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

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech II Year I Semester (R16) Regular Examinations Nov 2017

ENGINEERING MATHEMATICS-III

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

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

UNIT-I

1 a Prove that $\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}\right)|\text{Real } f(z)|^2 = 2|f'(z)|^2$ where $w=f(z)$ is analytic. 6M

b If $u(x,y)=x^3-3xy^2$, then find its harmonic conjugate and also the corresponding analytic function. 6M

OR

2 a Verify Cauchy's theorem for the function $f(z)=3z^2+iz-4$, if C is the square with vertices at $1\pm i$ and $-1\pm i$. 6M

b B is the positively oriented boundary of the region between the circle $|z|=4$ and the square with sides along the lines $x=\pm 1$ *and* $y=\pm 1$. Evaluate $\int_B f(z)dz$ for the following functions $(i).f(z)=\frac{1}{3z^2+1}$ and $(ii)\,f(z)=\frac{z}{1-e^z}$. 6M

UNIT-II

3 a Find the poles of the function $f(z)=\frac{1}{(z-1)(z+1)}$ and the residues at these poles. 6M

b Find residue of $\frac{z^2-2z}{(z^2+4)(z+1)^2}$. 6M

OR

4 a Find the bilinear transformation which maps the points $(\infty, i, 0)$ in the z-plane into $(-1,-i,1)$ in the $w-$plane. 6M

b Find the image of the infinite strip $0<y<\frac{1}{2}$ under the transformation $w=\frac{1}{z}$. 6M

UNIT-III

5 a Find the root of the equation $x\log_{10}^{x}=1.2$ using false position method. 6M

b Find the root of equation $e^{x}\sin x=1$ using Newton's Raphson Method. 6M

OR

6 a Given $\sin 45^{o}=0.7071,\ \sin 50^{o}=0.7660,\ \sin 55^{o}=0.8192,\ \sin 60^{o}=0.8660$ then find $\sin 52^{o}$ using Newton's forward interpolation formula. 6M

b A curve passes through the points $(0,1,8),(1,1,0),(3,-1,8)$ and $(6,9,0)$. Find the slope of the curve at x=2. 6M

UNIT-IV

7 a Fit a parabola of the form $y=a+bx+cx^{2}$ to the following data

x	1	2	3	4	5	6	7
y	2.3	5.2	9.7	16.5	29.4	35.5	54.4

6M

b Determine the constants a and b by the method of least square such that $y=ae^{bx}$

x	2	4	6	8	10
y	4.077	11.084	30.128	81.897	222.62

6M

OR

8 a Evaluate $\int_{0}^{1}\frac{dx}{1+x^{2}}$ using Simpson's $\left(\frac{3}{8}\right)^{\text{th}}$ rule taking h=$\frac{1}{6}$. Hence obtain an approximation value of π. 6M

b Evaluate $\int_{0}^{6}\frac{dx}{1+x^{2}}$ by using Trapezoidal rule and compare the result with its actual value. 6M

UNIT-V

9 a Evaluate $y(0.2)$ and $y(0.4)$ correct to four decimal places by Taylor's series method if $y(x)$ satisfies $y'(x)=1-2xy$ and $y(0)=0$. 6M

b Using Picard's method obtain the solution of $\frac{dy}{dx}=x-y^{2},\ y(0)=1$ and compute $y(0.1)=1$ Correct to four decimal places. 6M

OR

10 a Using Euler's method solve for y at $x=2$ from $\frac{dy}{dx}=3x^{2}+1,\ y(1)=2$ taking step size (i) h=0.5 and (ii) h=0.25. 6M

b Obtain the values of y at $x=0.1,\ 0.2$ using Runge-Kutta method of fourth order for the differential equation $y'+y=0,\ y(0)=1$. 6M

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