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Pre-Board-I Examination-2025-26

MARKING SCHEME SET 2 **Code: KVS(DR)/2025/SU**

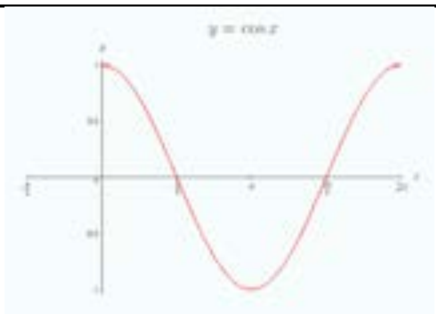
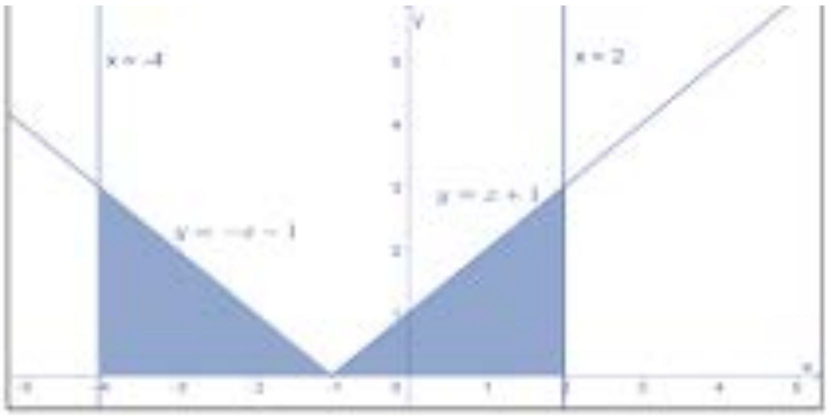
Class- XII **Subject: Mathematics (041)**

Time: 3 Hours **Maximum Marks: 80**

SECTION: A (Solution of MCQs of 1 Mark each)

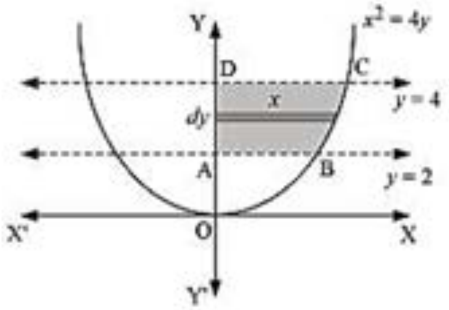
1.	(a)	Reflective relation
2	(a)	- A
3.	(d)	$[x - 2\ 5 + y][0\ 1\ 1\ 0] = O$ $\Rightarrow [5 + y\ x - 2] = O = [0\ 0]$ On comparing, $y = -5,\ x = 2,$ so $x + y = -3$
4.	(b)	$A^{-1} = [3\ 1\ 2\ 0\ 1\ 2\ 0\ 2\ 1],\ \Rightarrow \lvert A^{-1}\rvert = -9$ Thus, $\lvert A\rvert = \frac{-1}{9}$. So, $\lvert adjA\rvert = \lvert A\rvert^2 = \frac{1}{81}$
5.	(d)	$\lvert 2A^T\rvert = 2^3\lvert A^T\rvert = 8\ \lvert A\rvert = 24$
6.	(d)	(d) $\lvert -AA'\rvert$ = - $\lvert A\rvert\lvert A'\rvert$=-(-5)(-5)= -25
7.	(a)	Continuous function as LHL = RHL = f(4) = 11 But not differentiable as LHD ≠ RHD (LHD = 2, RHD = 8)
8.	(d)	$\frac{dy}{dt} = 3cos^2 t.(-\sin sin\,t),\ \ \frac{dx}{dt} = 3sin^2 t.(\cos cos\,t)$ $\frac{dy}{dx} = \frac{-3cos^2 t.sinsin\,t}{3sin^2 t.coscos\,t} = -\cot cot\,t$
9.	(c)	(0, e)
10.	(d)	(d) 1 { as a= $\frac{7}{8}$, $b = \frac{-1}{8}$}
11.	(b)	

