

## Scoring Indicators

1002

## Question Paper Set 2

## COURSE NAME

| Q No  | Scoring Indicators   | Split score                    | Sub Total | Total score |
|-------|--|--------------------------------|-----------|-------------|
|       | <b>PART A</b>  |                                |           | <b>9</b>    |
| I. 1  | $1+i$  | 1                              | 1         |             |
| I. 2  | $slope = 3/2$  | 1                              | 1         |             |
| I. 3  | $\sin 90 = 1, \cos 0 = 1, \text{ans: } 1$  | 1                              | 1         |             |
| I. 4  | $\sin 135 = \sin 45 = \frac{1}{\sqrt{2}}$  | 1                              | 1         |             |
| I. 5  | $\frac{2 \tan A}{1 + \tan^2 A}$  | 1                              | 1         |             |
| I. 6  | 1  | 1                              | 1         |             |
| I. 7  | $e^x - \frac{1}{x}$  | 1                              | 1         |             |
| I. 8  | $-2x$  | 1                              | 1         |             |
| I. 9  | $y' = 1/x$<br>$y'' = -1/x^2$   | $\frac{1}{2}$<br>$\frac{1}{2}$ | 1         |             |
|       | <b>PART B</b>  |                                |           | <b>24</b>   |
| II. 1 | Conjugate = $3 - i$<br>Ans: 10   | 1<br>2                         | 3         |             |
| II. 2 | Formula and substitution<br>$b = 9/5$<br>ans: $\frac{x}{3} + \frac{5y}{9} = 1$         | 1<br>1<br>1                    | 3         |             |
| II. 3 | Relation between sec and tan<br>$\tan \theta = \sqrt{3}$<br>$\cot \theta = 1/\sqrt{3}$ | 1<br>1<br>1                    | 3         |             |
| II. 4 | $\tan (A + B) = -3$<br>$\tan (A - B) = 1/3$  | 1.5<br>1.5                     | 3         |             |

|        |   |                                       |   |  |
|--------|---|---------------------------------------|---|--|
| II. 5  | Expansion of $(a + b)^2$<br>$\sin^2 A + \cos^2 A = 1$<br>$2 \sin A \cos A = \sin 2A$  | 1<br>1<br>1                           | 3 |  |
| II. 6  | Write $\tan \theta = \frac{\sin \theta}{\cos \theta}$<br>$\lim_{\theta \rightarrow 0} \frac{\sin \theta}{\theta} = 1$ & $\lim_{\theta \rightarrow 0} \cos \theta = 1$<br>Ans: 1           | $\frac{1}{2}$<br>1+1<br>$\frac{1}{2}$ | 3 |  |
| II. 7  | $\frac{d}{dx}(x \sin^{-1} x) = x \frac{d}{dx}(\sin^{-1} x) + \sin^{-1} x \frac{d}{dx} x$<br>$\frac{d(x)}{dx} = 1$ & $\frac{d}{dx}(\sin^{-1} x) = \frac{1}{\sqrt{1-x^2}}$ and substitution | 1<br>2                                | 3 |  |
| II. 8  | $\frac{dx}{dt} = 6t^2$<br>$\frac{dy}{dt} = 8t$<br>Ans: $\frac{4}{3t}$   | 1<br>1<br>1                           | 3 |  |
| II.9   | $3x^2 + 3y^2 \frac{dy}{dx} = 3$<br>Ans: $\frac{1-x^2}{y^2}$   | 2<br>1                                | 3 |  |
| II. 10 | $y' = \cos x - \sin x$<br>$y'' = -\sin x - \cos x$<br>$y'' + y = 0$   | 1<br>1<br>1                           | 3 |  |

| PART C |  |             |   | 42 |
|--------|--|-------------|---|----|
| III    | i) Expansion & substitute $i^2 = -1$<br>Answer = $5 + 12i$   | 3<br>1      | 4 | 7  |
|        | ii) modulus = 5<br>amplitude = $\tan^{-1}(-\frac{4}{3})$   | 1<br>2      | 3 |    |
| IV     | i) equation of parallel line<br>Substitute (3, -2) and finding $k = -11$<br>Ans: $3x - y - 11 = 0$ | 2<br>1<br>1 | 4 | 7  |
|        | ii) $4 - x = x - 7$<br>$x = 11/2$<br>$y = -3/2$  | 1<br>1<br>1 | 3 |    |

