R18 Regulation *Subject code: 2B4BA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech IV Semester Supplementary Examinations, December 2024

SPECIAL FUNCTIONS AND COMPLEX VARIABLES

(Common to EEE & ECE)

Maximum Marks: 70 Date:03.12.2024 Duration: 3 hours

Note: 1.This question paper contains two parts A and B.
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

	Part-A		
All the following questions carry equal marks (10X2M=20) Marks		CO	Bloom Tx
1	Find the value of $\Gamma(1)$.	1	L1
2	Solve $\int_0^2 (8-x^3)^{-1/3} dx$ in terms of Beta function.	1	L1
3	Define Analytic Function.	2	L1
4	Show that analytic function with constant imaginary part is constant.	2	L1
5	Evaluate $\int_C (2y+x^2)dx + (3x-y)dy$ where 'c' the parabola x = 2t, y $= t^2+3$ joining (0,3) and (2,4).	3	L1
6	Expand f(z) $=\frac{1}{z}$ about z=-1.	3	L1
7	Classify the nature of the function f(z)=. $\frac{z-\sin z}{z^5}$	4	L1
8	Find the residue of $e^z z^{-5}$ at z=0.	4	L1
9	Write the definition of invariant or fixed points of the Bilinear Transformation?	5	L1
10	Find the Mobius Transformation that maps (0,1,∞) into (-5,-1,-3).	5	L1
	Part-B		
Answer All the following questions. (5X10M=50Marks)		CO	Bloom Tx
11	Show that a) $\beta(m,n)=2\int_0^{\frac{\pi}{2}} sin^{2m-1}\theta cos^{2n-1}\theta d\theta$ [5M] b) $\Gamma(n)=\int_0^1 \left(log\frac{1}{x}\right)^{n-1} dx; n>0.$ [5M]	1	L2
	OR		
12	Show that $\beta(m,n) = \int_0^\infty \frac{x^{m-1}}{(1+x)^{m+n}} dx$ [10M]	1	L2
13	Find the analytic function whose real part $u(x,y) = x^3 - 3xy^2+3x^2 - 3y^2+2x+1$ [10M]	2	L2
	OR		
14	Prove that the function f(z) defined by	2	L2

	$f(z)=\begin{cases}\frac{x^3(1+i)-y^3(1-i)}{x^2+y^2} & z\neq 0\\ 0 & z=0\end{cases}$ is continuous and the C-R equations are satisfied at the origin yet $f'(0)$ does not exist. [10M]		
15	State and prove Cauchy's integral formula. [10M]	3	L2
	OR		
16	Evaluate the integrals around c:|z-1|=3 [10M] i) $\int_c \frac{e^z}{(z+1)^2}dz$ ii) $\int_c \frac{e^z}{(z+1)^4}d$	3	L2
17	Evaluate $\int_c \frac{4-3z}{z(z-1)(z-2)}$; where c is the circle |z|=$\frac{3}{2}$. using residue theorem. [10M]	4	L2
	OR		
18	Use the method of contour integration to evaluate $\int_0^\infty \frac{dx}{x^4+a^4}dx$ [10M]	4	L2
19	Show that the transformation $w=\frac{iz+2}{4z+i}$ transforms the real axis in the z-plane into a circle in the w-plane. [10M]	5	L2
	OR		
20	Find the bilinear Transformation that maps the points (0,-i,-1) into the points (i,1,0). [10M]	5	L2