

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE- SEMESTER-I&II EXAMINATION – SUMMER 2025****Subject Code:3110019****Date:16-06-2025****Subject Name:Remedial Mathematics****Time:10:30 AM TO 01:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

|                                                                                                       | <b>Marks</b> |
|-------------------------------------------------------------------------------------------------------|--------------|
| <b>Q.1 (a)</b> Find the slope of the line passing through the points (3, -2) and (3,4).               | <b>03</b>    |
| <b>(b)</b> Find the equation of line passing through (-4,3) with slope -5.                            | <b>04</b>    |
| <b>(c)</b> (1) Find the distance between the parallel lines $3x - 4y + 7 = 0$ and $3x - 4y + 5 = 0$   | <b>03</b>    |
| (2) Find the angles between the lines $\sqrt{3}x + y = 1$ and $x + \sqrt{3}y = 1$                     | <b>04</b>    |
| <b>Q.2 (a)</b> State domain and range of the function $f(x) = \cos x$                                 | <b>03</b>    |
| <b>(b)</b> Deduce trigonometric identity $\cos 2x = \frac{1 - \tan^2 x}{1 + \tan^2 x}$                | <b>04</b>    |
| <b>(c)</b> (1) Find $\frac{d^2y}{dx^2}$ if $y = \cos 2x$                                              | <b>03</b>    |
| (2) Find derivative of $\frac{\cos x}{1 + \sin x}$                                                    | <b>04</b>    |
| <b>OR</b>                                                                                             |              |
| (1) Find derivative of $y = \sin x \cos x$                                                            | <b>03</b>    |
| (2) ) Find $\frac{dy}{dx}$ if $y = \frac{x}{1 + \tan x}$                                              | <b>04</b>    |
| <b>Q.3 (a)</b> Evaluate $\lim_{x \rightarrow 0} \frac{\sin 4x}{\sin 2x}$                              | <b>03</b>    |
| <b>(b)</b> If $y = \sin^{-1} x$ , show that $(1 - x^2) \frac{d^2y}{dx^2} - x \frac{dy}{dx} = 0$ . . . | <b>04</b>    |
| <b>(c)</b> Find the solution of the following.                                                        |              |
| (1) $\frac{dy}{dx} = \frac{x+1}{2-y}$ ; $(y \neq 2)$                                                  | <b>03</b>    |
| (2) $\frac{dy}{dx} + 3y = e^{-3x}$                                                                    | <b>04</b>    |
| <b>OR</b>                                                                                             |              |
| <b>Q.3 (a)</b> Evaluate $\lim_{x \rightarrow 2} \frac{x^3 - 2x^2}{x^2 - 5x + 6}$                      | <b>03</b>    |
| <b>(b)</b> Find $\frac{dy}{dx}$ if $x = \cos t$ and $y = \cos 2t$                                     | <b>04</b>    |
| <b>(c)</b> Solve the following.                                                                       |              |
| (1) $xy \frac{dy}{dx} = (x + 2)(y + 2)$                                                               | <b>03</b>    |

$$(2) \frac{dy}{dx} = x + xy \quad 04$$

**Q.4 (a)** Find  $\int \frac{(1+\log x)^2}{x} dx$  03

**(b)** Find  $\int \frac{dx}{x^2+2x+2}$  04

**(c)** Evaluate the following.

(1)  $\int_0^4 (x + e^{2x}) dx$  03

(2)  $\int_0^{\pi/4} (2 \sec^2 x + x^3 + 2) dx$  04

**OR**

**Q.4 (a)** Find  $\int \frac{\sin^{-1} x}{\sqrt{1-x^2}} dx$  03

**(b)** Find  $\int \frac{x}{(x+1)(x+2)} dx$  04

**(c)** Evaluate the following.

(1)  $\int_0^1 x e^{x^2} dx$  03

(2)  $\int_0^{\pi} \sin^3 x dx$  04

**Q.5 (a)** Evaluate the determinant  $\begin{vmatrix} 3 & -1 & -2 \\ 0 & 0 & -1 \\ 3 & -5 & 0 \end{vmatrix}$  03

**(b)** If  $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ , Show that  $A^2 - 5A + 7I = 0$ . Hence find  $A^{-1}$ . 04

**(c)** Solve the system of linear equations 07  
 $3x - 2y + 3z = 8, \quad 2x + y - z = 1, \quad 4x - 3y + 2z = 4$

**OR**

**Q.5 (a)** Find the value of x, if  $\begin{vmatrix} x & 2 \\ 18 & x \end{vmatrix} = \begin{vmatrix} 6 & 2 \\ 18 & 6 \end{vmatrix}$  03

**(b)** By using the properties of determinants prove 04

$$\begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix} = (a-b)(b-c)(c-a)$$

**(c)** Solve the system of linear equations 07  
 $x - y + z = 4, \quad 2x + y - 3z = 0, \quad x + y + z = 2$

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