DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE, NOVEMBER – 2023

MATHEMATICS - I

[Maximum Marks: **75**]   [Time: **3** Hours]

PART-A

I. Answer *all* the following questions in one word or one sentence. Each question carries *'one'* mark.

(9 x 1 = 9 Marks)

		Module Outcome	Cognitive level
1.	Find the conjugate of -5-2i	M1.01	U
2.	Write the equation to a straight line passing through two given points (x_1, y_1) and (x_2, y_2)	M1.02	U
3.	Evaluate $\sin^2 30^0 + \cos^2 60^0$	M2.02	R
4.	Write the formula for $\cos(A+B)=$	M2.03	U
5.	Write the expression for $\cos 3A$	M2.03	R
6.	Evaluate $\lim_{\theta \to 0} 7\theta - 5$	M3.01	U
7.	Find $\frac{dy}{dx}$ if $y=x^5+\cos x-3$	M3.03	U
8.	Find $\frac{dy}{dx}$ if $x^2+y^2=36$	M4.02	A
9.	If $y=\sin x$, find $\frac{d^2y}{dx^2}$	M4.03	A

PART-B

II. Answer any *eight* questions from the following. Each question carries *'three'* marks.

(8 x 3 = 24 Marks)

		Module Outcome	Cognitive level
1.	Find the modulus and amplitude of $\sqrt{3}+i$	M1.01	U
2.	Find the slope and intercepts made on the line $3x-2y+5=0$	M1.02	U
3.	If $\tan\theta=1$, θ is acute, find $\sin\theta$ and $\cos\theta$	M2.02	R
4.	If $\tan A = \frac{3}{4}$, $\tan B = \frac{5}{12}$, $find\ the\ value\ of\ \tan(A-B)$	M2.03	U
5.	Prove that $\tan A=\frac{\sin 2A}{1+\cos 2A}$	M2.03	U
6.	Evaluate $\lim_{\theta \to 0}\frac{\sin 4\theta}{3\theta}$	M3.02	R
7.	Differentiate $y=\sin x.\cos x$ w.r.to x	M3.04	A
8.	Find $\frac{dy}{dx}$ if $x^2+xy+y^2=0$	M4.02	R
9.	If $x=at^2$, $y=2at$, find $\frac{dy}{dx}$	M4.02	U
10.	Find the second derivative of $y=x.\log x$	M4.03	A

III.	Multiply
	
	    i) (-1+3i) (1+i)
	    ii) (4-i)(2+i) (4+3 marks)
	
	OR
		M1.01	R

IV.	i) Find the equation to a straight line perpendicular
	          2x+5y=7 and passing through the point (3,-2)
	
	    ii) Find the perpendicular distance from the point (2,-3) to
	           the line 3x-4y+7=0 (4+3 marks)
		M1.04	U

V.	Find the modulus and amplitude of
	
	    i) -3-4i
	    ii) 1+i (4+3 marks)
	
	OR
		M1.01	R

VI.	Find the x-intercept of a line is 3 times its y-intercept. If the line passes through (-6, 3), find its equation.	M1.02	U
VII.	If cosA=1/2, A lies in the fourth quadrant, Find all other T-functions. **OR**	M2.02	R
VIII.	Show that $\tan 75^0 + \cot 75^0 = 4$ without using tables.	M2.03	U
IX.	Evaluate i) $\displaystyle\lim_{x \to 3} \frac{x^5-243}{x^2-9}$ ii)) $\displaystyle\lim_{x \to 0} \frac{tanx}{x}$ (4+3 marks) **OR**	M3.02	R

X.	Differentiate w.r.to x
	
	    i) $y=\sqrt{x}.\,tanx$
	    ii) $y=\dfrac{sinx}{x-cosx}$ (3+4 marks)
		M3.04	U

XI.	Evaluate i) $\lim\limits_{x \to 0} \dfrac{2sin3x.cosx}{5x}$ ii) $\lim\limits_{x \to 3} \dfrac{x^2-3x}{x^2-9}$ (4+3 marks)	M3.02	A
	OR		
XII.	Find the derivative of tanx and cotx using quotient rule. (4+3 marks)	M3.04	U

XIII.	Differentiate w.r.to x
	  i) $y=(2x^2+3)^5.tanx$
	
	  ii) $y= \dfrac{cos(logx)}{\sqrt{x}}$ (4+3 marks)
		M4.01	U

	OR		
XIV.	If $y=ae^x+be^{2x}$, prove that **y''-3y'+2y=0**	M4.03	A

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