D3

(5) 16/1/24

(D3) JAN - 24

Scoring Indicators

Question Paper Set II

COURSE NAME

Q No	Scoring Indicators	Split score	Sub Total	Total score
	PART A			9
I. 1	$-5+2i$		1	
I. 2	$\frac{y-y_1}{y_2-y_1} = \frac{x-x_1}{x_2-x_1}$		1	
I. 3	$(\frac{1}{2})^2 + (\frac{1}{2})^2 = \frac{1}{4} + \frac{1}{4} = \frac{1}{2}$		1	
I. 4	$\cos A \cdot \cos B - \sin A \sin B$		1	
I. 5	$4\cos^3 A - 3\cos A$		1	
I. 6	-5		1	
I. 7	$5x^4 - \sin x$		1	
I. 8	$2x + 2y \cdot dy/dx = 0$ $\frac{dy}{dx} = -x/y$		1	

I. 9	$y' = \cos x$ $y'' = -\sin x$		1	
	PART B			
II. 1	$r = \sqrt{x^2+y^2} = \sqrt{\sqrt{3}^2+1^2}$ $= \sqrt{3+1} = \sqrt{4} = 2$ $\theta = \tan^{-1}(y/x)$ $= \tan^{-1}(1/\sqrt{3}) = 30^\circ$	1 1 1	3	24
II. 2	$\text{Slope} = -\frac{a}{b} = 3/2$ $x\text{-intercept} = -c/a = -5/3$ $y\text{-intercept} = -c/b = 5/2$	1 1 1	3	
II. 3	$\sec^2\theta = 1+\tan^2\theta = 1+1 = 2$ $\sec\theta = \sqrt{2} \quad \cos\theta = 1/\sqrt{2}$ $\sin\theta = \sqrt{1-\cos^2\theta}$ $= \frac{1}{\sqrt{2}}$	1 1 1	3	
II. 4	$\tan(A-B) = \frac{\frac{3}{4}-\frac{5}{12}}{1+\frac{3}{4}\cdot\frac{5}{12}}$ $= 16/63$	1 2	3	
II. 5	$R.H.S = \frac{2\sin A\cos A}{1+2\cos^2 A-1}$ $= \frac{\sin A}{\cos A} = \tan A = L.H.S.$	2 1	3	
II. 6	$= \frac{4}{4}\cdot \lim_{\theta\to 0}\frac{\sin 4\theta}{3\theta}$ $= \frac{4}{3}\cdot \lim_{\theta\to 0}\frac{\sin 4\theta}{4\theta}$ $= 4/3 \cdot 1 = 4/3$	1 1 1	3	
II. 7	$y' = \sin x\cdot -\sin x + \cos x\cdot\cos x$ $= \sin^2 x + \cos^2 x$ $= \cos^2 x - \sin^2 x //$	2 1	3	

II. 8	$2x + x\cdot y' + y\cdot 1 + 2yy' = 0$ $y'(x+2y) = -(2x+y)$ $y' = \frac{-(2x+y)}{(x+2y)}$	1 1 1	3	
II.9	$\frac{dx}{dt} = 2a$ $dy/dt = 2a$ $\frac{dy}{dx} = \frac{2a}{2at} = 1/t$	1 1 1	3	
II.10	$y' = y' = x\cdot\frac{1}{x} + \log x \cdot 1$ $= 1 + \log x$ $y'' = 0 + 1/x = 1/x$	2 1	3	
	PART C			42
III	i) $= -1 - i + 3i + 3i^2$ $= -1 + 2i - 3$ $= -4 + 2i$ ii) $= 8 + 4i - 2i - i^2$ $= 8 + 2i + 1$ $= 9 + 2i$	2 1 1 1 1 1	7 4 3	7
IV	i) Equation is $5x - 2y = k$ — ① $x = 3 \quad y = -2 \Rightarrow 15 + 4 = k$ ① $\rightarrow 5x - 2y = 19$ ii) $\frac{3\cdot 2 + -4\cdot -3 + 7}{\sqrt{3^2 + (-4)^2}} = \frac{6+12+7}{5}$ $= 5$	1 2 1 2 1	7 4 3	7
V	i) $r = \sqrt{x^2+y^2} = \sqrt{(-3)^2 + (-4)^2}$ $= 5$ $\theta = \tan^{-1}(y/x) = \tan^{-1}(4/3)$ ii) $r = \sqrt{1^2+1^2} = \sqrt{2}$ $\theta = \tan^{-1}(1/1) = 45^\circ$	2 1 2 1	7 4 3	7
VI	$a = 3b$ Eqn → $\frac{x}{3b} + \frac{y}{b} = 1$ Put $x = -6, y = 3$ we get $b = 1$ Eqn → $x + 3y = 3$	1 1 3 2	7	7

