SECOND TERMINAL MATHEMATICS-VHSE(II)
KEY

Quest. No.	Scoring Indicators	Split Score	Total Score
1	(a). $(fog)(xP) = \frac{1}{x}$ (b). $f^{-1}(x) = \frac{3x-3}{x-1}$ $g^{-1}(x) = \frac{x-3}{x-1}$ (c). $(gof)(x) + = -x + 4$	1 1+1 2	5
2	(a). $\pi/6$ (b). $= \tan^{-1}\tan\left(\frac{\pi}{4}+\frac{x}{2}\right) = \frac{\pi}{4}+\frac{x}{2}$ (c). Give marks fro correct steps $\tan^{-1}\left[\frac{\sin\left(\pi/2 + x\right)}{1+\cos\left(\pi/2 + x\right)}\right] = \tan^{-1}\left[\frac{2\sin\left(\frac{\pi}{4}+\frac{x}{2}\right)\cos\left(\frac{\pi}{4}+\frac{x}{2}\right)}{2\cos^2\left(\frac{\pi}{4}+\frac{x}{2}\right)}\right]$	1 2	5
3	(a). $A^{-1}\begin{bmatrix} \frac{3}{5} & \frac{1}{5} \\ \frac{-2}{5} & \frac{1}{5} \end{bmatrix}$ (b). $4I + 5A^{-1} = 0$ $A - A^{-1} = \frac{1}{5}(4I - A)$ (c). $adjA = \begin{bmatrix} 3 & 1 \\ -2 & 1 \end{bmatrix}$ $A^{-1} = \frac{adjA}{\lvert A \rvert}$	3 2 2+1	8

4	$\Delta = \begin{vmatrix} x & x & x \\ 5x & 4x & 2x \\ 10x & 8x & 3x \end{vmatrix} + \begin{vmatrix} y & x & x \\ 4y & 4x & 2x \\ 8y & 8x & 3x \end{vmatrix}$ Apply $C_2 \to C_2 \to C_1$, , is the first determinats $\Delta = \begin{vmatrix} x & 0 & 0 \\ 5x & -x & -3x \\ 10x & -2x & -7x \end{vmatrix} + x^2 y \begin{vmatrix} 1 & 1 & 1 \\ 4 & 4 & 2 \\ 8 & 8 & 3 \end{vmatrix}$ $= x \begin{vmatrix} -x & -3x \\ -2x & -7x \end{vmatrix} + x^2 y \times 0 = x\left(7x^2 - 6x^2\right) = x + x^2 = x^3$	2 2 2	6
5	(a). $\lim_{x \to 3} f(3) = 3a + b$ $\lim_{x \to 3-} f(x) = 1$ $3a + b = 1 \to (1)$ $\lim_{x \to 5-} f(x) = 5a + b$ $\lim_{x \to 5} f(x) = 7$ $5a + b = 7 \to (2)$ Solving (1) and (2) a=3, b=-8 $\frac{dy}{dx} = \frac{x+y}{x+y}\left[1 + \frac{dy}{dx}\right] \frac{dy}{dx} = \frac{y}{x}$	2 1 2	5
6	$x = \frac{\sin y}{\sin(a+y)}$ $\frac{dx}{dy} = \frac{\sin(a+b)Cosy - SinyCos(a+y)}{Sin^2(a+y)} = \frac{\sin a}{Sin^2(a+y)}$	1 2	3
7	(a). $\int \log x dx = x \log x - x$ (b). $\frac{1}{x}$ (c). $\log x \log(\log x) - \log x$ (d).	4	4
8	$4 \log x + 3 \log y = 7og(x+y)$	1 2	3

9	$Putt = \tan\varphi$ $x = \sin^{-1}1\left(\frac{2\tan Q}{1+\tan^2 Q}\right) y = \tan^{-1}1\left(\frac{2\tan Q}{1-\tan^2 Q}\right)$ $= \sin^{-1}1\sin 2Q \quad y = \tan^{-1}1\tan 2Q$ $= 2Q = 2\tan^{-1}1 = 2Q = 2\tan^{-1}1$ $x = y$	1 2 2	5
10	(a). $x^2 + y^2 = 25$ $\frac{dy}{dt} = {}^{-}8/3\ m/s$ OR (b). $a = 120$ (c). $x + y = 24 \quad P = xy \qquad y = 12$ (d). $V = (18-2x)^3$ $x = 9$	1 2 3 1 2 1 2	6
11	(a). $\tan x/2 + C$ (b). $\frac{x^4\log x}{4} - \frac{x^4}{16} + C$	2 2	4
12	(a). formula Ans. $\frac{14}{3}$ (b). (i) $\pi/2 \log 1/2$ (ii) (iii) $\pi/4$	1 2 3 2+3	3 8
13	(i) (ii) $I.F = \frac{1}{x}$ (iii) $So \ln isy = \log x + \log x + 1 = Cx$	1 1+2	4

14	(i) $\vec{a}+\vec{b}=4\hat{i}+\hat{j}-\hat{k}, \vec{a}.\vec{b}=-5$ (ii) Unit Vector = $\frac{\hat{i}-11\hat{j}-7\hat{k}}{\sqrt{17}}$ (iii) $\left(\vec{a}+\vec{b}\right)-\left(\vec{a}-\vec{b}\right)=0$ (iv).	3 1+2 2	8
15	$7x+3y-z=17$ OR Shortest distance = $\frac{3}{\sqrt{19}}$	3 3	3

$\vec{a}\times\vec{b}=-11\hat{j}-7\hat{k}$