R20 Regulation *Subject code:3B3DA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech III Semester Supplementary Examinations, December 2024

COMPLEX ANALYSIS AND VECTOR CALCULUS

(Electronics & Communication Engineering)

Maximum Marks: 70 Date:02.12.2024 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	Define Analytic Function.	1	L1
2	Define Harmonic Function.	1	L1
3	Expand f(z) = sin z about z=π by using Taylor's series.	2	L1
4	Expand f(z) = $\frac{1}{z}$ in Laurent's series about z=1.	2	L1
5	Classify the nature of the singularity of the function f(z) = $\frac{e^{-z}}{(z-2)^4}$	3	L1
6	Find the zeroes of the function f(z) = $z^2 - 3z + 2$ *and also* find their orders.	3	L1
7	Define gradient of a scalar point function.	4	L1
8	If $\overline{f}=(x^2y)\,\bar{\imath}+(2y^2z)\bar{\jmath}+(3z^2y)\overline{K}$ then find curl $\overline{f}$.	4	L1
9	State Stoke's theorem.	5	L1
10	State Gauss divergence theorem.	5	L1

Part-B

Answer All the following questions.	(5X10M=50Marks)	CO	Bloom Tx
11	If u+v =e^x ($\cos y +\ \sin y$) then find the analytic function f(z) [10M]	1	L3
	OR		
12	Derive the C- R equations in polar form. [10M]	1	L4
13	Find the poles and residues at each pole of f(z)= $\frac{1-e^z}{z^4}$ [10M]	2	L3
	OR		
14	Evaluate $\int_C \frac{z^2+2Z-2}{Z(Z-4)(Z-1)}dz, where\ C\ is |z| = 1.5$. [10M]	2	L5
15	Evaluate the integrals $\int_C \frac{z-3}{z^2+2z+5}dz$ where 'c' is the circle given by i) $\lvert Z\rvert = 1$ $ii)\lvert z+1-i\rvert = 2$ [10M]	3	L5

	OR		
16	Find the poles and the corresponding residues of $\frac{1}{(z^2-1)^3}$ [10M]	3	L3
17	If $\bar{r}$ is the position vector of any point in space, then find $\nabla.\nabla(\log r)$. [10M]	4	L3
	OR		
18	Prove that $\nabla x(\nabla x\bar{a}) = \nabla(\nabla.\bar{a}) - \nabla^2\bar{a}$. [10M]	4	L3
19	Verify gauss divergence theorem for $F = x^3\bar{i} + y^3\bar{j} + z^3\bar{k}$ taken over the parallelopiped bounded by x=0,x=a,y=0,y=b,z=0,z=c. [10M]	5	L4
	OR		
20	Verify Green's theorem for $F = x^3\bar{i} + y^3\bar{j}$taken over the rectangle bounded by x=0,x=a,y=0,y=b. [10M]	5	L4