

First Term Unit Test 2017-18

Class: XII (MATHS)

Marking Scheme

Section A

1. If $A = \begin{bmatrix} 4 & 8 \\ 8 & 14 \end{bmatrix}$ 1 Mark

2. $\frac{1}{x \log_e 10}$ 1 Mark

Section B

3. (i) Correct answer 1 Mark

(ii) Correct answer 1 Mark

4. $\tan^{-1} \left(\frac{1 - \tan x}{1 + \tan x} \right)$ ½ Mark

$= \tan^{-1} \left\{ \tan \left(\frac{\pi}{4} - x \right) \right\}$ 1 Mark

$= \frac{\pi}{4} - x$ ½ Mark

5. $\begin{bmatrix} 2 & -2 \\ -2 & 2 \end{bmatrix} = k \begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$ 1 Mark

Or $2 \begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix} = k \begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$ ½ Mark

$\therefore k = 2$ ½ Mark

6. $\frac{1}{2} \begin{vmatrix} k & 0 & 1 \\ 4 & 0 & 1 \\ 0 & 2 & 1 \end{vmatrix} = \pm 4$ 1 Mark

$k = 0$ or 8 1 Mark

7. For continuity, $LHL = RHL = f(1)$ ½ Mark

$LHL = 4$ ½ Mark

$RHL = 4$ ½ Mark

$\therefore k = 4$ ½ Mark

Section C

8. Correct proof of one – one: 2 Marks

Correct proof of onto: 2 Marks

9. $\tan^{-1} \left[\frac{\frac{x-1}{x-2} + \frac{x+1}{x+2}}{1 - \frac{x-1}{x-2} * \frac{x+1}{x+2}} \right] = \frac{\pi}{4}$ 1 Mark

$\Rightarrow 2x^2 = 1$ 2 Mark

$\therefore x = \pm \frac{1}{\sqrt{2}}$ 1 Mark

10. $A^2 = \begin{bmatrix} -5 & -18 \\ 18 & 7 \end{bmatrix}$ 1 Mark

$6A = \begin{bmatrix} 12 & -18 \\ 18 & 24 \end{bmatrix}$ ½ Mark

$17I_2 = \begin{bmatrix} 17 & 0 \\ 0 & 17 \end{bmatrix}$ ½ Mark

Now correct Proof $A^2 - 6A + 17I_2 = 0$ 2 Marks

11. Applying $R_1 \rightarrow R_1 + R_2 + R_3$ 1 Mark

Taking $(5x + 4)$ common from R_1 ½ Mark

Applying, $C_2 \rightarrow C_2 - C_1; C_3 \rightarrow C_3 - C_1$ 1 Mark

Correct expansion ½ Mark

Correct proof of result 1 Mark

12. $x \log y = y - x$ ½ Mark

$x = \frac{y}{(1 + \log y)}$ 1 Mark

$\frac{dx}{dy} = \frac{\log y}{(1 + \log y)^2}$ 1½ Mark

$\therefore \frac{dy}{dx} = \frac{(1 + \log y)^2}{\log y}$ 1 Mark

Section D

13. Correct proof of commutative property: 2 Mark
 Correct proof of associative property: 2 Mark
 Correct proof of no identity element: 2 Mark

OR

Let $\sin^{-1} x = A$, $\sin^{-1} y = B$, $\sin^{-1} z = C$ ½ Mark

$2A + 2B + 2C = 2\pi$ 1 Mark

$\sin 2A + \sin 2B + \sin 2C = 4 \sin A \sin B \sin C$ 1 Mark

$2 \sin A \cos A + 2 \sin B \cos B + 2 \sin C \cos C = 4 \sin A \sin B \sin C$ 1 Mark

$2x\sqrt{1-x^2} + 2y\sqrt{1-y^2} + 2z\sqrt{1-z^2} = 4xyz$ 1½ Mark

$x\sqrt{1-x^2} + y\sqrt{1-y^2} + z\sqrt{1-z^2} = 2xyz$ 1 Mark

14. $2u + 3v + 10w = 4$, $4u - 6v + 5w = 1$, $6u + 9v - 20w = 2$ ½ Mark

$|A| = 1200 \neq 0$ 1 Mark

$$\text{Adj } A = \begin{bmatrix} 75 & 150 & 75 \\ 110 & -100 & 30 \\ 72 & 0 & -24 \end{bmatrix}$$
 1½ Mark

$A^{-1} = \frac{\text{Adj } A}{|A|}$ ½ Mark

$X = A^{-1} B$ ½ Mark

$$\begin{bmatrix} u \\ v \\ w \end{bmatrix} = \begin{bmatrix} 1/2 \\ 1/3 \\ 1/5 \end{bmatrix}$$
 1 Mark

$\therefore x = 2, y = 3, z = 5$ 1 Mark

15. $f(0) = 0$ ½ Mark

Correct evaluation: LHL = 0 2 Marks

Correct evaluation: RHL = 0 2 Marks

For continuity $f(a) = \text{LHL} = \text{RHL}$ 1 Mark

$\therefore f(x)$ is continuous at $x = 0$ ½ Mark

OR

Correct $\frac{dx}{dt}$ 1 Mark

Correct $\frac{dy}{dt}$ 1 Mark

Correct $\frac{d^2x}{dt^2}$ 1 Mark

Correct $\frac{d^2y}{dt^2}$ 1 Mark

Correct $\frac{d^2y}{dx^2}$ 2 Marks