		$(b)\ \frac{1}{2}\sin^{-1}\left(\frac{8x-9}{9}\right)+C$
12.	(c)	(c) 0 { as m=2 , n=3}
13	(c)	(c) $\pm\frac{1}{\sqrt{3}}$ { As modulus of unit vector is 1}
14.	(a)	$(a)\frac{5}{3}\sqrt{6}$ { as Projection of $\vec{a}\ on\ \vec{b}$ = $\frac{\vec{a}\cdot\vec{b}}{\lvert b\rvert}$ }
15.	(b)	(b) 2 { as $l^2+m^2+n^2=1$}
16.	(b)	(b) (2, 5)
17.	(d)	(d) q = 3p
18.	(a)	(a) 0.42
19	(a)	(a) **Both (A) and (R) are true and (R) is the correct explanation o**
20	(c)	**(c) (A) is true but (R) is false.**
21(a) OR		0 ≤ $2x^2 \le 1$ 1 $\frac{-1}{\sqrt{2}}$ ≤ x ≤ $\frac{1}{\sqrt{2}}$ 1
21(b)		$\tan^{-1}\sqrt{3}-\left(\pi-\cot^{-1}\sqrt{3}\right)$ 1 $=\frac{\pi}{2}-\pi=-\frac{\pi}{2}$ 1
22.		If the function f(x) is a continuous function, then $f(2)=f\left(2^{+}\right)\ and\ f\left(10^{-}\right)=f(10)$ I: $f(2)=f\left(2^{+}\right)\Rightarrow 5=2a+b......(i)$ 1/2 II: $f\left(10^{-}\right)=f(10)\Rightarrow 10a+b=21.........(ii)$ 1/2 from (i) and (ii), we get a=2, b=1 1
23.		

		$e^x + e^y \frac{dy}{dx} = e^{(x+y)}\left[1+\frac{dy}{dx}\right]$ Getting $(e^y - e^{x+y})\frac{dy}{dx} = e^{x+y} - e^x$, $\frac{dy}{dx} = \frac{e^{x+y}-e^x}{e^y - e^{x+y}}$	1 + 1
24(a) OR		 **Correct figure** $\frac{1}{2}$ $= \int_0^{2\pi} cosx = \int_0^{\frac{\pi}{2}} cosx + \int_{\frac{\pi}{2}}^{\frac{3\pi}{2}} cosx + \int_{\frac{3\pi}{2}}^{2\pi} cosx$ ½ Correct integration ½ Correct Answer 1/2	
24(b)		 $\int_{-4}^{2}\lvert x+1\rvert dx = \int_{-4}^{-1}(-x-1)\,dx + \int_{-1}^{2}(x+1)\,dx$ $= -\frac{(x+1)^2}{2}\Big]_{-4}^{-1} + \frac{(x+1)^2}{2}\Big]_{-1}^{2}$	
25		$\lvert\vec{a}-\vec{b}\rvert^2 = \lvert\vec{a}\rvert^2 + \lvert\vec{b}\rvert^2 - 2\lvert\vec{a}\rvert\lvert\vec{b}\rvert \cos 60^\circ$	1

		$\left\|\vec{a}-\vec{b}\right\| = \sqrt{19}$	1
		SECTION -C	
26(a) OR		$given\ x\sqrt{1+y} = -y\sqrt{1+x}$ squaring on both side $x^2(1+y) = y^2(1+x)$ $x^2 + x^2y = y^2 + y^2x$ $x^2 + x^2y - y^2 - y^2x = 0$ $x^2 - y^2 + x^2y - y^2x = 0$ $(x-y)(x+y) + xy(x-y) = 0$ $(x-y)(x+y+xy) = 0 \quad y = x, y = \frac{-x}{1+x}$ $\frac{dy}{dx} \neq 1, \frac{dy}{dx} = \frac{-1}{(1+x)^2}$	1
26(b)		$y = \sin(m\sin^{-1}x) \quad \Rightarrow \frac{dy}{dx} = \cos(m\sin^{-1}x)\frac{m}{\sqrt{1-x^2}}$ $\Rightarrow \sqrt{1-x^2}\frac{dy}{dx} = m\cos(m\sin^{-1}x)$ Again diff.w.r.t.x, $\sqrt{1-x^2}\frac{d^2y}{dx^2} + \frac{dy}{dx}\left(\frac{-2x}{\sqrt{1-x^2}}\right) = -m\sin(m\sin^{-1}x)\frac{m}{\sqrt{1-x^2}}$ $\Rightarrow (1-x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} + m^2y = 0$	
27(a)			

