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

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech II Year I Semester Supplementary Examinations Feb-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 Find an analytic function with the real part as $e^{-x}(x\sin y - y\cos y)$. **6M**

b Evaluate using Cauchy's integral formula $\int_C \frac{\sin^6 z}{\left(z-\frac{\pi}{2}\right)^3}dz$ around the circle $C: |z|=1$. **6M**

OR

2 a Evaluate the line integral $\int_C \frac{e^{2z}dz}{(z-1)(z-2)}$ where around the circle $C: |z|=3$ using Cauchy's integral formula. **6M**

b Define Harmonic function. Then, show that function $u = \frac{x}{x^2+y^2}$ is harmonic. **6M**

UNIT-II

3 a Find the residue of the function $f(z) = \frac{e^{2z}}{z(z-3)}$ where $C: |z|=2$. **6M**

b Find the image of the region in the z-plane between the lines $y=0$ and $y=\frac{\pi}{2}$ under the transformation $y = e^z$. **6M**

OR

4 a Find the bilinear transformation which maps the points $(0, 1, i)$ into the points $(1+i, -i, 2-i)$ in W-plane. **5M**

b Evaluate $\int_0^{\pi} \frac{1}{a+b\cos\theta}d\theta,\ a, b>0$. **7M**

UNIT-III

5 a Find a root of the equation $\cos x - x^2 - x$ using bisection method with $x_0 = -1$ and $x_1 = -1$. Perform four iterations. **6M**

b Using Newton's forward formula, fit the following data and hence estimate $f(1.4)$. **6M**

x	1.1	1.3	1.5	1.7	1.9
$f(x)$	0.21	0.69	1.25	1.89	2.61

OR

6 a Perform four iterations of Newton-Raphson method to find a real root of the equation $xe^x - \cos x = 0$. **6M**

b A jet fighter's position on an aircraft carrier's runway was timed during landing: **6M**

t, s	0	1	2	4
x, m	150	185	249	273

where x is the distance from the end of the carrier. Estimate distance travelled when $t = 3$ using Lagrange's interpolation.

UNIT-IV

7 a Fit the curve of the form $y = ae^{bx}$ for the following data. **6M**

x	77	100	185	239	285
y	2.4	3.4	7	11.1	19.6

b Find the approximate value of the integral $\int_0^1 \frac{1}{1+x^2} dx$ using Simpson's $\frac{1}{3}$ rule **6M**

With $h = 0.25$. Hence compare with its true value.

OR

8 a Fit a power curve to the following data. **6M**

x	1	2	3	4	5	6
y	2.98	4.26	5.21	6.10	6.80	7.50

b Find the approximate value of the integral $\int_1^{10} x^2 \log x dx$ using Trapezoidal rule **6M**

With $h = 1$.

UNIT-V

9 a Compute $y(1.1)$ and $y(1.2)$ by Taylor's series method, where $y(x)$ is the solution of the initial value problem $y^1 = x + y$, $y(1) = 0$. **6M**

b Using Runge-Kutta method of second order, compute $y(2.5)$ from **6M**

$y^1 = \frac{y+x}{x}$, $y(2) = 2$, assuming $h = 0.25$.

OR

10 a Given the differential equation $y^1 = y^2 + x$, $y(0) = 1$. Determine $y(0.1)$ and $y(0.2)$ using Euler's method. **6M**

b Using fourth order Runge-Kutta method estimate $y(0.2)$ and $y(0.4)$ for the initial value problem $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$, $y(0) = 1$. **6M**

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