S4 EC
May 2015

M 27010

Reg. No. : ....

Name : ....

IV Semester B.Tech. Degree (Reg./Sup./Imp. – Including Part-Time) Examination, May 2015
(2007 Admn. Onwards)
PT2K6/2K6 CE/ME/EE/EC/CS/IT/AEI 401 : ENGG. MATHEMATICS – III

Time : 3 Hours | Max. Marks : 100

PART – A

1. Show that $u = e^x \cos y$ is hormonic.
2. Show that f(z) = z lug (z) is differentiable only at z = 0.
3. Evaluate $\int_C x \, dz$ where C is $|z| = r$.
4. Find the residue of $f = \dfrac{e^z}{z^2(z^2+9)}$ at its poles.
5. The joint pdf of X and Y is given by $f(x, y) = x\,e^{-x(y+1)}$, $0 < x, y < \infty$
   Find : i) f(x) and f(y) ii) Are X, Y independent ?
6. If pdf fX is $f(x) = \dfrac{x}{2}$, $0 \le x \le 2$ find $P(X > 1.5 / X > 1)$.
7. Form the p.d.e. by eliminating the arbitrary function from $z = f(x^2 - y^2)$.
8. Solve $\dfrac{\partial^2 z}{\partial y^2} = \sin(xy)$. **(8×5=40)**

PART – B

9. a) Discuss the mapping w = coshz. **15**

   OR

   b) i) If f(z) is analytic prove that $\left(\dfrac{d^2}{\partial x^2} + \dfrac{\partial^2}{\partial y^2}\right)|f(z)|^2 = 4\,|f'(z)|^2$. **8**

   ii) If u is harmonic show that $\dfrac{\partial^2 u}{\partial z.\partial \bar{z}} = 0$. **7**

10. a) i) Expand $f(z) = \frac{1}{z(z-1)}$ as a Laurent's series about z = 0 and z = 1. **8**

ii) Evaluate $\int_C \frac{dz}{z^2(z^2+4)}$ where C is $|z+2i| = 3$. **7**

OR

b) Evaluate $\int_0^\infty \frac{dx}{(x^2+a^2)^2}$. **15**

11. a) Fit a curve of the form $y = ae^{bx}$ to the following data : **15**

x :	1	2	3	4
y :	1.65	2.7	4.5	7.35

OR

b) i) If joint pdf of X and Y is **8**

$$f(x, y) = k(6-x-y), \quad \begin{matrix} 0 < x < 2 \\ 2 < y < 4 \end{matrix}$$
$$= 0, \text{ elsewhere}$$

Find :

i) Value of k

ii) P (X < 1, Y < 3)

iii) P (X + Y < 3)

iv) P (X < 1 / Y < 3) **7**

ii) Joint pdf of X and Y given by

$$f(x, y) = \frac{xy}{96}, \; 0 < x < 4, \; 1 < y < 5.$$
$$0, \text{ elsewhere}$$

Find :

i) E(X)

ii) E(Y)

iii) E(XY)

iv) E(2X + 3Y)

v) CoV (X, Y).

12. a) Derive the solution of one dimensional Heat equation. **15**

OR

b) Derive one dimensional wave equation. **15**