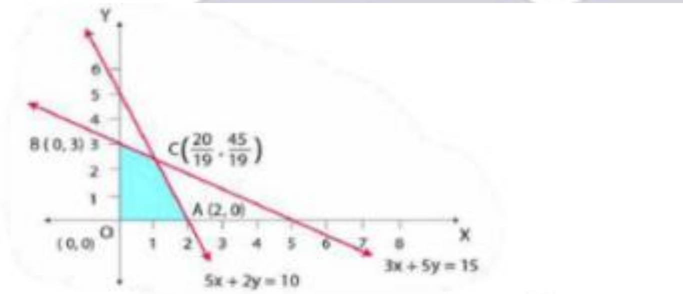
Mock Test 07: Full Syllabus Exam as per CBSE Sample Paper 2025-26

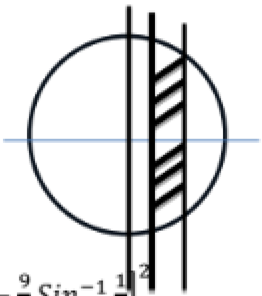
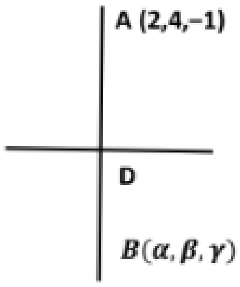
ANSWER KEY

1	(c)-2	
2	(c) parabola	
3	(c) ±6	
4	(d) $\frac{4}{7}$	
5	(b) $\pm\frac{1}{\sqrt{3}}\left(-\hat{\imath}+\hat{\jmath}+\hat{k}\right)$	
6	(b)-24	
7	(b)$\pi/4$	
8	(c)1	
9	(d) 75	
10	(d) 2	
11	(b) a = 5, b = 2	
12	(c) 0	
13	(d) (0, 2)	
14	(b) $\pi/6$	
15	(b)90°	
16	(c) 31/32	
17	(d)8	
18	(b)Constraints	
19	(c) Assertion is correct, reason is incorrect	
20	(a) Both (A) and (R) are true and (R) is the correct explanation of (A).	
	SECTION – B	
21	$\tan^{-1}\left\{2\sin\left(4\cos^{-1}\frac{\sqrt{3}}{2}\right)\right\} = \tan^{-1}\left\{2\sin\left(4\left(\frac{\pi}{6}\right)\right)\right\} = \tan^{-1}\left\{2\sin\left(\frac{2\pi}{3}\right)\right\} =$ $= \tan^{-1}\left\{2\left(\frac{\sqrt{3}}{2}\right)\right\} = \frac{\pi}{3}$ OR $\tan^{-1}(\tan(\pi+\frac{\pi}{6})) = \tan^{-1}(\tan(\frac{\pi}{6})$ $\frac{\pi}{6} \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$	**1** **1** **1** **1**
22	f(x) = $4x^3 - 6x^2 - 72x + 30$ $f'(x) = 12x^2 - 12x - 72$ For critical points $f'(x) = 0$, $12x^2 - 12x - 72 = 0$ 12(x-3)(x+2) = 0 x= -2, x= +3 $(-\infty, -2)$ and $(3, \infty)$ the function is strictly increasing (-2,3) the function is strictly decreasing	**1/2** **1/2** **1/2** **1/2**
23	: We have, $y = \text{cosec}\,(cot^{-1}x)$ $y = \text{cosec}\,(cosec^{-1}\sqrt{1+x^2}) = \sqrt{1+x^2}$ Now, $y = \sqrt{1+x^2}$ $\frac{dy}{dx} = \frac{1}{2}(1+x^2)^{-\frac{1}{2}}\frac{d}{dx}(1+x^2)$ $\frac{dy}{dx} = \frac{1}{2\sqrt{1+x^2}} \times 2x = \frac{x}{\sqrt{1+x^2}}$ $\sqrt{1+x^2}\,\frac{dy}{dx} = x$ $\sqrt{1+x^2}\,\frac{dy}{dx} - x = 0$	**1/2** **1/2** **1/2** ½

