

I B. Tech I Semester Supplementary Examinations, May/June - 2019
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 the question in **Part-A** is Compulsory
 3. Answer any **THREE** Questions from **Part-B**

PART -A

1. a) Find the relation between Δ, ∇, E . (4M)
- b) Find four iterations of $3x = 1 + \cos x$ using Iteration method. (4M)
- c) Write the merits of RK method. (4M)
- d) Find the half range cosine series of $f(x) = 2x$ in $[0, 1]$. (4M)
- e) State Fourier integral theorem. (3M)
- f) Find the Z- transform of unit step function. (3M)

PART -B

2. a) Find $f(35)$ from the following table. (8M)

| | | | | |
|---|-----|-----|-----|-----|
| x | 10 | 20 | 30 | 40 |
| y | 1.1 | 2.0 | 4.4 | 7.9 |

- b) Find the missing value of the following data. (8M)

| | | | | | |
|---|---|----|----|----|----|
| x | 1 | 2 | 3 | 4 | 5 |
| y | 7 | -- | 13 | 21 | 37 |

3. a) Find the positive root of $2x - \log_{x_{10}} = 7$ using Newton Raphson Method. (8M)

- b) Find the positive root of $xe^x = 2$ using Bisection Method. (8M)

4. a) Evaluate $y(0.2)$ and $y(0.4)$ by Taylor's method if $y' = 1 - 2xy, y(0) = 0$. (8M)

- b) Find $y(0.1)$ by Modified Euler's method given that $\frac{dy}{dx} = \frac{y-x}{y+x}, y(0) = 1$ (8M)

5. a) Find the Fourier series of $f(x) = x + \pi$ in $(-\pi, \pi)$ (8M)

- b) Find the Half range sine series of $f(x) = \begin{cases} 1 & 0 < x < 1 \\ -1 & 1 < x < 2 \end{cases}$ (8M)

6. a) Using Fourier integral, Show that $\int_0^{\infty} \frac{\cos \lambda x + \lambda \sin \lambda x}{1 + \lambda^2} d\lambda = \begin{cases} 0 & \text{if } x < 0 \\ \pi e^{-x} & \text{if } x > 0 \end{cases}$ (8M)

- b) Prove that $F\{x^n f(x)\} = (-i)^n \frac{d^n}{dp^n} [F(p)]$ (8M)

7. a) Evaluate $Z^{-1} \left[\frac{z^2}{(z-1)(z-3)} \right]$, using convolution theorem. (8M)

b) Find (i) $Z \left[\sin \frac{n\pi}{2} \right]$ (ii) $Z \left[\cos \frac{n\pi}{2} \right]$ (8M)