

Scoring Indicators

Question Paper Set 1

COURSE NAME

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

I.9	$\frac{dy}{dx} = 2e^x$ $\frac{d^2y}{dx^2} = e^x$	$-\frac{1}{2}$ $1/2$	1	
PART B				24
II.1	$x=1 \quad y=\sqrt{3}$ Modulus = $\sqrt{x^2+y^2} = \sqrt{1^2+(\sqrt{3})^2} = \sqrt{4} = 2$ Amplitude $\theta = \tan^{-1}(y/x) = \tan^{-1}(\frac{\sqrt{3}}{1})$ $\tan^{-1}(\sqrt{3}) = 60^\circ$	2 1	3	
II.2	$\frac{y-y_1}{y_2-y_1} = \frac{x-x_1}{x_2-x_1}$ $\frac{y+1}{3+1} = \frac{x-2}{-6-2}$ $4x + 8y = 0$	1 1 1	3	
II.3	$\sec \alpha = \sqrt{1 + \tan^2 \alpha} = \sqrt{1 + 3^2} = \sqrt{10}$ $\cos \alpha = \frac{1}{\sqrt{10}}$ $\sin \alpha = \sqrt{1 - \cos^2 \alpha} = 3/\sqrt{10}$	1 1 1	3	
II.4	$\tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A \cdot \tan B}$ $= \frac{1/2 + 1/3}{1 - 1/6} = \frac{5/6}{5/6} = 1$ $A+B = \tan^{-1}(1) = 45^\circ$	2 1	3	
II.5	$\cos A = \sqrt{1 - \sin^2 A} = 0.8$ $\sin 2A = 2 \sin A \cos A$ $= 2 \times 0.6 \times 0.8$ $= 0.96$	1 1 1	3	
II.6	$= \frac{5}{5} \frac{4}{0 \rightarrow 0} \frac{\sin 50}{20}$ $= \frac{5}{2} \frac{4}{0 \rightarrow 0} \frac{\sin 50}{50} = \frac{5}{2} \cdot 1 = \frac{5}{2}$	1 1 1	3	
II.7	$\frac{dy}{dx} = e^x \cdot \frac{d}{dx} \sec x + \sec x \cdot \frac{d}{dx} e^x$ $= e^x \cdot \sec x \cdot \tan x + \sec x \cdot e^x$	1 2	3	

II.8	$3x^2 + 3y^2 \cdot \frac{dy}{dx} = 0$ $3y^2 \cdot \frac{dy}{dx} = -3x^2$ $\frac{dy}{dx} = \frac{-x^2}{y^2}$	1 1 1	3	
II.9	$\frac{dy}{dt} = b \cos t$ $\frac{dx}{dt} = -a \sin t$ $dy/dx = \frac{b \cos t}{-a \sin t} = \frac{-b \cot t}{a}$	1 1 1	3	

II.10	$y' = x \cdot \cos x + \sin x$ $y'' = x \cdot (-\sin x) + \cos x \cdot 1 + \cos x$	1 2	3	
-------	--	--------	---	--

PART C

				42
III	i) $= 2 - 8i + 3i - 12i^2$ $= 2 - 5i + 12 = 14 - 5i$ ii) $6 + 2i - 3i - i^2$ $= 6 - i + 1 = 7 - i$	2 2 2 1	7 4 3	7

IV	i) Equation is $3x - 2y = k$ — (1) Put $x=1, y=-2$ $3 + 4 = k$ $(1) \rightarrow 3x - 2y = 7$ ii) $\tan \theta = \frac{m_1 - m_2}{1 + m_1 m_2} = \frac{2 - 1/3}{1 + 2 \cdot 1/3}$ $= 1$ $\theta = \tan^{-1}(1) = 45^\circ$	1 2 1 1 2 1	7 4 3	7
----	--	----------------------------	-------------	---

V	i) $x = -1, y = -2$ $r = \text{Modulus} = \sqrt{x^2 + y^2} = \sqrt{(-1)^2 + (-2)^2} = \sqrt{5}$ $\theta = \text{Amplitude} = \theta = \tan^{-1}(y/x) = \tan^{-1}(2)$ ii) $x = -2, y = 3$ $r = \text{Modulus} = \sqrt{(-2)^2 + 3^2} = \sqrt{13}$ $\theta = \text{Amplitude} = \tan^{-1}\left(\frac{3}{-2}\right)$	2 2 2 1	7 4 3	7
---	---	------------------	-------------	---