24	Given $\overrightarrow{OA} = 2\hat{i} + 3\hat{j} - \hat{k}$ and $\overrightarrow{OB} = 3\hat{i} + 2\hat{j} + \hat{k}$ then $\overrightarrow{AB} = \overrightarrow{OB} - \overrightarrow{OA} = \hat{i} - \hat{j} + 2\hat{k}$ A Unit vector in the direction of $\overrightarrow{AB} = \frac{\overrightarrow{AB}}{\lvert\overrightarrow{AB}\rvert} = \frac{\hat{i} - \hat{j} + 2\hat{k}}{\sqrt{1+1+4}} = \frac{\hat{i}}{\sqrt{6}} - \frac{\hat{j}}{\sqrt{6}} + \frac{2\hat{k}}{\sqrt{6}}$ The vector of magnitude 6 units in the direction of $\overrightarrow{AB} = 6\left(\frac{\hat{i}}{\sqrt{6}} - \frac{\hat{j}}{\sqrt{6}} + \frac{2\hat{k}}{\sqrt{6}}\right)$	**1/2** **1** **1/2**
25	Ans:P(exactly one solve)=P(A∩B'∩C ')+P(A'∩B∩C ')+P(A'∩B'∩C) $= \frac{1}{3}\cdot\frac{5}{7}\cdot\frac{5}{8} + \frac{2}{3}\cdot\frac{2}{7}\cdot\frac{5}{8} + \frac{2}{3}\cdot\frac{5}{7}\cdot\frac{3}{8} = \frac{75}{168}$	**1** **1**
	SECTION – C	
26	$\int_1^4 [\lvert x-1\rvert + \lvert x-2\rvert + \lvert x-3\rvert]\, dx$ $\int_1^4 \lvert x-1\rvert dx + \int_1^4 \lvert x-2\rvert dx + \int_1^4 \lvert x-3\rvert dx$ $= \int_1^4 (x-1)dx + \int_1^2 -(x-2)dx + \int_2^4 (x-2)dx + \int_1^3 -(x-3)\, dx + \int_3^4 (x+3)\, dx$ For calculation $\int_1^4 [\lvert x-1\rvert + \lvert x-2\rvert + \lvert x-3\rvert]\, dx = \frac{19}{2}$	**1/2** **1** **1** **1/2**
27		**1**

	$I = \int \frac{6x+7}{\sqrt{(x-5)(x-4)}}\,dx = \int \frac{6x+7}{\sqrt{x^2-9x+20}}\,dx$ $Let\ 6x+7 = A\frac{d}{dx}(x^2-9x+20)+B$ $6x+7 = A(2x-9)+B \ldots(1)$ *Comparing the x coefficients*: $2A = 6 \Rightarrow A = 3$ *Comparing the constants*: $-9A + B = 7 \Rightarrow B = 34$ $: I = \int \frac{6x+7}{\sqrt{(x-5)(x-4)}}\,dx = \int \frac{3(2x-9)+34}{\sqrt{x^2-9x+20}}\,dx$ $=3\int \frac{2x-9}{\sqrt{x^2-9x+20}}\,dx + 34\int \frac{1}{\sqrt{x^2-9x+20}}\,dx$ $I_1 = 3\int \frac{2x-9}{\sqrt{x^2-9x+20}}\,dx = \frac{6}{2}\int \frac{2x-9}{\sqrt{x^2-9x+20}}\,dx = 6\sqrt{x^2-9x+20}$ $I_2 = 34\int \frac{1}{\sqrt{x^2-9x+20}}\,dx = 34\int \frac{1}{\sqrt{\left(x-\frac{9}{2}\right)^2-\frac{81}{4}+20}}\,dx$ $I_2 = 34\int \frac{1}{\sqrt{\left(x-\frac{9}{2}\right)^2-\frac{1}{4}}}\,dx = 34\log\left\lvert x-\frac{9}{2}+\sqrt{x^2-9x+20}\right\rvert + c$ $I = 6\sqrt{x^2-9x+20}+34\log\left\lvert x-\frac{9}{2}+\sqrt{x^2-9x+20}\right\rvert + c$	1 1
28	 Corner points (0,0), (0,3) , (2,0), (20/19 , 45/19) Max. of Z = 235/19, at (20/19 , 45/19)	2 1/2 1/2
29	Given $\vec{a} = 2\hat{i}+2\hat{j}+3\hat{k}$ $\quad \vec{b} = -\hat{i}+2\hat{j}+\hat{k}$ $\quad \vec{c} = 3\hat{i}+\hat{j}$ $\vec{a}+\lambda\vec{b} = 2\hat{i}+2\hat{j}+3\hat{k}+\lambda(-\hat{i}+2\hat{j}+\hat{k}) = (2-\lambda)\hat{i}+(2+2\lambda)\hat{j}+(3+\lambda)\hat{k}$ $\vec{a}+\lambda\vec{b}$ is perpendicular to $\vec{c} \Rightarrow (\vec{a}+\lambda\vec{b}).\vec{c} = 0$ $(3)(2-\lambda)+(1)(2+2\lambda)+(0)(3+\lambda) = 0 \Rightarrow 6-3\lambda+2+2\lambda = 0 \Rightarrow \lambda = 8$ **Or** Given $\lvert\vec{a}\rvert = 1$, $\lvert\vec{b}\rvert = 1$, $\quad \vec{a}.\vec{a} = \lvert\vec{a}\rvert\lvert\vec{a}\rvert \cos 0^\circ = \lvert\vec{a}\rvert^2 = a^2$ $\lvert\vec{a}-\vec{b}\rvert^2 = \lvert\vec{a}\rvert^2 + \lvert\vec{b}\rvert^2 - 2\vec{a}\bullet\vec{b}$ $= (1)^2+(1)^2-2\lvert\vec{a}\rvert\lvert\vec{b}\rvert \cos\theta$ $= 1+1-2(1)(1)\cos\theta$ $= 2(1-\cos\theta)$ $= 2\left(2\sin^2\frac{\theta}{2}\right)$ $\lvert\vec{a}-\vec{b}\rvert = 2\sin\frac{\theta}{2}$ Therefore, $\sin\left(\frac{\theta}{2}\right) = \frac{1}{2}\lvert\vec{a}-\vec{b}\rvert$	1 1 1

