PVP 14

Code: EE4T1

II B.Tech - II Semester – Regular/Supplementary Examinations – April 2019

COMPLEX VARIABLES & SPECIAL FUNCTIONS
(ELECTRICAL & ELECTRONICS ENGINEERING)

Duration: 3 hours Max. Marks: 70

PART – A

Answer ***all*** the questions. All questions carry equal marks

11 x 2 = 22 M

1.

a) Find the real and imaginary parts of Cosh (x+iy).
b) Find all the roots of the equation: Sinz = Cosh4.
c) List the C-R equations in polar co-ordinates.
d) State Cauchy's integral formula.
e) Define Complex potential Function.
f) Determine the poles of the function $f(z) = \frac{1-e^{2z}}{z^4}$.
g) Find the poles and residues at each pole of tanhz?
h) Find the image of the infinite strip $0 < y < \frac{1}{2}$ under the transformation $w = \frac{1}{z}$.
i) Find the bilinear transformation which maps the points $(-1, 0, 1)$ into the points $(0, i, 3i)$
j) Determine $\frac{d}{dx} J_0(x)$.
k) Express the function in Legendre polynomial $5x^3+x$

PART – B

Answer any ***THREE*** questions. All questions carry equal marks.

3 x 16 = 48 M

2. a) Show that the function $f(x,y)=x^3y-xy^3+xy+x+y$ can be imaginary part of an analytic function z = x + i y.

8 M

b) Find f(z) = u + iv given that $u+v=\dfrac{Sin2x}{\cosh 2y-\cos 2x}$. 8 M

3. a) Evaluate $\int_c (x-2y)dx+(y^2-x^2)dy$ Where C is the boundary of the first quadrant of the Circle $x^2+y^2=4$. 8 M

b) Develop $f(z)=\dfrac{1+2z}{z^2+z^3}$ in a series of positive and negative powers of z. 8 M

4. a) Evaluate $\int_C \dfrac{Sin^6 z}{\left(z-\frac{\pi}{6}\right)^3}\, dz$ where C: | z | = 1. 8 M

b) Evaluate $\int_0^{2\pi} \dfrac{d\theta}{(5-\cos\theta)^2}$ using residue theorem. 8 M

5. a) Show that circles are invariant under linear and inversion transformations. 8 M

b) Find the bilinear transformation which maps the points $z=1, i, -1$ onto the points $w=i, 0, -i$ hence find

i) the image of $|z| < 1$

ii) the invariant points of this transformation. 8 M

6. a) State and prove the Orthogonality of the Bessel's function. 8 M

b) Prove that: $P_n(x) = \frac{1}{n!2^n} \frac{d^n}{dx^n}(x^2 - 1)^n$. 8 M