Q.P. Code: 16HS612 **R16**

Reg. No: | | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

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

ENGINEERING MATHEMATICS-III

(Common to all)

Time: 3 hours Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

UNIT-I

1	a	If $f(z) = u + iv$ is an analytic function of z and if $u - v = e^x(\cos y - \sin y)$, then find $f(z)$ in terms of z.	**6M**
	b	Evaluate the integral $\int_C (y - x - 3x^2 i)dz$ where C consists of line segments from $z = 0$ to $z = i$ and the other from $z = i$ to $z = i + 1$.	**6M**

OR

2	a	Evaluate $\int_0^{1+3i} (x^2 - iy)dz$ along the path $y = x^2$.	**6M**
	b	Evaluate the integral $\int_C \frac{\cos z - \sin z}{(z+i)^3} dz$ where $C : \lvert Z \rvert = 2$ using Cauchy's integral.	**6M**

UNIT-II

3	a	Determine the poles of the function $f(z) = \frac{z^2 + 1}{z^2 - 2z}$ and hence residues at each pole.	**6M**
	b	Evaluate $\int_{-\infty}^{\infty} \frac{\cos ax \; dx}{x^{2+1}}$, $a > 0$.	**6M**

OR

4	a	Find the bilinear transformation which maps the points $(\infty, i, 0)$ into the points $(0, i, \infty)$.	**5M**
	b	Use residue theorem to evaluate the integral $\int_0^{\pi} \frac{\cos 2\theta \; d\theta}{1 + 2a\cos 2\theta + a^2}$, $a^2 < 1$.	**7M**

UNIT-III

5	a	Find a real root of the equation $x^3 - 7x + 3 = 0$ using Newton –Raphson method with an initial approximation $x_0 = 3$.	**6M**
	b	Use Newton's Backward interpolation formula to find $f(38)$ given $f(25) = 0.2707$, $f(30) = 0.3027$ $f(35) = 0.3386$, $f(40) = 0.3794$	**6M**

OR

6	a	Find the solution of the equation $x^3 - 2x - 3 = 0$ on the interval [0, 2] using Regula-falsi position method. Perform four iterations.	**6M**
	b	Using Lagrange's interpolation fit a polynomial $P(x)$ of degree at most 2 such $P(1) = 1$, $P(3) = 27$, $P(4) = 64$. Hence, use it to estimate $P(2)$.	**6M**

UNIT-IV

7 a Fit the curve of the form $y = ab^x$ to the following data **6M**

x	1	2	3	4
y	7	10	15	25

b Approximate the integral $\int_0^{\frac{\pi}{2}} \sin x\,dx$, using Simpson's $\frac{3}{8}^{\text{th}}$ rule with $h = \frac{\pi}{12}$. **6M**

OR

8 a Fit a second degree polynomial to the following data by the method of **least squares.** **6M**

x	0	3	5	7
y	1	10	27	50

b Evaluate the integral $\int_0^1 e^{-x^2}\,dx$, using Simpson's $\frac{1}{3}$ rule with $h = 0.2$. **6M**

UNIT-V

9 a Given that $\frac{dy}{dx} = y - x^2$, $y(0) = 1$, use Picard's method to find the value of $y(0.1)$ and $y(0.2)$, correct to four decimal places. **6M**

b Solve the initial value problem $\frac{dy}{dx} = -2xy^2$, $y(0) = 1$ with $h = 0.2$ on the interval [0, 0.2] using fourth order Runge-Kutta method. **6M**

OR

10 a Given the differential equation $\frac{dy}{dx} = x^2 - y^2$, $y(0) = 1$, determine the value of $y(0.2)$ using Taylor's series method. **6M**

b If the initial value problem is $\frac{dy}{dx} = \frac{2y}{x}$, $y(1) = 2$, then approximate the value of $y(2)$ using Euler's method. **6M**

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