Date- 24/11/18 Time- 10:00 Am
TO 11:30 Am

Roll No. | | | | | | | |

Paper Code: TMA 301

(B.Tech (ME))
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) Every analytic function is differentiable. (True/False)
b) Composition of two bilinear transformations is also bilinear. (True/False)
c) If $f(z)$ is conformal mapping then it preserves the magnitude of angle but not sense .(True/False)
d) An entire function is analytic in whole complex plane. (True/False)
e) If $f(z)=u(x,y)+iv(x,y)$ satisfies C-R equations then f(z) is analytic function. (True/False)

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

a) Define an Analytic function with an example.
b) Define a Conformal Mapping.
c) Define a bilinear transformation with an example.
d) Verify that the function $u(x,y)=4xy-3x+2$ is harmonic in $\mathbb{C}$ or not.
e) If $f(z)=4xy^2+ix^2y$, determine where C-R conditions satisfied.
f) For what values of a the function $e^{ax}\tan y$ is harmonic.

Section-B

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

(5X2=10 Marks)

Q3.

a. Determine the analytic function whose imaginary part is $v=\log(x^2+y^2)+x-2y$.
b. Drive Cauchy-Riemann equations in Polar form.
c. Evaluate $\int_C \frac{e^z}{(z-1)(z-4)}\,dz$, where C is the circle $|z|=2$ by using Cauchy Integral Formula.

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

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

b. Use Cauchy integral formula to evaluate $\int_C \frac{z}{z^2 - 3z + 2} dz$, where C is the circle $|z - 2| = 1/2$.

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

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

a. Show that the function defined by $f(z) = \sqrt{|xy|}$ satisfy Cauchy-Riemann equation at the origin but is not analytic at that point.

b. Find the value of the integral $\int_0^{1+i} (x^2 - iy)dz$ along the parabola $y = x^2$.

c. Show that the function $u(x, y) = x^2 - y^2 - 2xy - 2x + 3y$ is harmonic and find its harmonic conjugate.