

Velegapudi Ramakrishna Siddhartha Engineering College::Vijayawada

(Autonomous)

II/IV B Tech Degree Examinations(Month/Year)

SEMESTER-III

VR20

Department of MATHEMATICS

20BS3101B:Complex Analysis & Numerical Methods

Time:3Hrs		MODEL QUESTION PAPER			Max Marks:70		
Part – A is Compulsory							
Answer one (01) question from each unit of Part – B							
Answers to any single question or its part shall be written at one place only							
Cognitive Levels(K): K1-Remember;K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create							
Q. No	Question			Marks	Course Outcome	Cog. Level	
Part - A				10X1=10M			
1	a	Write the Cauchy-Reimann Equations in Cartesian form.			1	CO1	K1
	b	Define singular point.			1	CO1	K1
	c	State Cauchy’s integral formula.			1	CO1	K1
	d	$f(z) = \frac{z}{(z-1)(z-2)}$ at $z=1$.			1	CO2	K1
	e	Write the condition for the transformation $w = \frac{az+b}{cz+d}$ to be bilinear.			1	CO2	K1
	f	What is the order of convergence of Newton –Raphson Method .			1	CO3	K1
	g	Write an example for Transcendental equation.			1	CO3	K1
	h	What is the relation between E and V ?			1	CO3	K1
	i	Write Newton’s forward difference interpolation formula.			1	CO4	K1
	j	State Simpson’s $\frac{1}{3}$ rd rule.			1	CO4	K1
Part – B				4X15 =60M			
UNIT – I							
2	a	State and prove C-R equations in polar form.			8	CO1	K2
	b	Show that $u = e^x \cos y$ is harmonic and hence find itsconjugate.			7	CO1	K2
(OR)							
3	a	State and prove Cauchy’s Integral theorem			7	CO1	K2
	b	Evaluate $\oint_c \frac{z^3 e^{-z}}{(z-1)^3} dz$, where C: $ z = 2$ using Cauchy’s integral formula.			8	CO1	K3
UNIT – II							
4	a	Find the Laurent’s expansion of $f(z) = \frac{1}{(z-1)(z-2)}$ in the region i) $ z < 1$, ii) $1 < z < 2$.			8	CO2	K3
	b	Using Residue theorem evaluate $\int_c \frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)^2(z-2)}$ where c is $ z = 3$			7	CO2	K3
(OR)							
5	a	Evaluate by using contour integration $\int_0^{2\pi} \frac{d\theta}{5-4\sin\theta}$.			7	CO2	K3
	b	Find the Bilinear transformation which maps the points $(0, i, 1)$ on to the points $(-1,0,1)$.			8	CO2	K3
UNIT – III							
6	a	Using Newton-Raphson method, find the real root of $x\sin x + \cos x = 0$.			7	CO3	K3

	b	Solve the following system of equations by using Gauss –Seidel iterative method $20x + y - 2z = 17$; $3x + 20y - z = -18$; $2x - 3y + 20z = 25$						8	CO3	K3		
(OR)												
7	a	Interpolate by means of Newton backward formula, the population of the town for the year 1984, given that						8	CO3	K4		
		Year	1939	1949	1959	1969	1979				1989	
		Popula tion (‘000)	12	15	20	27	39				52	
	b	Find the polynomial $f(x)$ using Lagrange’s interpolation formula and hence find $f(3)$ for						7	CO3	K3		
		x	0	1	2	5						
		f(x)	2	3	12	147						
UNIT – IV												
8	a	Given that						8	CO4	K3		
		x	1.0	1.1	1.2	1.3	1.4				1.5	1.6
		y	7.989	8.403	8.781	9.129	9.451				9.750	10.031
		Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x=1.1$										
	b	Using Taylor’s method, solve $\frac{dy}{dx} = 2y + 3e^x$ with $y(0) = 0$ at $x = 0.2$.						7	CO4	K3		
(OR)												
9	a	Evaluate $\int_0^6 \frac{1}{1+x^2} dx$, using Simpson’s 1/3 and 3/8 rules by taking $h=1$.						7	CO4	K3		
	b	Use Runge-Kutta method of 4 th order, solve $\frac{dy}{dx} = 1 + y^2$ with $y(0) = 0$ at $x = 0.2, 0.4$.						8	CO4	K3		