30	Given $\frac{dv}{dt} = 12$, and $h = 3r$ Volume of cone $= \frac{1}{3}\pi r^2 h = \pi r^3$ $\frac{dv}{dt} = 3\pi r^2 . \frac{dr}{dt}$ substituting values we get $\frac{dr}{dt} = \frac{1}{\pi}$ ***OR*** $f(x) = \frac{4\sin x}{2+\cos x} - x$ $f'(x) = \frac{(2+\cos x)\,4\cos x \;-\; 4\,sinx\,(-\sin x)}{(2+\cos x)^2} - 1$ $f'(x) = \frac{8\cos x + 4\cos^2 x + 4\sin^2 x \;-\; 4 - \cos^2 x - 4\cos x}{(2+\cos x)^2}$ $f'(x) = \frac{\cos x(4 - \cos x)}{(2+\cos x)^2}$ For all $x \in (0, \frac{\pi}{2}]$, $\cos x \geq 0$ and $4 - \cos x \geq 0$ *for all* $x \in R$ $f'(x)$ is positive $f(x)$ is increasing for all $x \in [0, \frac{\pi}{2}]$	**1** **1** **1**
31	We have, $x\sqrt{1+y} + y\sqrt{1+x} = 0 \implies x\sqrt{1+y} = -y\sqrt{1+x}$ $x^2(1+y) = y^2(1+x) \implies x^2 - y^2 = y^2x - x^2y$ $(x+y)(x-y) = -xy\,(x-y) \implies x + y = -xy$ $x = -y - xy \implies y(1+x) = -x$ $y = -\frac{x}{1+x}$ [$since, x \neq y$] $\frac{dy}{dx} = -\left\{\frac{(1+x)\times 1 - x\,(0+1)}{(1+x)^2}\right\}$ $\frac{dy}{dx} = -\frac{1}{(1+x)^2}$	**1** **1** **1** **1** **1** **1**
	SECTION – D	
32		**Fig 1m** **1**

	Given: $x^2 + y^2 = 9 \ldots (1) \quad x = 1,\ x = 2$ $x = 1 \ldots\ldots (2) \quad x = 2 \ldots\ldots (3)$ *Required Area* = $= 2\int_1^2 [\sqrt{9 - x^2}]dx$ $= 2\left[\frac{x}{2}\sqrt{9 - x^2} + \frac{9}{2} Sin^{-1}\frac{x}{3}\right]_1^2$  $= 2\left[\sqrt{9-4} + \frac{9}{2} Sin^{-1}\frac{2}{3} - \frac{1}{2}\sqrt{9-1} - \frac{9}{2} Sin^{-1}\frac{1}{3}\right]_1^2$ $= 2\sqrt{5} + 9\ Sin^{-1}\frac{2}{3} - (2\sqrt{2}) - 9\ Sin^{-1}\frac{1}{3}$	**1** **1** **1** **1**
33	To prove reflexive To prove symmetric To prove transitive To prove equivalence Proving T_1 related with T_3 $\frac{3}{6} = \frac{4}{8} = \frac{5}{10}$ OR Showing one one Taking cases, x_1,x_2 both are even , x_1,x_2 both are odd and x_1,x_2 one is odd another is even Showing onto by any method	**1** **1** **1** **1** **1** **3** **2**
34	Given point (2, 4, –1) Given line $\frac{x+5}{1} = \frac{y+3}{4} = \frac{z-6}{-9}$ Let $\frac{x+5}{1} = \frac{y+3}{4} = \frac{z-6}{-9} = k$  Any Point on given line D (k–5, 4k–3, –9k+6) DRs of AD: $x_2 - x_1$, $y_2 - y_1$, $z_2 - z_1$ k–5 –2, 4k–3 –4, –9k+6 +1 k–7, 4k–7, –9k+7 DRs of the given line $\frac{x+5}{1} = \frac{y+3}{4} = \frac{z-6}{-9}$ are 1, 4, –9 AD is perpendicular to given line: $a_1 a_2 + b_1 b_2 + c_1 c_2 = 0$ 1(k – 7) + 4(4k – 7) +(– 9) (–9k+7) k – 7 + 16k – 28 + 81k – 63 = 0 98k – 98 = 0 ⇒k = 1	**1/2** **1/2** **1** **1/2** **1** **1/2**