OR

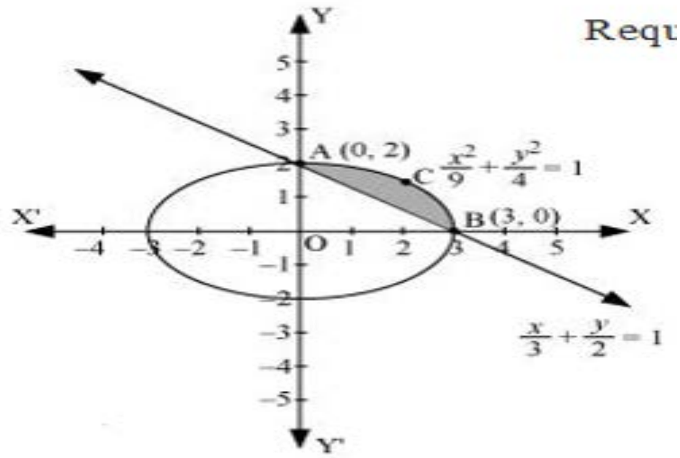


correct fig

Area of ABCD = $\int_2^4 x$ dy = $\int_2^4 2\sqrt{y}$ dy 1

$= 2\left[\frac{y^{\frac{3}{2}}}{\frac{3}{2}}\right]_2^4 = \frac{4}{3}(8 - 2\sqrt{2})$ **sq units** **1**

27(b)



Correct fig

Required area = $\int_0^3 2\sqrt{(1 - \frac{x^2}{9})}\,dx$ - $\int_0^3 2(1 - \frac{x}{3})\,dx$

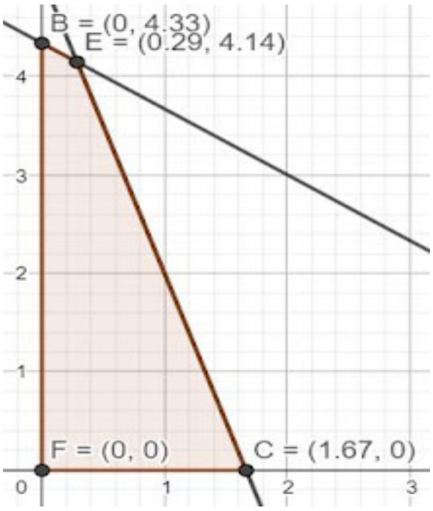
= 2/3 $\int_0^3 \sqrt{(9 - x^2)}\,dx$ - 2/3 $\int_0^3 2(3 - x)\,dx$ 1

= 2/3 $\left[\frac{x}{2}\sqrt{9 - x^2} + \frac{9}{2}\left(\frac{x}{3}\right)\right]_0^3$ – 2/3 $\left[3x - \frac{x^2}{2}\right]_0^3$

= 2/3 x 9/4 (π-2) = **3/2 (π-2) sq units**

28.

		$(\vec{a}-\vec{d}) \times (\vec{b}-\vec{c})$ $= \vec{a}\times\vec{b} - \vec{a}\times\vec{c} - \vec{d}\times\vec{b} + \vec{d}\times\vec{c}$ $= \vec{a}\times\vec{b} - \vec{a}\times\vec{c} + \vec{b}\times\vec{d} - \vec{c}\times\vec{d}$ $= 0$ ($\because$ *given* $\vec{a}\times\vec{b} = \vec{c}\times\vec{d}$ & $\vec{a}\times\vec{c} = \vec{b}\times\vec{d}$) 1 $\Rightarrow \vec{a}-\vec{d} \parallel \vec{b}-\vec{c}$	
29(a)		f’(x) = 2x + a for increasing f’(x) > 0 least value of a such that $x > \frac{-a}{2}$, when x ∈ (1,2). Thus, the least value of a for f to be increasing on (1,2) is given by, $\frac{-a}{2} = 1 \Rightarrow a = -2$	1
OR 29(b)		$f(x) = x^4 - 62x^2 + ax + 9$ $f'(x) = 4x^3 - 124x + a$ As, function attains maximum value at x=1. So, f ‘(1) = 0 $4(1)^3 - 124 + a = 0 \Rightarrow a = 120$	1 1
30		2x + 3y≤ 13 represents half plane containing origin 3x + y ≤ 5 represents half plane containing the origin The feasible region determined by the system of given constraints is O(	



correct graph $1\frac{1}{2}$

Corner Points	Value of Z = 9 x + 3y
O(0, 0)	0
C(1.67,0)	15
E(0.29,4.14)	15
B(0, 4.33)	13

