Code No : 19SHT201 **R19**

I B. Tech II Semester Regular Examinations, December - 2020
MATHEMATICS-II
(Common to ALL Branches)

Time : 3 hours **Max. Marks : 60**

Note : Answer **ONE** question from each unit (**5 × 12 = 60 Marks)**

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UNIT - I

1. a) Find a real root of the eq. $x^3 - x - 1 = 0$ correct to three decimal places by Iteration method. 6M

   b) Solve the following system of equations by Jacobi's method starting with the solution (2, 3, 0) 6M
   $5x - y + z = 10$; $2x + 4y = 12$; $x + y + 5z = -1$

(OR)

2. a) Find a real root of the equation $x^4 - x - 9 = 0$ by Newton-Raphson method correct to three places of decimal. 6M

   b) Use method of false position to find the 4^{th} root of 32 correct to three decimal places. 6M

UNIT – II

3. a) Prove the following relations between the operators. 4M
   (i) $\Delta = E - 1$ (ii) $\nabla = 1 - E^{-1}$ (iii) $\delta = E^{1/2} - E^{-1/2}$ (iv) $\mu = \frac{1}{2}(E^{1/2} + E^{-1/2})$

   b) From the following table estimate the number of students who obtained marks between 40 and 45 by Newton's formula. 8M

Marks	30-40	40-50	50-60	60-70	70-80
No. of Students	31	42	51	35	31

(OR)

4. a) Use Gauss's forward formula to evaluate y_{30}, given that $y_{21} = 18.4708$; $y_{25} = 17.8144$; $y_{29} = 17.1070$; $y_{33} = 16.3432$; $y_{37} = 15.5154$. 6M

   b) Use Newton's divided difference formula to find f(9) for the following data 6M

x	5	7	11	13	17
f(x)	150	392	1452	2366	5202

UNIT – III

5. a) Evaluate $\int_0^6 \frac{1}{1+x^2}\,dx$ using (i) Trapezoidal rule (ii) Simpson's 3/8 rule by dividing into 6 equal sub intervals. 6M

   b) Apply Runge-Kutta Method to find an approximate value of y for x = 0.2 in steps of 0.1, if $\frac{dy}{dx} = x + y^2$ given that y = 1 when x = 0. 6M

(OR)

6. a) Using Picard's method obtain a solution up to the fifth approximation of the equation $\frac{dy}{dx} = x + y$ such that y = 1 when x = 0. 6M

   b) Using Modified Euler's method, find approximate value of y when x = 0.3, given $\frac{dy}{dx} = x + y$ and y = 1 when x = 0. 6M
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UNIT –IV

7.	a)	Find $L(t^2e^{-2t}\cos t)$	6M
	b)	Using Laplace transform, solve $(D^2 + 1)x = t\cos 2t$, given that $x = 0$, $\frac{dx}{dt} = 0$ at $t = 0$.	6M

(OR)

8.	a)	Evaluate $\int_0^\infty \frac{e^{-t} - e^{-2t}}{t}\,dt$, by using the Laplace transform.	6M
	b)	Find $L^{-1}\{\frac{1}{s(s^2+2s+2)}\}$ by using convolution theorem.	6M

UNIT –V

9.	a)	State Dirichlet's conditions for the expansion of a function in Fourier series.	2M
	b)	Find the Fourier cosine series over the interval $0 < x < 2$ for the function $f(x) = x$.	10M

(OR)

10.	a)	State Fourier integral theorem.	2M
	b)	Find the Fourier transform of $f(x) = \begin{cases} -1; & -1 \le x < 0 \\ 1; & 0 \le x \le 1 \\ 0; & \text{else where} \end{cases}$	10M

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