(1) S.Y. IT Sem-III March-2023 ATKT

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. Find the area of ellipse x2/16 + y2/49 =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 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 $(1 + \cos x + i \sin x)^n = 2n \cos n\, x/2\, (\cos n\, x/2 + i \sin n\, x/2)$

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

a. Solve the Differential Equation $(1 - 2xy - x^3)dy - (1 + y^2 + 3x^2 y)\, dx = 0$

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

c. Change to polar coordinates and evaluate $\int_0^{\infty} \int e^{-(x^2+y^2)} dx dy \infty 0$

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

e. Solve : $y = xp + 1/p$

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

(15M)

Q3. Attempt any three of the following

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 (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
$f(s) = s^2 (s^2 + a^2)^2$

(15M)

Q4. Attempt any three of the following

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

b. Define error function. Evaluate erf(√x)

c. Explain the legendres differential equation

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

e. What is laplace transform and state its advantages

f. Find the laplace transform of t.sin6t

(15M)

Q5. Attempt any three of the following

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

b. express in polar from $-1 + \sqrt{3}i$

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

d. Find the complex square root of -6-2i

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

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