Correct table

The maximum value of Z is 15 at C(1.67,0) and E(0.29,4.14) $\frac{1}{2}$

31(a). Let X – Number of tails, X = 0, 1, 2

P(H) = $\frac{3}{4}$, P(T) = $\frac{1}{4}$

Probability distribution is

X	0	1	2
P(X)	$\frac{9}{16}$	$\frac{3}{8}$	$\frac{1}{16}$

Mean E(x) = $\frac{1}{2}$

OR 31(b)

A: A solve the problem
B: B solve the problem

$P(\text{problem is solved}) = P(A \cup B) = \frac{2}{3}$

$\because$ A and B are independent $P(A \cap B) = P(A).P(B)$

P(exactly one solve the problem) = $P(A \cap \overline{B}) + P(\overline{A} \cap B) = \frac{1}{2}.\frac{2}{3} + \frac{1}{2}.\frac{1}{3} = \frac{1}{2}$

32

To multiply B and A to show that BA= 6I
Given system can be represented as

$$\begin{bmatrix} 1 & -1 & 0 \\ 2 & 3 & 4 \\ 0 & 1 & 2 \end{bmatrix}\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 3 \\ 17 \\ 7 \end{bmatrix} \Rightarrow AX = C$$

$\Rightarrow X = A^{-1}C$

Since BA= 6I we have $A^{-1} = \frac{1}{6}B$
X = 1/6 BC

X= $\frac{1}{6}[2\,2\ -4\ -4\,2\ -4\,2\ -1\,5][3\,17\,7],\ X = [2\ -1\,4]$

Therefore x = 2, y= -1 and z = 4

33(a)

$Put\ \sin x = t \Rightarrow \cos x\ dx = dt$

$$\therefore I = \int \frac{\cos x}{\sqrt{\sin^2 x - 2\sin x - 3}}dx = \int \frac{dt}{\sqrt{t^2 - 2t - 3}}$$

$$\Rightarrow I = \int \frac{dt}{\sqrt{(t-1)^2 - 2^2}} = \log\left|(t-1) + \sqrt{(t-1)^2 - 2^2}\right| + C$$

$$\Rightarrow I = \log\left|(t-1) + \sqrt{t^2 - 2t - 3}\right| + C = \log\left|(\sin x - 1) + \sqrt{\sin^2 x - 2\sin x - 3}\right| + 3$$

OR

33(b)

I = $\int_0^{\Pi} \frac{x \tan x}{\sec x + \tan x}dx$ ....(1)

I= $\int_0^{\pi} \frac{(\pi - x)\tan(\pi - x)}{\sec(\pi - x) + \tan(\pi - x)}dx$ $\Rightarrow$ I = $\int_0^{\pi} \frac{(\pi - x)\tan x}{\sec x + \tan x}dx$ ------------(2)

Adding (1) & (2)

2I = $\int_0^{\pi} \frac{\pi \tan x}{\sec x + \tan x}dx$ = $\pi \int_0^{\pi} \frac{\tan x}{\sec x + \tan x}dx$

		$= \pi\int_0^{\pi}(\tan x\sec x-\tan^2 x)dx$ $= \pi\int_0^{\pi}(\tan x\sec x-\sec^2 x+1)dx$ I = $\frac{1}{2}\left[\ \pi(\sec x-\tan x+x)\ \right]_0^{\pi}$ $=\frac{1}{2}\pi(\pi-2)$
34(a)		$\cos x\ \frac{dy}{dx}+y=\sin x$ or $\frac{dy}{dx}+\frac{1}{\cos x}y=\frac{\sin x}{\cos x}$ or $\frac{dy}{dx}+\sec x\ y=\tan x$ Comparing with $\frac{dy}{dx}+p\ y=q$ Here $p=\sec x, q=\tan x$ 1 I.F. = $e^{\int \sec x.dx}=e^{\log(\sec x+\tan x)}=\sec x+\tan x$ Multiplying the differential equation both sides by I.F. and integrate to $y(\sec x+\tan x)=\int \tan x(\sec x+\tan x)\,dx$ 1 $y(\sec x+\tan x)=\int(\tan x\sec x+\tan^2 x)\,dx$ $y(\sec x+\tan x)=\int(\tan x\sec x+\sec^2 x-1)\,dx$ $y(\sec x+\tan x)=\sec x+\tan x-x+c$ 1
OR 34(b)		$\sec^2 y(1+x^2)dy+2x\tan y dx=0$ $\Rightarrow \sec^2 y(1+x^2)\,dy=-2x\tan y\,dx$ $\Rightarrow \frac{\sec^2 y}{\tan y}dy=-\frac{2x}{1+x^2}dx$ $\Rightarrow \int\frac{\sec^2 y}{\tan y}dy=-\int\frac{2x}{1+x^2}dx$ $\Rightarrow \log\lvert\tan y\rvert=-\log\lvert 1+x^2\rvert+\log c$