VI	i) $m = 1/3$ $(x_1, y_1) = (-2, 4)$ Eqn. is $y - y_1 = m(x - x_1)$ $y - 4 = 1/3(x - (-2))$ $x - 3y + 14 = 0$	1 1 2	7 4	7
----	---	-------------	--------	---

	ii) $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2 - (-3)}{6 - 2} = 5/4$	1 2	3	
VII	$\cot A = 12/5$ $\sec A = \sqrt{1 + \tan^2 A} = -13/12$ $\cos A = -12/13$ $\sin A = \sqrt{1 - \cos^2 A} = -\frac{5}{13}$ $\csc A = -13/5$	1 2 1 2 1	7	7
VIII	$\tan 15 = \tan (45 - 30) = \frac{\tan 45 - \tan 30}{1 + \tan 45 \cdot \tan 30}$ $= \frac{\sqrt{3} - 1}{\sqrt{3} + 1}$ $\tan 15 + \cot 15 = \frac{\sqrt{3} - 1}{\sqrt{3} + 1} + \frac{\sqrt{3} + 1}{\sqrt{3} - 1}$ $= 4$	2 2 2 1	7	7
IX	i) $\lim_{x \rightarrow 2} \frac{x^5 - 2^5}{x - 2} \Big \lim_{x \rightarrow 2} \frac{x^3 - 2^3}{x - 2}$ $= \frac{5 \cdot 2^4}{3 \cdot 2^2} = 20/3$ ii) $\frac{-3 \cdot 2^2 + 5}{2^2 - 2} = \frac{17}{2}$	2 2 2	5 2	7
X	i) $\frac{dy}{dx} = x^2 \cdot \frac{d}{dx} \log x + \log x \cdot \frac{d}{dx} (x^2)$ $= x^2 \cdot \frac{1}{x} + \log x \cdot 2x$ ii) $\frac{dy}{dx} = \frac{(x + \sin x) \cdot \frac{d}{dx} \cos x - \cos x \cdot \frac{d}{dx} (x + \sin x)}{(x + \sin x)^2}$ $= \frac{(x + \sin x) \cdot (-\sin x) - \cos x (1 + \cos x)}{(x + \sin x)^2}$	1 2 1 3	3 4	7
XI	i) $= \frac{2}{2} \lim_{x \rightarrow 0} \frac{3 \sin 2x \cdot \cos x}{5x}$ $= \frac{6}{5} \lim_{x \rightarrow 0} \frac{\sin 2x \cdot \cos x}{2x}$ $= \frac{6}{5} \cdot \lim_{x \rightarrow 0} \frac{\sin 2x}{2x} \cdot \lim_{x \rightarrow 0} \cos x = 6/5$	1 1 2	4	7

	$\text{ii) } \lim_{x \rightarrow 1} \frac{x-1}{(x+1)(x-1)}$ $= \lim_{x \rightarrow 1} \frac{1}{x+1} = \frac{1}{1+1} = \frac{1}{2}$	1 12	3	
XII	$\frac{d}{dx} \left(\frac{x}{\cos x} \right) = \frac{\cos x \cdot 0 - 1(\sin x)}{\cos^2 x} = \frac{-\sec x \cdot \tan x}{1}$ $\frac{d}{dx} \left(\frac{x}{\sin x} \right) = \frac{\sin x \cdot 0 - \cos x}{\sin^2 x} = \frac{-\csc x \cdot \cot x}{1}$	4 3	4 3	7
XIII	$\text{i) } y' = (x^2+1)^{10} \cdot \frac{d}{dx} \sec 5x + \sec 5x \cdot \frac{d}{dx} (x^2+1)^{10}$ $= (x^2+1)^{10} \cdot \sec 5x \cdot \tan 5x \cdot 5 + \sec 5x \cdot 10(x^2+1)^9 \cdot 2x$ $\text{ii) } y' = \frac{x \cdot \frac{d}{dx} \sin(\log x) - \sin(\log x) \cdot \frac{d}{dx} x}{x^2}$ $= \frac{x \cdot \cos(\log x) \cdot \frac{1}{x} - \sin(\log x) \cdot 1}{x^2}$	1 3 1 2	4 3	7
XIV	$\text{ii) } y' = a \cos x - b \sin x$ $y'' = -a \sin x - b \cos x$ $y'' = -(a \sin x + b \cos x)$ $y'' = -y$ $y'' + y = 0$	3 1 1 1	4	7
	$\text{i) } \frac{dx}{d\theta} = a \sec \theta \cdot \tan \theta$ $\frac{dy}{d\theta} = b \sec^2 \theta$ $\frac{dy}{dx} = \frac{b}{a} \cos \theta$	1 1 1	3	