R20 Regulation *Subject code: 3B3DA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech III Semester Supplementary Examinations, July 2024

Complex Variables and Vector Calculus
(ECE)

Maximum Marks: 70 Date:18.07.2024 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	Show that analytic function with constant imaginary part is constant.	1	L1
3	Evaluate $\int_c z^2 dz$ where c is the straight line segment from O(Z=0) to A(Z=2+i).	2	L1
4	Write Taylor's series expansion of f(z)= $\frac{e^z}{z(z+1)}$ about z=2	2	L1
5	Find the zeros and its orders of f(z)= $(z-2)^3(z-3)^2$	3	L1
6	Find the residue of $e^z z^{-5}$ at z=0	3	L1
7	Define divergence of a vector point function.	4	L1
8	Find a unit normal vector to the given surface $x^2y+2xz=4$ at the point (2,-2,3).	4	L1
9	State gauss divergence theorem.	5	L1
10	State Stokes theorem.	5	L1

Part-B

Answer All the following questions.	(5X10M=50Marks)		
11	If u+v $=e^x(\cos y+\sin y)$ then find the analytic function f(z). [10]	1	L2
	OR		
12	Derive the C- R equations in polar form. [10]	1	L2
13	Find the poles and residues at each pole of f(z)= $\frac{1-e^z}{z^4}$ [10]	2	L2
	OR		
14	Evaluate $\int_C \frac{Z^2+2Z-2}{Z(Z-4)(Z-1)}dz, where\ C\ is\ \lvert z\rvert=1.5$ [10]	2	L2
15	Evaluate the integrals $\int_c \frac{z-3}{z^2+2z+5}dz$ where 'c' is the circle given by [10] i) $\lvert Z\rvert=1$ $ii)\lvert z+1-i\rvert=2$	3	L2

	OR		
16	Find the poles and the corresponding residues of $\frac{1}{(z^2-1)^3}$ [10]	3	L2
17	If $\bar{r}$ is the position vector of any point in space, then find $\nabla.\nabla(\log r)$. [10]	4	L2
	OR		
18	Prove that $\nabla x(\nabla x\bar{a}) = \nabla(\nabla.\bar{a}) - \nabla^2\bar{a}$. [10]	4	L2
19	Verify gauss divergence theorem for F $=x^3\bar{\imath} + y^3\bar{\jmath} + z^3\bar{k}$ taken over the cube bounded by x=0,x=a,y=0,y=a,z=0,z=a. [10]	5	L2
	OR		
20	Find the work done by $\bar{f} = 3x^2\bar{\imath} + \bar{\jmath} + 2z\,\bar{k}$ along the straight line from (0,0,0) to (2,1,3). [10]	5	L2