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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE, NOVEMBER – 2024

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 the complex number $1-i$	M1.01	U	
2.	Find the slope of the straight line $3x - 2y + 1 = 0$	M1.02	U	
3.	Evaluate $\sin 90^{\circ} \times \cos 0^{\circ}$	M2.01	U	
4.	Find the value of $\sin 135^{\circ}$	M2.02	R	
5.	Write the expression for <i>sin 2A</i> in terms of <i>tan A</i>	M2.03	R	
6.	Find $\lim_{\theta \to 0} \cos \theta$	M3.01	U	
7.	Find $\frac{dy}{dx}$ if $y=e^x - \log x$	M3.03	U	
8.	Find $\frac{dy}{dx}$ if $x^2 + y = 1$	M4.02	А	
9.	Find the second derivative of <i>log x</i>	M4.03	А	

PART-B

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

(8 x 3 = 24 Marks) Module Outcome Cognitive level

		Module Outcome	Cognitive level
1.	Multiply $(3 + i)$ with its conjugate.	M1.01	R
2.	Find the equation of the line with x intercept 3 and passing through the	M1.02	U
	point (-2, 3)		
3.	If sec $\theta = 2$ then find tan θ and cot θ	M2.02	R
4.	If $\tan A = 2$ and $\tan B = 1$ then find $\tan(A+B)$ and $\tan(A-B)$	M2.03	U
5.	Prove that $(\cos A + \sin A)^2 = 1 + \sin 2A$	M2.03	U
6.	Show that $\lim_{\theta \to 0} \frac{\tan \theta}{\theta} = 1$	M3.02	U
7.	Find the derivative of $x \sin^{-1} x$.	M3.04	А
8.	If $x = 2t^3$, $y = 4t^2$ then find $\frac{dy}{dx}$.	M4.02	U
9.	Find $\frac{dy}{dx}$ if $x^3 + y^3 = 3x$	M4.02	U
10.	If $y = \sin x + \cos x$ then show that $\frac{d^2y}{dx^2} + y = 0$	M4.03	Α

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VIII.Prove that i) $sin(A + B) - sin(A - B) = 2 cos A sin B$ M2.03Rii) $\frac{sin3x}{sinx} - \frac{cos3x}{cosx} = 2$ (3 +4 marks)M2.03RIX.Findi) $\lim_{x\to 0} \frac{sin2x}{sin4x}$ M3.02Uii) $\lim_{x\to 3} \frac{x^3 - 27}{x^2 - 9}$ (3+4 marks)M3.02UX.i) Find the derivative of tan x using quotient rule.(5 marks)M3.04A		500211		
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IX.Findi) $\lim_{x\to 0} \frac{\sin 2x}{\sin 4x}$ M3.02Uii) $\lim_{x\to 3} \frac{x^3-27}{x^2-9}$ (3+4 marks)M3.02UORX.i) Find the derivative of $\tan x$ using quotient rule.(5 marks)M3.04A		$\frac{\sin 3x}{\cos 2x} = \frac{\cos 3x}{\cos 2x} = 2$	s) M2.03	R
ii) $\lim_{x \to 3} \frac{x^3 - 27}{x^2 - 9}$ (3+4 marks)M3.02UORImage: Second se		$\int \sin x \cos x = 2 \qquad (3 + 4 \operatorname{mark})$	5) 112.05	
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ii) $\lim_{x \to 3} \frac{x^3 - 27}{x^2 - 9}$ (3+4 marks)M3.02UORImage: Second se	IX.	Find i) $\lim_{x \to 0} \frac{\sin 2x}{\sin 4x}$	M3.02	U
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ORORX.i) Find the derivative of <i>tan x</i> using quotient rule.(5 marks)M3.04A		ii) $\lim_{x \to 3} \frac{x - 2x}{x^2 - 9}$ (3+4 mark	s) M3.02	U
X.i) Find the derivative of <i>tan x</i> using quotient rule.(5 marks)M3.04A		OR		
	X) M3 04	۸
ii) Find the derivative of $x^3 - 3\sqrt{x} + 5$ (2 marks)M3.03A			, 	
		ii) Find the derivative of $x^3 - 3\sqrt{x} + 5$ (2 marks)) M3.03	A

PART-C

Answer all questions from the following. Each question carries *'seven*' marks $(6 \ge 7 = 42 \text{ Marks})$

XI.	Find i) $\lim_{x \to 2} \frac{x^2 - 5x + 6}{x^2 + x - 6}$ (4 marks)	s) M3.02	U
	ii) $\lim_{x \to 0} \frac{\sin 3x}{x} \cos x$ (3 mark	s) M3.02	U
	OR		
XII.	Find the derivative of the following functions i) $\frac{x+1}{x-1}$ (4 marks)	s) M3.04	U
	ii) $x \operatorname{cosec} x$ (3 mark	s) M3.04	U
XIII.	Find the derivative of		
	i) $e^{2x} \sin 2x$ (4 marks	M4.01	А
	ii) $\frac{\sin(\log x)}{x}$ (3 marks	M4.01	А
	OR		
XIV	Find $\frac{dy}{dx}$ if i) $x^2 + xy + y^2 = 0$ (4 marks)	s) M4.02	U
	ii) $x = t - sin t, y = 1 - cos t$ (3 marks)	s) M4.02	U