VII	$\cos A = 1/2 \quad \sec A = 2$ $\sin A = \pm\sqrt{1-\cos^2 A} = \pm\sqrt{1-1/4}$ $= \pm\sqrt{3/4} = -\sqrt{3}/2$ $\operatorname{Cosec} A = -2/\sqrt{3}$ $\tan A = \sin A/\cos A = -\sqrt{3}$ $\cot A = \frac{-1}{\sqrt{3}}$	1 2 1 2 1	7	7
VIII	$\tan 75 = \tan(45+30) = \frac{\sqrt{3}+1}{\sqrt{3}-1}$ $\cot 75 = \frac{\sqrt{3}-1}{\sqrt{3}+1}$ $\tan 75 + \cot 75 = \frac{\sqrt{3}+1}{\sqrt{3}-1} + \frac{\sqrt{3}-1}{\sqrt{3}+1}$ $= 4$	2 1 1 3	7	7
IX	i) $= \lim_{x\to 3} \frac{x^5-3^5}{x-3} \Big/ \lim_{x\to 3} \frac{x^2-3^2}{x-3}$ $= 5\cdot 3^4/2\cdot 3^1 = 135/2$ ii) $= \lim_{x\to 0} \frac{\sin x}{\cos x}\cdot\frac{1}{x}$ $= \lim_{x\to 0}\frac{\sin x}{x}\cdot\lim_{x\to 0}\frac{1}{\cos x} = 1$	2 2 1 2	4 3	7
X	i) $y' = \sqrt{x}\frac{d}{dx}\tan x + \tan x\cdot\frac{d}{dx}\sqrt{x}$ $= \sqrt{x}\sec^2 x + \frac{\tan x}{2\sqrt{x}}$ ii) $y = \frac{(x-\cos x)\frac{d}{dx}\sin x - \sin x\cdot\frac{d}{dx}(x-\cos x)}{(x-\cos x)^2}$ $= \frac{(x-\sin x)\cos x - \sin x(1+\sin x)}{(x-\cos x)^2}$	2 1 1 3	3 4	7
XI	i) $= 3/3\cdot\lim_{x\to 0}\frac{2\sin 3x\cdot\cos x}{5x}$ $= \frac{6}{5}\cdot\lim_{x\to 0}\frac{\sin 3x}{3x}\cdot\lim_{x\to 0}\cos x$ $= 6/5\cdot 1\cdot 1 = 6/5$	1 2 1	4	7

	ii) $\lim_{x\to 3} \frac{x(x-3)}{(x+3)(x-3)}$	2	3	
	$= \lim_{x\to 3} \frac{x}{x+3} = \frac{3}{3+3} = 1/2$	1		
XII	i) $\frac{dy}{dx} = \frac{\cos x \cos x - \sin x \cdot -\sin x}{\cos^2 x}$	2	7	7
	$= \frac{\cos^2 x + \sin^2 x}{\cos^2 x} = \frac{1}{\cos^2 x} = \sec^2 x$	2		
	ii) $\frac{dy}{dx} = \frac{\sin x \cdot -\sin x - \cos x \cdot \cos x}{\sin^2 x}$ $= \frac{-1}{\sin^2 x}$	2		
	$= -\operatorname{cosec}^2 x$	1		
XIII	i) $y' = (2x^2+3)^5 \cdot \frac{d}{dx}\tan x + \tan x \cdot \frac{d(2x^2+3)^5}{dx}$	1	7	7
	$= (2x^2+3)^5 \cdot \sec^2 x + \tan x \cdot 5(2x^2+3)^4 \cdot 4x$	3	4	
	ii) $y' = \frac{\sqrt{x} \cdot \frac{d}{dx}\cos(\log x) - \cos(\log x) \cdot \frac{d\sqrt{x}}{dx}}{\sqrt{x}^2}$	1	3	
	$= \frac{\sqrt{x} \cdot -\sin(\log x) \cdot 1/x - \cos(\log x) \cdot 1/2\sqrt{x}}{x}$	2		
XIV	$y' = ae^x + b \cdot e^{2x} \cdot 2$	2	7	7
	$y'' = ae^x + 2b \cdot e^{2x} \cdot 2$	2		
	$y'' - 3y' + 2y = ae^x + 4be^{2x}$ $-3(ae^x + 2be^{2x}) + 2(ae^x + be^{2x})$	2		
	$= ae^x + 4be^{2x} - 3ae^x - 6be^{2x} + 2ae^x + 2be^{2x}$			
	$= 0$	1		