Date - 27/11/18
time - 10:00 AM TO 11:00 AM

Roll No. | | | | | | | |

Paper Code: TMA-302
(B.Tech (CE))
Mid Semester Examination 2018
III Semester
Paper Name: Engineering Mathematics

Time: 1:30 Hours **MM:50**

Note:

(i) This question paper contains two sections.
(ii) Both sections are compulsory.

Section-A

Q1. True-False statements. **(1X5=5 Marks)**

a) An analytic function is always differentiable. (True/False)
b) Inverse of bilinear transformation is not linear. (True/False)
c) If $f(z)$ is conformal mapping then it preserves the magnitude of angle and sense. .(True/False)
d) Harmonic function does not satisfy Laplace equation. (True/False)
e) If $F_1(s)$ and $F_2(s)$ are Fourier integral transforms of $f_1(x)$ and $f_2(x)$ respectively then $F[af_1(x)+bf_2(x)]=aF_1(s)+bF_2(s)$.. (True/False)

Q2. Answer any five questions. **(3X5=15 Marks)**

a) Define a Mobius transformation
b) Define an Analytic function.
c) If $f(z)=x^2y+ixy^2$, determine where C-R conditions satisfied.
d) Show that the function $\frac{1}{2}\log(x^2+y^2)$ is harmonic.
e) For what value of m the function $2x-x^2+my^2$ is harmonic.
f) Find fixed points of bilinear transformation $T(z)=\frac{z+8}{2z+1}$.

Section-B

Each question contains three parts a,b & c. Attempt any two parts of choice from each question.

Q3. **(5X2=10 Marks)**

a. Find the Fourier transform of $f(x)=\begin{cases}1 & if\ |x|<a \\ 0 & if\ |x|>a\end{cases}$.

b. Verify that $u(x,y)=x^2-y^2-y$ is harmonic function and find harmonic conjugate of $u(x,y)$.

c. Find and plot the image of triangular region with vertices at (0,0), (1,0), (0,1) under the transformation $w=(1-i)z+3$.

Q4. **(5X2=10 Marks)**

a. Find the Fourier sine transform of of $f(x)=\dfrac{e^{-ax}}{x}$.

b. Find bilinear transformation which maps points $z_1=-1,\ z_2=0,\ z_3=1$ of z-plane to points $w_1=-i,\ w_2=1,\ w_3=i$ of w-plane.

c. Find analytic function whose imaginary part is $v(x,y)=\log(x^2+y^2)+x-2y$.

Q5. **(5X2=10 Marks)**

a. Drive polar form of Cauchy-Riemann equations.

b. Find the Fourier cosine transform of $f(x)=e^{-2x}+4e^{-3x}$.

c. Find the analytic function $f(z)=u(x,y)+iv(x,y)$ of which the real part is $\log\sqrt{x^2+y^2}$.