

I B. Tech II Semester Supplementary Examinations, Nov/Dec - 2019**MATHEMATICS-II (MM)**

(Com. to CE,EEE,ME,AE,AME,Bio-Tech,Chem E,Metal E,Min E,PCE,PE)

Time: 3 hours

Max. Marks: 70

Note: 1. Question paper consists of two parts (**Part-A** and **Part-B**)2. Answering question in **Part-A** is Compulsory3. Answer any **FOUR** Questions from **Part-B****PART -A**

1. a) Find the interval of the existence of root of $\log x - \cos x = 0$. (2M)
- b) Find the relation between E and δ . (2M)
- c) Write formula for Simpson's $3/8^{\text{th}}$ rule. (2M)
- d) Write Dirichlet conditions on Fourier series. (2M)
- e) Write the shifting theorem in Fourier transforms. (2M)
- f) Write the linear solution of heat (one dimensional) equations. (2M)
- g) Write the procedure to solve ODE using Euler's method. (2M)

PART -B

2. a) Find the Real root of the equation $x^3 + 2x^2 + 10x - 20 = 0$ using Newton Raphson method. (7M)
- b) Find the Real root of the equation $xe^x = \cos x$ using Bisection method. (7M)
3. a) Find $y(10)$ from the following data. (7M)

x	5	6	9	11
y	12	13	14	16

- b) Find $y(8)$ from the following data. (7M)

x	4	5	6	7
y	4	10	12	20

4. a) Evaluate $\int_0^5 \frac{dx}{4x+5}$ using (i) Simpson's $3/8^{\text{th}}$ rule with $h = 0.5$ (ii) Trapezoidal rule with $h = 0.5$ (7M)
- b) Find $y(1.2)$ given that $y' = \frac{2xy + e^x}{x^2 + xe^x}$, $y(1) = 0$ by RK method of fourth order (7M)
5. a) Find the Fourier series for $f(x) = \begin{cases} -\pi, & -1 < x < 0 \\ \pi, & 0 < x < 1 \end{cases}$ (7M)

- b) Find the Half range cosine series of $f(x) = \begin{cases} x & 0 < x < \frac{\pi}{2} \\ -x & \frac{\pi}{2} < x < \pi \end{cases}$ (7M)
6. a) Find the Fourier sine transform of (a) $e^{-ax} \cos ax$ (b) $e^{-ax} \sin ax$ (7M)
- b) Find the Fourier cosine transform of $f(x) = \begin{cases} x & \text{if } 0 < x < \frac{1}{2} \\ 1-x & \text{if } \frac{1}{2} < x < 1 \\ 0 & \text{if } x > 1 \end{cases}$ (7M)
7. a) Solve $4 \frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} = 3u$ given that $u(0, y) = 3e^{-y} - e^{-5y}$ (7M)
- b) Solve $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ subject to (7M)
- (i) $u(0, y) = 0$ for all y
(ii) $u(a, y) = 0$ for all y
(iii) $u(x, \infty) = 0, 0 \leq x \leq a$
(iv) $u(x, 0) = kx, 0 \leq x \leq a$