DURATION: 2 ½ HOURS **G52010OAM** **MARKS: 75**

N. B.: (1) **All** questions are **compulsory.**

(2) Make **suitable** assumptions wherever necessary and **state the assumptions** made.

(3) Answers to the **same question** must be written together.

(4) Numbers to the **right** indicate **marks**.

(5) Draw **neat labeled diagrams** wherever **necessary.**

(6) Use of **Non-programmable** calculators is **allowed**.

Q1. Attempt any three of the following: **(15M)**

a. Express in a + ib form cot (x + iy).

b. express in polar from -1 + √ 3i

c. For different values of k, discuss the following equations:
x + 2 y − z = 0 ;
3 x + (k + 7) y − 3 z = 0 ;
2 x + 4 y + (k − 3)z = 0

d. Express in a + ib form cot (x + iy).

e. Find the adjoint of the given matrix and hence find Inverse if exist

$$\begin{bmatrix} -9 & 4 & 4 \\ -8 & 3 & 4 \\ -16 & 8 & 7 \end{bmatrix}$$

f. Prove that (1 + cos x + i sin x)n = 2n cosn x/2 (cos nx/2 + i sin nx/2)

Q2. Attempt any three of the following: **(15M)**

a. Solve the Differential Equation (1 - 2xy – x 3) dy - (1 + y2 + 3x 2 y) dx = 0

b. Find the General Solution of the equation (D3 + 3D)y = cos x

c. Change to polar coordinates and evaluate $\int \infty 0 \int e -(x\ 2+y\ 2\ )dxdy\ \infty 0$

d. find the area of the circle under the region $x^2 + y^2 = 49$

e. solve : y = xp + 1/p

f. solve : $(D^2 +6D + 9)Y = 5^X - \log 2$

Q3. Attempt any three of the following **(15M)**

a. Find the Laplace Transformation of $f(t) = t^3 e^{2t}$

b. Find Laplace transformation of the function $f(t) = t(2\sin 3t + e\ 2t)$

c. Find inverse Laplace transform $(\tan^{-1}s)$

d. Evaluate $F(t)= e^{-3t} \cos 2t\ dt$

e. Find Laplace transformation of the function
$f(t) = t(2\sin 3t + e^{2t})$

f. Find Inverse Laplace Transformation by convolution theorem for
$f(s) = s^2 (s^2 + a^2)^2$

Q4. Attempt any three of the following **(15M)**

a. Explain the legendres differential equation

b. Define error function. Evaluate erf $(\sqrt{x})$

c. Solve the following equation
$X+2Y+3Z=0$, $2X+3Y+Z=0$,$4X+5Y+4Z=0$

d. Find the area bounded by region if $Y = 2X$ and $y^2 =16ax$

e. What is Laplace transform and state its advantages

f. Find the Laplace transform of t.sin6t

Q5. Attempt any three of the following **(15M)**

a. Find the area of ellipse $x^2/16 + y^2/49 =1$

b. Find the complex square root of 3-2i

c. Derive the formula of Laplace transform of sinat

d. Prove that error function is an odd function

e. Find the Laplace transform of (tcos3t + 1 – sinh6t)

f. Explain types of differential equation and write advantages of D.E