|      |  |                       |   |   |
|------|--|-----------------------|---|---|
| V    | Expansion of the first product & substitute $i^2 = -1$<br>Answer = $4 + 3i$<br>Expansion of the second product & substitute $i^2 = -1$<br>Ans: $5 - 5i$<br>Final Ans: 4                  | 2<br>1<br>2<br>1<br>1 | 7 |   |
| VI   | i) slope of first line = 1 and slope of second line = $-\sqrt{3}$<br>$\tan \theta = \frac{1 + \sqrt{3}}{1 - \sqrt{3}}$<br>Answer: $\theta = \tan^{-1} \frac{1 + \sqrt{3}}{1 - \sqrt{3}}$ | 1<br>2<br>1           | 4 | 7 |
|      | ii) $m = 1$<br>substitution in the formula of point slope form<br>answer: $y = x - 7$  | 1<br>1<br>1           | 3 |   |
| VII  | i) Third side = 3<br>$\sin \theta = 3/5$<br>$\tan \theta = -3/4$<br>$\operatorname{Cosec} \theta = 5/3, \sec \theta = -5/4$ and $\cot \theta = -4/3$                                     | 1<br>1<br>1<br>2      | 5 | 7 |
|      | $1 + \cos 2A = 2\cos^2 A$<br>$\sin 2A = 2 \sin A \cos A$ and ans: $\cot A$   | 1<br>1                | 2 |   |
| VIII | i) $\sin(A + B) = \sin A \cos B + \cos A \sin B$<br>$\sin(A - B) = \sin A \cos B - \cos A \sin B$<br>Final answer  | 1<br>1<br>1           | 3 | 7 |
|      | ii) $\sin 3x = 3 \sin x - 4 \sin^3 x$<br>$\cos 3x = 4 \cos^3 x - 3 \cos x$<br>Final answer   | 1<br>1<br>2           | 4 |   |
| IX   | i) dividing the numerator and denominator by $x$ and simplification<br>use of trigonometric limit $\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$<br>ans: $1/2$                            | 1<br>1<br>1           | 3 | 7 |
|      | ii) dividing numerator and denominator by $(x - 3)$<br>apply the algebraic limit numerator and denominator<br>final answer: $9/2$  | 1<br>2<br>1           | 4 |   |
| X    | i) write $\tan x = \sin x / \cos x$ and apply quotient rule<br>$\frac{d}{dx} \sin x = \cos x, \frac{d}{dx} \cos x = -\sin x$<br>ans: $\sec^2 x$  | 2<br>1<br>2           | 5 | 7 |

|      |  |                 |   |   |
|------|--|-----------------|---|---|
|      |  | 1               |   |   |
|      | $\text{ii) } \frac{d}{dx}(x^3) = 3x^2, \frac{d}{dx}(\sqrt{x}) = \frac{1}{2\sqrt{x}} \text{ and } \frac{d}{dx}(5) = 0$ $\text{ans: } 3x^2 - \frac{3}{2\sqrt{x}}$  | 1               | 2 |   |
| XI   | $\text{factorisation of numerator} = (x - 3)(x - 2)$ $\text{factorisation of denominator} = (x + 3)(x - 2)$ $\text{answer: } -1/5$   | 1.5<br>1.5<br>1 | 4 | 7 |
|      | $\text{Multiplying numerator and denominator by 3}$ $\lim_{3\theta \rightarrow 0} \frac{\sin 3\theta}{3\theta} = 1 \& \lim_{\theta \rightarrow 0} \cos \theta = 1$ $\text{Ans: } 3$  | 1<br>1<br>1     | 3 |   |
| XII  | $\text{i) } \frac{d}{dx} \left( \frac{x+1}{x-1} \right) = \frac{(x-1) \frac{d}{dx}(x+1) - (x+1) \frac{d}{dx}(x-1)}{(x-1)^2}$ $\frac{d}{dx}(x+1) = 1, \frac{d}{dx}(x-1) = 1$ $\text{ans: } \frac{-2}{(x-1)^2}$  | 2<br>1<br>1     | 4 | 7 |
|      | $\text{ii) } \frac{d}{dx}(x \operatorname{cosec} x) = x \frac{d}{dx}(\operatorname{cosec} x) + \operatorname{cosec} x \frac{d}{dx}(x)$ $\frac{d}{dx}(\operatorname{cosec} x) = -\operatorname{cosec} x \cot x \& \frac{d}{dx}(x) = 1$ $\text{ans: } -x \operatorname{cosec} x \cot x + \operatorname{cosec} x$ | 1<br>1<br>1     | 3 |   |
| XIII | $\frac{d}{dx}(e^{2x} \sin 2x) = e^{2x} \frac{d}{dx}(\sin 2x) + \sin 2x \frac{d}{dx}(e^{2x})$ $\frac{d}{dx}(e^{2x}) = 2e^{2x} \text{ and } \frac{d}{dx}(\sin 2x) = 2 \cos 2x$ $\text{Final answer: } 2e^{2x} \sin 2x + 2e^{2x} \cos 2x$   | 1<br>2<br>1     | 4 | 7 |
|      | $\text{ii) } \frac{d}{dx} \left( \frac{\sin(\log x)}{x} \right) = \frac{x \frac{d}{dx}(\sin(\log x)) - \sin(\log x) \frac{d(x)}{dx}}{x^2}$ $\frac{d}{dx}(\sin(\log x)) = \frac{\cos(\log x)}{x} \text{ and } \frac{d(x)}{dx} = 1$ $\text{Ans: } \frac{\cos(\log x) - \sin(\log x)}{x^2}$                       | 1<br>1<br>1     | 3 |   |
| XIV  | $2x + x \frac{dy}{dx} + y + 2y \frac{dy}{dx} = 0$ $\text{Ans: } \frac{-2x-y}{x+2y}$  | 2<br>2          | 4 | 7 |
|      | $\frac{dx}{dt} = 1 - \cos t$ $\frac{dy}{dt} = \sin t$ $\text{Ans: } \frac{\sin t}{1 - \cos t}$   | 1<br>1<br>1     | 3 |   |