

2848A



R18 Regulation

Subject code: 2B48A

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Semester Supplementary Examinations, February 2024**Special Functions and Complex Variables**

(Common to ECE & EEE)

Maximum Marks: 70

Date: 16.02.2024 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.
 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	Show that $\beta(m, n) = \beta(n, m)$.	1	L2
2	Find the value of $\Gamma(n+1)$. If n is a positive integer	1	L3
3	Explain Analytic Function	2	L2
4	Explain Harmonic Function	2	L2
5	Expand $f(z) = \sin z$ about $z=\pi$ by using Taylor's series	3	L2
6	Let c be the circle $ z =3$ described in the positive sense find $\int_c \frac{z+3}{z-2} dz$.	3	L3
7	Explain Removable singularity	4	L2
8	Find the residues of the function $f(z) = \frac{e^{-z}}{(z-2)^4}$	4	L3
9	Explain Bilinear Transformation and give an example.	5	L2
10	Explain invariant or fixed points of the Bilinear Transformation.	5	L2

Part-B

Answer All the following questions. (5X10M=50Marks)			
11	Prove that $\int_0^1 \frac{x^{m-1}(1-x)^{n-1}}{(x+a)^{m+n}} dx = \frac{B(m,n)}{a^n(1+a)^m}$ [10M]	1	L5
OR			
12	a) Evaluate $\int_0^1 x^2 \left(\log \frac{1}{x}\right)^3 dx$ [5M] b) Show that $\Gamma\left(\frac{1}{2}\right) = \sqrt{\pi}$. [5M]	1	L5 L2
13	Find the analytic function whose real part $u(x,y) = x^3 - 3xy^2 + 3x^2 - 3y^2 + 2x + 1$ [10M]	2	L3
OR			
14	Derive the C- R equations in polar form. [10M]	2	L5
15	State and prove Cauchy's integral theorem.	3	L5
OR			

16	Expand the Laurent's series for $f(z) = \frac{z}{(z-1)(z-3)}$ in the region $0 < z-1 < 2$ [10M]	3	L2
17	Find the poles and residues at each pole of $f(z) = \frac{\cot z \cdot \coth z}{z^3}$ [10M]	4	L3
	OR		
18	Evaluate by contour integration $\int_0^{2\pi} \frac{d\theta}{2+\cos\theta}$ [10M]	4	L5
19	S.T the relation $w = \frac{5-4z}{4z-2}$ transforms the circle $ z = 1$ into a circle of radius unity in the w-plane. [10M]	5	L2
	OR		
20	Find the bilinear Transformation that maps the points $(1-2i, 2+i, 2+3i)$ into the points $(2+i, 1+3i, 4)$. [10M]	5	L3