



SCHOOL OF ENGINEERING

SUMMER TERM / MAKE UP END TERM EXAMINATION

Semester: Summer Term 2019

Date: 23 July 2019

Course Code: MAT 103

Time: 2 Hours

Course Name: Engineering Mathematics-iii

Max Marks: 80

Program &Sem: B. Tech & III Sem (2016 & 2017 Batch)

Weightage: 40%

Instructions:

- (i) Read the question properly and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) Scientific and Non-programmable calculators are permitted

Part A

Answer **all** the Questions. **Each** question carries **eight** marks. (3Qx8M=24)

1. Show that $f(z) = e^z$ is analytic and find $f'(z)$.
2. Find the bilinear transformation that maps the points $i, 1, -1$ onto $1, 0, \infty$.
3. Evaluate $\oint \frac{\sin^2 z}{(z - \frac{\pi}{6})^3} dz$ using Cauchy's integral formula for derivatives where C is the circle $|z| = 1$.

Part B

Answer **all** the Questions. **Each** question carries **ten** marks. (3Qx10M=30)

4. Find the analytic function where imaginary part is $e^x \sin y$
5. Evaluate $\oint \frac{\sin(\pi z^2) + \cos(\pi z^2)}{(z-1)(z-2)} dz$ where C is the circle $|z| = 3$ by using Cauchy's integral formula.
6. Expand $f(z) = \frac{z+1}{(z+2)(z+3)}$ as a Laurent's series in the region
 - (a) $|z| < 2$
 - (b) $2 < |z| < 3$
 - (c) $|z| > 3$.

Part C

Answer **any Two** Questions. **Each** question carries **thirteen** marks. (2Qx13M=26)

7. Find the harmonic conjugate of $u = x^2 - y^2 - y$. Also show that u is harmonic.
8. Discuss the transformation $w = z^2$.
9. Find the poles and residues for the function $f(z) = \frac{z^2}{(z-1)(z-2)(z-3)}$ and evaluate $\oint_C f(z) dz$ where C is the circle $|z| = 2.5$.