

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
B.Tech Degree S1(S) Examinations May 2026 (2024 Scheme)Course Code: GYMAT101
Course Name: MATHEMATICS FOR ELECTRICAL SCIENCE AND
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 eigen value of $\begin{bmatrix} 3 & 4 \\ 4 & -3 \end{bmatrix}$ | (CO1) | (3) |
| 2 | Find the rank of the matrix $\begin{bmatrix} 2 & -3 \\ -1 & 2 \\ 3 & -4 \end{bmatrix}$ | (CO1) | (3) |
| 3 | Solve $y'' + 6y' + 9y = 0$. | (CO2) | (3) |
| 4 | Show that $\{x, x^2\}$ form a basis of solutions of the ODE
$x^2y'' - 2xy' + 2y = 0$ | (CO2) | (3) |
| 5 | Find the Laplace transform of $\sin^2 2t$ | (CO3) | (3) |
| 6 | Find $L^{-1}\left(\frac{1}{(s-3)^2-16}\right)$ | (CO3) | (3) |
| 7 | If $f(x)$ is a periodic function with period 2π in the interval $0 < x < 2\pi$,
write the Euler's formula to find a_0, a_n and b_n . | (CO4) | (3) |
| 8 | Find the Taylor's series for the function $f(x) = \frac{1}{x}$ about the point $x = 1$ in
the region $ x - 1 < 1$ | (CO4) | (3) |

PART B

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

Module -1

- | | | | |
|---|---|-------|-----|
| 9 | Diagonalize $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$ | (CO1) | (9) |
|---|---|-------|-----|

- 10 Using Gauss elimination method find the solution of the system (CO1) (9)
 $x + y - z = 9$; $8y + 6z = -6$; $-2x + 4y - 6z = 40$

Module -2

- 11 a) Using method of undetermined coefficients find the general solution of (CO2) (5)
 $y'' + 4y' + 4y = e^{2x}$

- b) Solve the initial value problem (CO2) (4)

$$y'' + y' + 0.25y = 0, y(0) = 3, y'(0) = -3.5$$

- 12 Using the method of variation of parameter find the general solution of the (CO2) (9)
 non-homogeneous ODE $y'' + 4y = \tan 2x$

Module -3

- 13 a) Using the Laplace transform Solve initial value problem (CO3) (5)

$$y'' - y = t, \quad y(0) = 1, y'(0) = 1$$

- b) Find $L^{-1}\left\{\frac{3s^2 - 2}{s^2 - 5s + 6}\right\}$ (CO3) (4)

- 14 a) Using convolution theorem, find $L^{-1}\left\{\frac{1}{(s^2 + a^2)^2}\right\}$ (CO3) (5)

- b) Find $L(\sin 3t \cos 2t)$ (CO3) (4)

Module -4

- 15 Find the Fourier series of the function $f(x) = \frac{(\pi-x)^2}{4}$ with the period 2π in (CO4) (9)
 $[0, 2\pi]$. Hence evaluate $\sum_{n=1}^{\infty} \frac{1}{n^2}$

- 16 Find the half range cosine series of e^x in $[0, 1]$. Hence evaluate (CO4) (9)
 $\sum_{n=1}^{\infty} \frac{e(-1)^n - 1}{1 + n^2\pi^2}$
