Code No: **R13207** **R13** **SET-1**

**I B. Tech II Semester Supplementary Examinations, January/February - 2023**
**MATHEMATICS-II (MM)**
(Common to CE, ME)

Time: 3 hours Max. Marks: 70

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

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**PART –A(22 Marks)**

1. a) Find a positive root of $x^3 - x - 1 = 0$ using Bisection method in 3 stages. [4M]
   b) Show that $\mu^2 = 1 + \frac{\delta^2}{4}$. [4M]
   c) Solve $y' = x + y$ given $y(1) = 0$ .Find $y(1.1)$ by Taylor's series method. [3M]
   d) Express a function $f(x)$ as a half range cosine series in $(0, \pi)$. [4M]
   e) Show that $F_s[f(x)\cos ax] = \frac{1}{2}[F_s(p+a) + F_s(p-a)]$ [4M]
   f) Find $Z[(n-1)^2]$. [3M]

**PART –B (48 Marks)**

2. a) Find the root of the equation $x \log_{10} x = 1.2$ using false position method. [8M]
   b) Using Newton Raphson method find a positive root of $x^4 - x - 9 = 0$ in $[1, 2]$ [8M]

3. a) Find the Newton's forward difference interpolating polynomial for [8M]

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|---|---|---|---|---|
| $x$ | 0 | 1 | 2 | 3 |
| $f(x)$ | 1 | 3 | 7 | 13 |

   b) Find the value of $f(2)$ using Lagrange's interpolation formula. [8M]

| | | | | |
|---|---|---|---|---|
| $x$ | 0 | 1 | 3 | 4 |
| $f(x)$ | 5 | 6 | 50 | 105 |

4. a) Using modified Euler method find $y(0.2)$ given $y' = y + e^x$ and $y(0) = 0$. [8M]
   b) Use Runge-Kutta method to evaluate $y(0.1)$, giventhat $y' = x + y$, $y(0) = 1$. [8M]

5. a) Express $f(x) = x$ as a Fourier series in $(-\pi, \pi)$. [8M]
   b) Find the half range sine series for $f(x) = x(\pi - x)$ in $0 < x < \pi$ and deduct $\frac{1}{1^3} - \frac{1}{3^3} + \frac{1}{5^3} - \frac{1}{7^3} ....... = \frac{\pi^3}{32}$ [8M]

6. a) Find Fourier transform of $f(x) = e^{-\frac{x^2}{2}}$, $-\infty < x < \infty$. [8M]
   b) Find Fourier cosine transform of $f(x) = \begin{cases} x & if \quad 0 < x < 1 \\ 2 - x & if \quad 1 < x < 2 \\ 0 & if \quad x > 2 \end{cases}$ [8M]

7. a) Find $Z\left\{\frac{1}{n(n+1)}\right\}$ [8M]
   b) Using the Z transform solve $y_{n+2} - 7y_{n+1} + 12y_n = 0$ given that $y_0 = 1$, $y_1 = 2$. [8M]

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