B.Tech III Semester End Examination, August 2021 19KU1A0426.

COMPLEX VARIABLES AND TRANSFORMS (19ABS9907)

Time :3 Hours Max. Marks: 70

PART- A (10 x 2 = 20 M)

(Compulsory Question)

Answer the following

1 . a) Write C-R equations in polar form.
b) Show that $v = y/(x^2 + y^2)$ is harmonic.
c) State Cauchy's integral theorem.
d) State liouville's theorem of f(z).
e) Find the laplace transform of t^2e^{at} .
f) Show that $L^{-1}\{1/(s-a)\} = e^{at}$
g) Write the Dirichlet's conditions of a fourier series of f(x).
h) Find the fourier coefficient a_0 , if $f(x) = x^2$, $0 < x < 2\pi$
i) Find the Z – transform of n.
j) State the initial value theorem of Z- transform.

PART – B (5 x 10 = 50 M)

(Answer one FULL question from each unit; ALL questions carry equal marks)

UNIT – I

2 . a) Derive C – R equations in Cartesian form.
b) Find f(z) = u + iv given that $u - v = e^x(\cos y - \sin y)$

OR

3 . a) Find the bilinear transformation which maps the points z = 1, I, - 1 onto the points w = i, 0, - 1. Hence find the invariant points of this transformations.
b) Discuss the transformation w = z + 1/z.

UNIT – II

4 . a) State and prove Cauchy's integral formula
b Evaluate $\int_0^{1+i} (x^2 + iy)dz$ along the paths y = x and $y = x^2$

OR

5 . Evaluate $\int_0^{2\pi} \frac{1}{1 - 2p\sin\theta + p^2} d\theta,$ (0 < p < 1)

UNIT – III

6 . a) Find the laplace transformation of (i) Sin2t cos3t, (ii) $(e^{-at} - e^{-bt})/t$
b) Find the laplace transformation of $L\{te^{-t}\sin 3t\}$

OR

7 . a) Find the inverse laplace transform of (i) $(s + 2)/(s^2 - 4s + 13)$, (ii) log [(s + 1)/(s – 1)]
b) Solve $(D^2 + \omega^2)y = 0$, where y(0) = A , $(dy/dx)_{x=0} = B$

UNIT – IV

8 . a) Find the fourier series for $f(x) = x - x^2$ from $x = -\pi$ to $x = \pi$
b) Find the fourier series for f(x) = |x| in (- π, π)

OR

9 . a) Express f(x) = x as a half-range sine series in 0 < x < 2.

b) Find a fourier series to represent x^2 in the interval $(-\ell, \ell)$

UNIT – V

10. a) Find the fourier transform of $f(x) = e^{x^2/2}$, $-\infty < x < \infty$

b) Find the fourier cosine transform of e^{-ax}.

OR

11. a) Find the Z – transform cosh $n\theta$.

b) Using Z – transform, solve $y_{n+2} + 4y_{n+1} + 3y_n = 3^n$ with $y_0 = 0$, $y_1 = 1$.

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