CODE No.: 19BT3BS02 SVEC-19

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(An Autonomous Institution, Affiliated to JNTUA, Ananthapuramu)

II B.Tech I Semester (SVEC-19) Regular Examinations February – 2021

SPECIAL FUNCTIONS AND COMPLEX ANALYSIS

[Electrical and Electronics Engineering, Electronics and Communication Engineering, Electronics and Instrumentation Engineering]

Answer One Question from each Unit All questions carry equal marks UNIT-1 1. a) Define gamma function and express $\int_0^\infty x^{p-1} e^{-kx} dx$ ($k > 0$) 6 Marks L1 CO1 PO1 in terms of gamma function. b) Prove that $\beta\left(m, \frac{1}{2}\right) = 2^{2m-1}\beta$ (m, m). (OR) 2. a) Show that $\int_a^b (x-a)^{m-1} (b-x)^{n-1} dx = (b-a)^{m+n-1}\beta$ (m, n). 6 Marks L2 CO1 PO1 b) Prove that $\int_0^1 x^3 \left(1-\sqrt{x}\right)^5 dx = 2\beta$ (8,6). (UNIT-II) 3. a) Express $J_5(x)$ in terms of $J_0(x)$ and $J_1(x)$. 6 Marks L2 CO1 PO1 b) Show that $(n+1)P_{n-1}(x) = (2n+1)xP_n(x) - nP_{n-1}(x)$. (OR) 6 Marks L2 CO1 PO1 (OR) 6 Marks L2 CO2 PO2 (OR) 6 Marks L2 CO2 PO2 10 PO1 (OR) 6 Marks L2 CO2 PO2 11 PO1 (OR) 6 Marks L2 CO2 PO2 12 PO1 (OR) 6 Marks L3 CO3 PO2 Discuss the transformation $W = \sqrt{z}$. Is it Conformal at the 6 Marks L3 CO2 PO2 b) Discuss the transformation $W = \sqrt{z}$. Is it Conformal at the 6 Marks L3 CO2 PO2 6. a) Find the analytic function f(z) = u + iv where $u = e^{x^2-y^2} \cos 2xy$. b) Find the analytic function $(x) = u + iv$ if $2u + v = e^x$ ($\cos y - \sin y$). b) Find the bilinear transformation which maps the points 6 Marks L2 CO2 PO2 10 PO1 11 PO1 12 PO1 13 PO1 14 PO1 15 PO1 16 PO1 17 PO1 18 PO1 18 PO1 19 PO1 19 PO1 10 PO1 10 PO1 11 PO1 12 PO1 13 PO1 14 PO1 15 PO1 16 PO1 17 PO1 18 PO1 18 PO1 19 PO1 19 PO1 10 PO	Electronics and instrumentation Engineering j							
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f(z) = u + iv if 2u + v = e ^x (cos y - sin y). b) Find the bilinear transformation which maps the points 6 Marks L2 CO2 PO2 z = 1, i, -1 on to the points w = i, 0,-i. UNIT-IV			(OR)					
b) Find the bilinear transformation which maps the points 6 Marks L2 CO2 PO2 $z = 1$, i, -1 on to the points $w = i$, 0,-i.	6.	a)	•	6 Marks	L3	CO2	PO2	
z = 1, i, -1 on to the points $w = i$, 0,-i. UNIT-IV			$f(z) = u + iv$ if $2u + v = e^{x} (\cos y - \sin y)$.					
UNIT-IV		b)	<u> </u>	6 Marks	L2	CO2	PO2	
Write Cauchy's integral formula and evaluate $\int \frac{\sin^2 z}{(-\pi)^3} dz$	7.			12 Marks	L2	CO2	PO2	
Write Educity's integral formula and Evaluate $C \left z - \frac{\pi}{6} \right $	•		Write Cauchy's integral formula and evaluate $\int_{C} \frac{\sin^{2} z}{\left(z - \frac{\pi}{6}\right)^{3}} dz$		· -		-	
where C is the Circle $ z = 1$.			\ /					

- Evaluate f (2) and f (3) where $f(a) = \int_C \frac{2z^2 z 2}{z a} dz$ 8. 6 Marks CO2 PO2 and C is the Circle |z| = 2.5.
 - 6 Marks L2 CO₂ PO1 Expand $f(z) = \frac{z-1}{z+1}$ in Taylor's series about the Point z=1.

6 Marks L2

- UNIT-V
 Write Residue theorem and evaluate $\int_C \frac{1-2z}{z(z-1)(z-2)} dz$ 9. CO₂ PO₁ a) where C is the circle |z| = 1.5 by Residue theorem.
 - $\int_0^\infty \frac{\cos ax}{x^2 + 1} dx \text{ by applying Calculus of}$ 6 Marks L3 CO₂ PO2 Evaluate b) Residues.

(OR) By Integrating around a Unit circle, evaluate 10 12 Marks CO₂ L3 PO₂ $\int_0^{2\pi} \frac{\cos 3\theta}{5 - 4\cos \theta} \ d\theta.$

€} (B) (A)