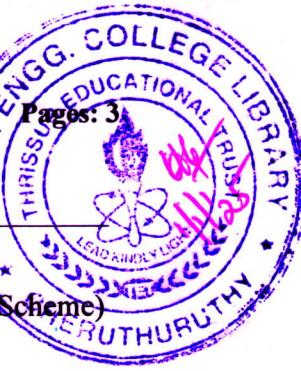


A

03GYMAT101122402



Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

First Semester B.Tech Degree Regular Examination December 2024 (2024 Scheme)

Course Code: GYMAT101

**Course Name: MATHEMATICS FOR ELECTRICAL SCIENCE – 1 /
PHYSICAL SCIENCE - 1**

Max. Marks: 60

Duration: 2 hours 30 minutes

PART A

(Answer all questions. Each question carries 3 marks) CO Marks

- | | | |
|---|---|----------|
| 1 | Find the rank of the matrix $\begin{bmatrix} 2 & 1 & -1 \\ 0 & 3 & -2 \\ 2 & 4 & -3 \end{bmatrix}$ | CO 1 (3) |
| 2 | Find the eigen values and eigen vectors of $\begin{bmatrix} 1 & 2 \\ 0 & 3 \end{bmatrix}$ | CO 1 (3) |
| 3 | Show that $y_1 = e^{-2x}, y_2 = e^{3x}$ are linearly independent | CO 2 (3) |
| 4 | Solve: $y'' + 3y = 0$ | CO 2 (3) |
| 5 | Find $L[e^{2t} + 4t^3 - 2 \sin 3t]$ | CO 3 (3) |
| 6 | Find $L^{-1}\left[\frac{s^2-3s+4}{s^3}\right]$ | CO 3 (3) |
| 7 | If $f(x)$ is a periodic function with period 2π in the interval $-\pi < x < \pi$, write the Euler's formula to find a_0, a_n and b_n . | CO 4 (3) |
| 8 | Expand $f(x) = e^x$ as a Maclaurin's series | CO 4 (3) |

PART B

(Answer any one full question from each module, each question carries 9 marks)

Module -1

- 9 Find the value of μ for which the system of equations $x + y + z = \text{CO 1}$ (9)
 $1, x + 2y + 3z = \mu, x + 5y + 9z = \mu^2$ is consistent. For each
 value of μ obtained, find the solutions of the system.

- 10 Diagonalize:
$$\begin{bmatrix} 1 & 0 & 1 \\ 0 & 3 & 2 \\ 0 & 0 & 2 \end{bmatrix}$$
 CO1 (9)

Module -2

- 11 Solve using the method of variation of parameters: $y'' - y = x^2$ CO 2 (9)
- 12 a) Solve the initial value problem: $y'' + 4y = 0, y(0) = 4, y'(0) = 2.$ CO 2 (5)
- b) Using the method of undetermined coefficients, solve $y'' + 3y' + 2y = 12x^2.$ CO 2 (4)

Module -3

- 13 a) Use Laplace transforms, solve $y'' + 5y' + 6y = 0, y(0) = 0, y'(0) = -1.$ CO3 (5)
- b) Find $L^{-1} \left[\frac{2s+1}{s^2+2s+5} \right]$ CO3 (4)
- 14 a) Using Convolution theorem, find $L^{-1} \left[\frac{1}{s(s^2+4)} \right]$ CO3 (5)
- b) Find $L[f(t)],$ where $f(t) = \begin{cases} t-1, & 1 < t < 2 \\ 3-t, & 2 < t < 3 \end{cases}$ CO3 (4)

Module -4

- 15 Find the Fourier series expansion of $f(x) = x^2 - 2$ in the interval CO4 (9)
 $-2 < x < 2$.
- 16 Obtain the Half-range Fourier cosine series of $f(x) = x \sin(0, \pi)$. CO4 (9)

Hence deduce that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots = \frac{\pi^2}{8}$
