier sine transform f(x) = 1 in [0,2]. [2M]
   d) Find $\Delta(tan^{-1}x)$ if h = 1. [2M]
   e) Find y (0.1) given that by Euler's method $\frac{dy}{dx} = x + 2y,\ y(0) = 1.$ [2M]
   f) Write the merits of modified Euler's theorem. [2M]
   g) Write one dimensional Wave equation. [2M]

PART –B (56 Marks)

2. a) Find the Real root of $xtanx + 1 = 0$using False position method. [7M]
   b) Evaluate $x^3 + 2x^2 + 0.4 = 0$ using Newton Raphson method. [7M]

3. a) Find f(21) if f(17) = 5.474 , f(18) = 6.050 , f(19) = 6.686 , f(20) = 7.389 using Newton Backward interpolation formula. [7M]
   b) Evaluate y(x) from the following table. [7M]

x	0	1	3	4
y	2	3	4	5

4. a) Evaluate $\int_0^{\pi} xsinxdx$ using Trapezoidal Rule. [7M]
   b) Using Picard's method find y(0.1) ,y(0.2) given that $\frac{dy}{dx} = x - y, y(0) = 2.$ [7M]

5. a) Find the Fourier series of $f(x) = |x| \quad in \ (-\pi,\pi)$ [7M]
   b) Find the Half range cosine series of $f(x) = \cos\left(\frac{\pi x}{l}\right), 0 < x < l$ [7M]

6. a) Solve $\frac{\partial^2 u}{\partial x \partial t} = e^{-t}\cos x$ given that $u(x,0) = 0, \frac{\partial u}{\partial t}(0,t) = 0$ [7M]
   b) Find the temperature in a bar of length 1 which is perfectly insulated laterally and whose ends O and A are kept at 0^0 C given that the initial temperature at any point P of the rod is given by f(x). [7M]

7. a) Find the Fourier Cosine transform of $f(x)$ defined by $f(x) = \frac{1}{x}$ [7M]
   b) Find the Fourier transform of $f(x)$ defend by $f(x) = \begin{cases} x^2 & if\ |x| < 1 \\ 0 & if\ |x| > 1 \end{cases}$ [7M]

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