$$\Rightarrow \log|\tan y| = \log\frac{c}{1+x^2} \qquad \Rightarrow \tan y = \frac{c}{1+x^2} \qquad \Rightarrow \tan y\left(1+x^2\right) = c$$

Substituting $y = \frac{\pi}{4}, x = 1$

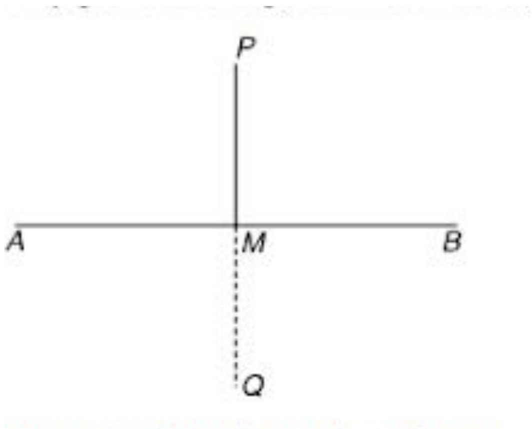
$1(1+1) = c \;\Rightarrow\; c = 2$

Hence particular solution is $\Rightarrow \tan y\left(1+x^2\right) = 2$

1/2

35. Let general points on the line M$(\lambda,\ 2\lambda+1,\ 3\lambda+2)$

d. r. of PM $< \lambda-1, 2\lambda-5, 3\lambda-1 >$ 1



PM is perpendicular to the given line

Finding $\lambda = 1$ 1

Image is Q (1, 0, 7)

Equation of the line PQ is $\frac{x-1}{0} = \frac{y-6}{-6} = \frac{z-3}{4}$

Distance PQ = $2\sqrt{13}$ units 1

36. (i)Traffic flow is not reflexive as $(A, A) \notin R$ (or no major s
connected with itself)
1

(ii) Traffic flow is not transitive as $(A, B) \in R$ *and* $(B, E$
but $(A, E) \notin R$
1

(iii)(a) R = {(A, B), (A, C), (A, D), (B, C), (B, E), (C, E), (
(D, C)}

		1 Domain = $\{A, B, C, D\}$ 1/2 Range = $\{B, C, D, E\}$ 1/2 OR III (b). No, the traffic flow doesn't represent a function has three images. 1+1
37.		(i) $V = \frac{1}{2}\pi r^2 h \Rightarrow h = \frac{2V}{\pi r^2}$ S = $\pi r^2 + \frac{2V(\pi + 2)}{\pi r}$ (ii) $\frac{dS}{dr} = 2\pi r - \frac{2V(\pi+2)}{\pi r^2}$ $For \min \frac{dS}{dr} = 0 \Rightarrow \pi^2 r^3 = V(\pi+2)$ 1 (iii) $\frac{dS}{dr} = 2\pi r - \frac{2V(\pi+2)}{\pi r^2}$ ½ + ½ + $\frac{d^2S}{dr^2} = 2\pi + \frac{4V(\pi+2)}{\pi} \cdot \frac{1}{r^3}$ $= 2\pi + \frac{4\pi^2 r^3}{\pi r^3} = 6\pi > 0$ OR Since $\pi^2 r^3 = V\left(\pi + 2\right)$ $\Rightarrow \pi^2 r^3 = \frac{1}{2}\pi r^2 h\left(\pi + 2\right)$ $\Rightarrow h : 2r = \pi : \pi + 2$ 1+
38.		(i) E_1: production in plant A E_2: production in plant B A: choosing defective tractors

		$P(A/E_1) = \frac{1}{50}$, $P(A/E_2) = \frac{1}{100}$	1+1
		Finding $P(A) = \frac{2}{125}$	
		(ii) Applying Bayes Theorem	1+1
		Getting $P(E_1/A) = \frac{3}{4}$	