

I B. Tech I Semester Supplementary Examinations, April - 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**

PART -A

1. a) Perform three iterations of bisection method to find positive square root of 30 in (4M)
(5.477, 5.478).
- b) Find unique polynomial $P(x)$ such that $P(1)=1, P(3)=27, P(4)=64$ using (4M)
Lagrange's method of interpolation.
- c) Using Euler's algorithm find $y(0.2)$ for the equation $\frac{dy}{dx}=1-y$ with initial (3M)
condition $x=0, y=0$.
- d) If $F(p)$ is the complex Fourier transform of $f(x)$, then prove that (3M)
 $F(f(ax)) = \frac{1}{a} F\left(\frac{p}{a}\right), a \neq 0$.
- e) If $f(x) = x \sin x$ in $(0, 2\pi)$ then find the Fourier coefficient a_0 . (4M)
- f) If $Z\{f(k)\} = F(z)$, then prove that $Z\{kf(k)\} = -z \frac{d}{dz} F(z)$. (4M)

PART -B

2. a) Find a real root of $xe^x = 3$ using Regula-Falsi method. (8M)
- b) Perform two iterations of the Newton-Raphson method to solve the system of (8M)
equations $x^2 + y^2 + xy = 7$ and $x^3 + y^3 = 9$.
3. a) Construct difference table for the following data. (8M)

x	0.1	0.3	0.5	0.7	0.9	1.1	1.3
f(x)	0.003	0.067	0.148	0.248	0.370	0.518	0.697

Evaluate f (0.6).

- b) Find the interpolating polynomial f(x) as a cubic polynomial from the table. (8M)

x	0	1	4	5
c	4	3	24	39



4. a) Find the Fourier series of $f(x) = \left(\frac{\pi - x}{2}\right)^2$ in the interval $0 < x < 2\pi$. (8M)
- b) Obtain the Fourier sine series for $f(x) = x \sin x$, $0 < x < \pi$. (8M)
5. a) Find the Fourier transform of $f(x) = \begin{cases} \cos x & \text{for } |x| \leq a \\ 0 & \text{for } |x| > a > 0 \end{cases}$. (8M)
- b) Find the Fourier sine transform of $f(x) = \frac{e^{-ax}}{x}$ and deduce (8M)
- $$\int_0^{\infty} \frac{e^{-ax} - e^{-bx}}{x} \sin sxdx = \tan^{-1}(s/a) - \tan^{-1}(s/b).$$
6. a) Find the inverse Z – transform of $\frac{z}{(z+3)^2(z-2)}$. (8M)
- b) Solve the difference equation, using Z –transform $y(n+2) + 3y(n+1) + 2y(n) = 0$, (8M)
given $y(0) = 0$, $y(1) = 1$.
7. a) Find the value of y at $x = 0.1$ by Picard's method, given that $\frac{dy}{dx} = \frac{y-x}{y+x}$, $y(0) = 1$. (8M)
- b) Using Modified Euler method find $y(0.2)$ and $y(0.4)$ given $y' = y + e^x$, $y(0) = 0$. (8M)

