

**I B. Tech I Semester Supplementary Examinations, November - 2020**  
**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) Show that  $\Delta = E \nabla = \nabla E = \delta E^{\frac{1}{2}}$  (4M)
- b) Find four iterations of  $3x = 1 + \cos x$  Newton Raphson method. (4M)
- c) Write the demerits of Euler's method. (3M)
- d) Find the half range sine series of  $f(x) = 2x$  in  $[0, 1]$  (4M)
- e) Find the Fourier transform of  $f(x)$  defined by  $f(x) = \begin{cases} 1 & \text{if } |x| < a \\ 0 & \text{if } |x| > a \end{cases}$  (4M)
- f) Write the shifting theorems in z-transform. (3M)

**PART -B**

2. a) Find  $f(15)$  from the following table. (8M)

x	10	20	30	40
y	1.1	2.0	4.4	7.9

- b) Find polynomial which is passing through the following points  $(-1, -21), (1, 15), (2, 12), (3, 3)$  (8M)
3. a) Find the positive root of  $2x - \log_{x10} = 7$  using Iteration Method. (8M)
- b) Find the positive root of  $xe^x = 1$  using Bisection Method. (8M)
4. a) Find  $y(0.1)$  and  $y(0.2)$  using Runge-Kutta 4<sup>th</sup> order, given that  $y' = x^2 - y, y(0) = 1$  (8M)
- b) Find  $y(0.1)$  by Picard's method given that  $\frac{dy}{dx} = \frac{y-x}{y+x}, y(0) = 1$  (8M)

5. a) Find the Fourier series of  $f(x) = e^{-x}$  in  $(0, 2\pi)$  and hence deduce that (8M)

$$\frac{\pi}{2 \sinh \pi} = \sum_{n=2}^{\infty} \frac{(-1)^n}{n^2 + 1}$$

- b) Find the Half range cosine series of  $f(x) = x$  in  $[0, \pi]$  Hence deduce (8M)

$$1 + \frac{1}{3^2} + \frac{1}{5^2} + \dots = \frac{\pi^2}{8}$$

6. a) Using Fourier integral, show that  $e^{-x} \cos x = \frac{2}{\pi} \int_0^{\infty} \frac{\lambda^2 + 2}{\lambda^2 + 4} \cos \lambda x d\lambda$  (8M)
- b) Find the Finite Fourier Cosine transforms of  $f(x)$  defined by  $f(x) = \begin{cases} x, & 0 < x < \frac{\pi}{2} \\ \pi - x, & \frac{\pi}{2} < x < \pi \end{cases}$  (8M)
7. a) Find the inverse Z – transform of  $\left[ \frac{z}{z^2 + 11z + 24} \right]$  (8M)
- b) Solve the difference equation  $y_{n+2} - 5y_{n+1} + 6y_n = 3n + 5$ ,  $y_0 = 1$ ,  $y_1 = 3$  using Z-Transforms (8M)