R16

SET - 1

I B. Tech II Semester Supplementary Examinations, December - 2020
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 **ALL** the questions in **Part-A** is Compulsory
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1. a) Define linear convergence and quadratic convergence.   (2M)

    b) Find $\Delta(x^2 + sinx)$.   (2M)

    c) Write formula to find interpolation polynomial for unequal intervals.   (2M)

    d) Find the value of a_n in the half range cosine series of f(x) = x in [0,2].   (2M)

    e) Using Euler's method find y(1.0) for the D.E $\dfrac{dy}{dx} = 1 + xy, y(0) = 1 , h = 0.5$ (2M)

    f) Write Fourier integral formula.   (2M)

    g) Write one dimensional wave equation.   (2M)

PART –B

2. a) Find the Real root of $x^4 - x - 10 = 0$ using bisection method.   (7M)

    b) Find the iterative formula for $\sqrt[k]{N}$, hence Evaluate $\sqrt[3]{11}$ using Newton Raphson method.   (7M)

3. a) Find the Missing terms in the following data.   (7M)

x	45	50	55	60	65
y	3	--	2	--	-2.4

    b) Find f(31) using Gauss For ward interpolation formula from the following table.   (7M)

x	25	30	35	40
y	0.2707	0.3027	0.3386	0.3794

4. a) Evaluate $\displaystyle\int_0^{\pi} \dfrac{\sin^2 x}{5 + 4\cos x}dx$ by (i) Simpson's 1/3 rd rule (ii) Simpson's 3/8th rule.   (7M)

    b) Evaluate y (0.1) using Picard's method   for $\dfrac{dy}{dx} = \dfrac{x^2}{1 + y^2}$, $y(0) = 0$ (7M)

5. a) Expand the function f(x) = x+x^2 as a Fourier series in [-π,π]　　(7M)
       Hence deduce that

       (i) $\dfrac{1}{1^2} - \dfrac{1}{2^2} + \dfrac{1}{3^2} - \dfrac{1}{4^2} + ... = \dfrac{\pi^2}{12}$

       (ii) $\dfrac{1}{1^2} + \dfrac{1}{2^2} + \dfrac{1}{3^2} + \dfrac{1}{4^2} + ... = \dfrac{\pi^2}{6}$

    b) Expand $f(x) = \begin{cases} 0, & -\pi < x < 0 \\ \sin x, & 0 < x < \pi \end{cases}$ as half range sine series.　　(7M)

6. a) Express the $f(x)$ defend by $f(x) = \begin{cases} 1 & if\ |x| < 1 \\ 0 & if\ |x| > 1 \end{cases}$ as a Fourier integral　　(7M)

       Hence Evaluate $\displaystyle\int_0^\infty \dfrac{\sin\lambda\cos\lambda x}{\lambda} d\lambda$

    b) Find the Fourier transform of $f(x)$ defend by $f(x) = \begin{cases} x & if\ 0 < x < 1 \\ 1-x & if\ 1 < x < 2 \\ 0 & if\ x > 2 \end{cases}$　　(7M)

7. a) Solve the PDE $x^2\dfrac{\partial u}{\partial x} + y^2\dfrac{\partial u}{\partial y} = 0$ using method of variation of parameters.　　(7M)

    b) A tightly stretched string with fixed end points at x = 0 and x = 1 is initially in a　　(7M)
       position given by

       $f(x) = \begin{cases} x & 0 < x < \dfrac{1}{2} \\ 1-x & \dfrac{1}{2} < x < 1 \end{cases}$

       If it is released from this position with velocity zero find the displacement u(x, t)
       at any point of x of the string at any time is t>0.