



R17 Regulation

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

Subject code: 1B3AA

B.Tech II Year I Semester Supplementary Examinations, February 2021

MATHEMATICS- IV

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

Maximum Marks: 70

Date: 19.02.2021 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 Discuss the analyticity of $f(z) = z + 2\bar{z}$ in the complex plane.
- 2 Find the invariant points of the transformation $w = \frac{1+z}{1-z}$.
- 3 State the Cauchy's Integral formula.
- 4 Determine the radius of convergence in the Taylor's series expansion of $f(z) = \frac{z-1}{z^2}$ in powers of $(z-1)$.
- 5 Define essential singularity with an example.
- 6 Find the residue of $\cot z$ at the pole $z = 0$.
- 7 Write down Dirichlet's conditions for a function to be expanded as a Fourier series.
- 8 Find the Fourier coefficient a_0 for $f(x) = e^x$ in $-\pi < x < \pi$.
- 9 State Modulation theorem on Fourier transform.
- 10 Find the sine transform of $\frac{1}{x}$.

Part-B

Answer All the following questions.

(10M X 5=50Marks)

- 11 Find k such that the function $f(x, y) = x^3 + 3kxy^2$ is harmonic and hence find the harmonic conjugate of the function.

OR

- 12 Find the bilinear transformation that maps the points $z_1 = -i, z_2 = 0, z_3 = i$ in to the points $w_1 = -1, w_2 = i, w_3 = 1$ respectively.

13 Evaluate $\int_C \frac{1}{z^8(z+4)} dz$ where C is the circle $|z| = 2$

OR

14 Evaluate $\int_C \frac{z+1}{z^2+2z+4} dz$, where C is the circle $|z+1+i| = 2$.

15 Evaluate $\int_0^{2\pi} \frac{d\theta}{13+12 \cos \theta}$.

OR

16 Evaluate $\int_C \frac{4-3z}{z(z-1)(z-2)}$; where c is the circle $|z| = \frac{3}{2}$. using residue theorem

17 Obtain the Fourier series for $f(x) = \begin{cases} x; & x \in (0, \pi) \\ 2\pi - x; & x \in (\pi, 2\pi) \end{cases}$.

OR

18 Expand $f(x) = x \sin x$ as a half-range cosine series in $(0, \pi)$.

19 Find the Fourier cosine transform of $f(x) = \frac{e^{-ax}}{x}$.

OR

20 A uniform string is stretched and fastened to two points 'l' apart. Motion is started by displacing the string into the form of the curve $y = kx(l-x)$ and then releasing it from this position at time $t = 0$. Find the displacement of the point of the string at a distance x from one end at time t .