GYANMANJARI INNOVATIVE UNIVERSITY

GYANMANJARI DIPLOMA ENGINEERING COLLEGE

Diploma Engineering –Mid Semester Examination (MSE)- S2026

Enrollment No.:_____

Subject Code: DETXX10106 **Date:** 16/03/2026

Subject Name: Mathematics **Semester:** 2

Time: 10:30 AM to 12:30 PM **Total Marks: 60**

Instructions:

4. **Question No. 1 is compulsory.**
5. **Make suitable assumptions wherever necessary.**
6. **Figures to the right indicate full marks.**

			Marks
Q.1	(a)	Find the determinant (નિશ્ચયક શોધો): $\begin{vmatrix} 7+\sqrt{3} & 3-\sqrt{5} \\ 3+\sqrt{5} & 7-\sqrt{3} \end{vmatrix}$	05
	(b)	Prove that (સાબિત કરો કે): $\begin{vmatrix} x+y & x-y \\ x-y & x+y \end{vmatrix} = 4xy$	05
	(c)	Find A^{-1} for A=$\begin{bmatrix} 3 & 1 & 2 \\ 2 & -3 & -1 \\ 1 & 2 & 1 \end{bmatrix}$ (જો A=$\begin{bmatrix} 3 & 1 & 2 \\ 2 & -3 & -1 \\ 1 & 2 & 1 \end{bmatrix}$, તો A^{-1} શોધો.)	10
Q.2	(a)	Prove that (સાબિત કરો કે): $tan66° = \frac{cos21°+sin21°}{cos21°-sin21°}$	05
	(b)	Find the limit (લક્ષ મેળવો): $\lim_{x\to\infty} \frac{4x^3-7x^2+5x-1}{8x^3+7x^2-4n+1}$	05
		OR	
	(b)	Find the value (મૂલ્ય શોધો) : $6\,\text{cosec}^2\frac{\pi}{3} - 7cos^2\frac{\pi}{2} - 5sec^2\frac{\pi}{4} + 4cot^2\frac{\pi}{6}$	05
	(c)	If $f(x)=\frac{\sqrt{x+5}}{\sqrt{x+5}+\sqrt{8-x}}$ then prove that f(x) + f(3 –x) = 1. [જો $f(x)=\frac{\sqrt{x+5}}{\sqrt{x+5}+\sqrt{8-x}}$ તો સાબિત કરો કે f(x) + f(3 –x) = 1.[	10
		OR	
	(c)	Prove that (સાબિત કરો કે): $7\log\left(\frac{16}{15}\right)+5\log\left(\frac{25}{24}\right)-3\log\left(\frac{80}{81}\right)=\log 2$	10
Q.3	(a)	Write the formulas (સૂત્રો લખો) 1. $\frac{d}{dx}\,tanx$ 2. $\frac{d}{dx}\,a^x$ 3. $\frac{d}{dx}\,logx$ 4. $\frac{d}{dx}\,f(x)\cdot f(y)$	05

5. $\frac{d}{dx}\ cosx$

(b) Find $\frac{d^2y}{dx^2}$ of the following parametric functions [પ્રચલ વિધેય માટે $\frac{d^2y}{dx^2}$ મેળવો.]: $y = \sec\theta$, $x = \tan\theta$ 05

(c) Find the differentiation with respect to x [xની સાપેક્ષે વિકલન શોધો.]

(i) $y=e^x \sin x \cos x$ (ii) $y= \log\left(\frac{\sin x}{1+\cos x}\right)$ 10

OR

Q.3 (a) Find the differentiation of the following using definition [આપેલ વિધેયનું વિકલન શોધો]: 05

$f(x) = x^2 + 2x-1$

(b) Find the derivative of the following function with respect to x [આપેલ વિધેયનું વિકલન શોધો]:

1. $\log(sin2x)$ 05
2. $\frac{\sin(logx)}{x}$

(c) If $x = \sec\theta + \tan\theta$ & $y = \sec\theta - \tan\theta$ then prove that $\frac{dy}{dx} = -\frac{1}{x^2}$ 10

(જો $x = \sec\theta + \tan\theta$ & $y = \sec\theta - \tan\theta$ સાબિત કરો $\frac{dy}{dx} = -\frac{1}{x^2}$)