



Regulation R18

Subject code: 2H3SS

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY  
(Autonomous, Accredited by NAAC with 'A' Grade)

**B.Tech II Year I Semester Regular Examinations, February 2021**

**Complex Analysis**

(Computer Science and Engineering)

Maximum Marks: 70

Date: 01.03.2021 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 Define Analytic Function
- 2 Define Harmonic Function
- 3 Expand  $f(z) = \frac{\sin z}{(z-\pi)}$  about  $z=\pi$  by using Taylor's series
- 4 Let  $c$  be the circle  $|z|=3$  described in the positive sense find  $\int_c \frac{z+3}{z-2} dz$ .
- 5 Define i) Removable singularity  
ii) Essential singularity
- 6 Find the pole and its order of the function  $f(z) = \frac{e^{-z}}{(z-2)^4}$
- 7 Define Contour Integration
- 8 Write the statement of Residue theorem.
- 9 Define Bilinear Transformation and give an example
- 10 Define invariant or fixed points of the Bilinear Transformation

**Part-B**

Answer All the following questions.

(10M X 5=50Marks)

- 11 If  $u+v = e^x (\cos y + \sin y)$  then find the analytic function  $f(z)$  10M  
OR
- 12 Derive the C- R equations in polar form 10M
- 13 State and prove Cauchy's integral theorem. (10M)  
OR
- 14 Expand the Laurent's series for  $f(z) = \frac{z}{(z-1)(z-3)}$  in the region  $0 < |z-1| < 2$  10M
- 15 Find the poles and residues at each pole of  $f(z) = \frac{\cot z \cdot \coth z}{z^3}$  10M  
OR
- 16 Find poles and residues at each pole of  $f(z) = \frac{1}{(z^2+4)^2}$  10M
- 17 Evaluate  $\int_0^\infty \frac{1}{(x^2+a^2)^2} dx$  10M  
OR
- 18 Evaluate  $\int_0^{2\pi} \frac{1}{2+\cos \theta} d\theta$  10M

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

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