R17 Regulation

Subject code:1B3AA

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech II Year I Semester Supplementary Examinations, March/April 2023

Mathematics-IV

(Common to CE,EEE,ME,ECE,CSE &IT)

Maximum Marks: 70 Date:27.03.2023 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)

1 Define analytic function.
2 Define conjugate Harmonie function.
3 State Cauchy's integral theorem.
4 Find the lines fractional transformation that maps the points -1, i, 1 onto the points 0, i, ∞.
5 Define essential singularity, removable singularity.
6 Write working rule to evaluate the integrals of the type $\int_0^{2\pi} F\,(cos\theta, sin\theta)d\theta$
7 If $f(x) = 1$ in $(0,2\pi)$ then find a_n.
8 If $f(x) = x^2$ in $(-l, l)$ then find a_0.
9 State the modulation theorem for Fourier transforms.
10 Find the Fourier Sine transform of x.

Part-B

Answer All the following questions. (5X10M=50Marks)

11 Test for Analyticity at the origin for $f(z) = \begin{Bmatrix} \frac{x^3y(y-ix)}{x^6+y^2} & , Z \neq 0 \\ 0 & ,Z = 0 \end{Bmatrix}$ (10M)

OR

12 Show that the function u = $e^{-2xy}\sin(x^2 - y^2)$ is harmonic, find the conjugate function ' V ' and express u + iv as an analytic function of Z. (10M)

13 Expand f (z) = $\frac{1}{z^2-3z+2}$ in the region (i) $0 < | z-1 | < 1$ (ii) $1< |z |< 2$ (10M)

OR

14 Evaluate: $\oint \frac{e^z}{(z-1)(z-4)} dz$ around the circle $|z| = 2$. (10M)

15 Evaluate $\int_{-\infty}^{\infty} \frac{dx}{x^6+1}$ (10M)

OR

16 Find the Residue at each pole of $f(z) = \frac{4Z^2-4Z+1}{(Z-1)^2(Z-2)(Z^2+4)}$. (10M)

17 Find the Fourier series of $f(x) = x - x^2$ in the interval $[-\pi, \pi]$ (10M)

OR

18 Find the half-range Fourier Cosine series of the function f(x) given by (10M)

$$f(x) = \begin{cases} Cos\, x, & for\ 0 < x < \pi/2 \\ 0, & for\ \pi/2 < x < \pi \end{cases}$$

19 Solve the boundary value problem $u_{tt} = a^2 u_{xx}$; $0 < x < l$; $t > 0$ with u (0,t) = 0 ; u (l,t) = 0 and u (x,0) = 0, u_t (x,0) = $sin^3(\frac{\pi x}{l})$. (10M)

OR

20 Using the Fourier sine transform solve the P.D.E $\frac{\partial V}{\partial t} = k\frac{\partial^2 v}{\partial x^2}$ for x> $0, t > 0$ under the boundary conditions v= v_0 when x= $0, t > 0$ and the initial condition v= 0 when t= 0,x> 0. (10M)