Code No: R13107 **R13** SET - 1

I B. Tech I Semester Supplementary Examinations, August/Sep - 2022
MATHEMATICS-II (MM)
(Com. to ECE, EEE, EIE, Bio-Tech, E Com E, Agri E)

Time: 3 hours Max. Marks: 70

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

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PART –A

1. a) State merits of Newton-Raphson method. (3M)

b) If $\frac{dy}{dx} = y,\ y(0) = 1$ find y_3 using Picard's method of successive approximation. (4M)

c) Prove that $\mu = \sqrt{\left(1+\frac{\delta^2}{4}\right)}$. (4M)

d) Find Fourier coefficient b_n for the function $f(x) = \begin{cases} 1+x, -1 < x < 0 \\ 1-x, 0 < x < 1. \end{cases}$ (4M)

e) Find finite Fourier sine transform of $f(x) = x$ in $(0,1)$. (3M)

f) Find $Z^{-1}\left\{\frac{z}{(z-2)(z-3)}\right\}$. (4M)

PART -B

2. a) Find a real root for $e^x \sin x = 1$, using RegulaFalsi method. (8M)

b) Solve the system of equations Newton- Raphson method $3yx^2 - 10x + 7 = 0$ and $y^2 - 5y + 4 = 0$. (8M)

3. a) Find f(2.5) using Newton's forward formula from the following table: (8M)

x	0	1	2	3	4	5	6
y	0	1	16	81	256	625	1296

b) Using Lagrange's interpolating formula, find y (10) from the following table. (8M)

x	5	6	9	11
f(x)	12	13	14	16

4. a) Find the Fourier series of $f(x) = \begin{cases} \frac{-1}{2}(\pi - x), \text{for } -\pi < x < 0 \\ \frac{1}{2}(\pi - x), \text{for } 0 < x < \pi \end{cases}$ (8M)

b) Obtain the Fourier cosine series for f(x) = x sin x, $0 < x < \pi$. (8M)
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5. a) Find the Fourier transform of $f(x)=\begin{cases} a^2-x^2, \text{if } |x|<a \\ 0 \quad , \text{if } |x|>a \end{cases}, a>0$. Hence Show that $\int_0^\infty \frac{\sin x-\cos x}{x^3}dx=\frac{\pi}{4}$ (8M)

b) Find the Fourier cosine transform of $f(x)=\frac{e^{-ax}}{x}$ and deduce (8M)

6. a) Find the inverse Z – transform of $\frac{z}{(z^2+1)(z-1)}$. (8M)

b) Using Z – transform, solve $y_{n+2}+2y_{n+1}+y_n=n$. Given that $y_0=y_1=0$. (8M)

7. a) Solve $y'=y-x^2$, y(0) = 1, by Picard's method up to the fourth approximation. Hence, find the value of y(0.1), y(0.2). (8M)

b) Apply the fourth order Runge-Kutta method, to find an approximate value of y when x = 1.2, in steps of 0.1, given that : $y'=x^2+y^2$, y(1) = 1.5 (8M)