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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

B.Tech II Year I Semester Supplementary Examinations August-2021

MATHEMATICS-III

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 60

PART-A

(Answer all the Questions 5 x 2 = 10 Marks)

- 1 a Write Simpson formulae. 2M
- b Write the diagonal five-point formula. 2M
- c Find $L(t^2 + 3t + 10)$. 2M
- d Find the finite Fourier sine transform of $f(x) = 2x, 0 < x < 4$. 2M
- e Solve $p(1 + q) = qz$. 2M

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

- 2 Using Newton-Raphson method, find (i) the square root of 28 and (ii) the cube root of 15. 10 M

OR

- 3 a Evaluate $\int_0^1 \frac{1}{1+x} dx$ by Trapezoidal rule and Simpson's 1/3 rule. 5 M
- b Using Simpson's 3/8 rule and compare the result with actual value. 5 M

UNIT-II

- 4 a Tabulate $y(0.1)$, $y(0.2)$ and $y(0.3)$ using Taylor's series method given that $y' = y^2 + x$ and $y(0) = 1$. 5 M
- b Using Euler's method, find an approximate value of y corresponding to $x = 1$ given that $\frac{dy}{dx} = x + y$ and $y = 1$ when $x = 0$. 5 M

OR

- 5 Solve $y'' - x(y')^2 + y^2 = 0$ using the R-K method of 4th order for $x = 0.2$ given $y(0) = 1, y'(0) = 0$ taking $h = 0.2$. 10 M

UNIT-III

- 6 a Find $L^{-1}\left(\frac{1}{2} \log\left(\frac{s^2 + a^2}{s^2 + b^2}\right)\right)$. 5M
- b Find $L^{-1}\left(\frac{1}{(s^2 + 5^2)^2}\right)$ using convolution theorem. 5M

OR

- 7 Solve the D.E. $\frac{d^2x}{dt^2} + 9x = \sin t$ using Laplace transform given that $x(0) = 1, x\left(\frac{\pi}{2}\right) = 1$. 10 M

UNIT-IV

- 8 Find the Fourier transform of $f(x) = \begin{cases} a^2 - x^2, & |x| < a \\ 0, & |x| > a > 0 \end{cases}$. Hence show that 10 M

$$\int_0^{\infty} \frac{\sin x - x \cos x}{x^3} dx = \frac{\pi}{4}.$$

OR

- 9 Find the Fourier sine and cosine transforms of $f(x) = e^{-ax}$, $a > 0$ and hence deduce 10 M
the integrals (i) $\int_0^{\infty} \frac{p \sin px}{a^2 + p^2} dp$ and (ii) $\int_0^{\infty} \frac{\cos px}{a^2 + p^2} dp$.

UNIT-V

- 10 a Solve $p^2 + q^2 = x + y$. 5M
b Solve $z^2(p^2x^2 + q^2) = 1$. 5M

OR

- 11 A tightly stretched string of length l with fixed ends is initially in equilibrium position. It 10 M
is set vibrating by giving each point a velocity $b \sin^3\left(\frac{\pi x}{l}\right)$. Find the displacement $y(x, t)$.

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