Substitute k=1 in D then

Foot of the perpendicular = D (– 4, 1, – 3) **1/2**

Let B(α, β, γ) be the image of A

Then mid-point of AB = D

$$\left(\frac{\alpha+2}{2}, \frac{\beta+4}{2}, \frac{\gamma-1}{2}\right) = (-4, 1, -3)$$ **1/2**

$\frac{\alpha+2}{2} = -4$, $\alpha + 2 = -8$, $\alpha = -10$

$\frac{\beta+4}{2} = 1$ $\beta + 4 = 2$ $\beta = -2$

$\frac{\gamma-1}{2} = -3$ $\gamma - 1 = -6$ $\gamma = -5$ **1**

Image = B $(-10, -2, -5)$

OR **1/2**

The equations of the given lines are

$\vec{r} = (1-t)\hat{\imath} + (2-t)\hat{\jmath} + (3-2t)\hat{k}$ & $\vec{r} = (s+1)\hat{\imath} + (2s-1)\hat{\jmath} - (2s+1)\hat{k}$ **1/2**

After writing standard equation of a line, then we have

$\vec{r} = \hat{\imath} - 2\hat{\jmath} + 3\hat{k} + t(-\hat{\imath} + \hat{\jmath} - 2\hat{k})$ & $\vec{r} = \hat{\imath} - \hat{\jmath} - \hat{k} + s(\hat{\imath} + 2\hat{\jmath} - 2\hat{k})$ **1.5**

Shortest Distance between the lines = $\frac{|(\vec{a_2} - \vec{a_1}).(\vec{b_1} \times \vec{b_2})|}{|\vec{b_1} \times \vec{b_2}|}$ **1/2**

$\vec{a_1} = \hat{\imath} - 2\hat{\jmath} + 3\hat{k}$ $\vec{a_2} = \hat{\imath} - \hat{\jmath} - \hat{k}$ $\vec{a_2} - \vec{a_1} = 0\hat{\imath} + \hat{\jmath} - 4\hat{k}$

$\vec{b_1} = -\hat{\imath} + \hat{\jmath} - 2\hat{k}$ $\vec{b_2} = \hat{\imath} + 2\hat{\jmath} - 2\hat{k}$

$$\vec{b_1} \times \vec{b_2} = \begin{vmatrix} \hat{\imath} & \hat{\jmath} & \hat{k} \\ -1 & 1 & -2 \\ 1 & 2 & -2 \end{vmatrix} = \hat{\imath}(-2+4) - \hat{\jmath}(2+2) + \hat{k}(-2-1) = 2\hat{\imath} - 4\hat{\jmath} - 3\hat{k}$$ **1**

$|\vec{b_1} \times \vec{b_2}| = \sqrt{4+16+9} = \sqrt{29}$

$$SD = \frac{|(\vec{a_2} - \vec{a_1}).(\vec{b_1} \times \vec{b_2})|}{|\vec{b_1} \times \vec{b_2}|} = \left|\frac{(0\hat{\imath} + \hat{\jmath} - 4\hat{k}).(2\hat{\imath} - 4\hat{\jmath} - 3\hat{k})}{\sqrt{29}}\right|$$

$$SD = \left|\frac{(0)(2)+(1)(-4)+(-4)(-3)}{\sqrt{29}}\right| = \left|\frac{-4+12}{\sqrt{29}}\right| = \frac{8}{\sqrt{29}} = \frac{8\sqrt{29}}{29}$$

35 **1**

Given differential equation is $\tan x \frac{dy}{dx} = 2x \tan x + x^2 - y$

$\Rightarrow \frac{dy}{dx} = 2x + \frac{x^2}{\tan x} - \frac{y}{\tan x}$ $\Rightarrow \frac{dy}{dx} + \frac{1}{\tan x} y = 2x + x^2 \cot x$

$\Rightarrow \frac{dy}{dx} + (\cot x)y = 2x + x^2 \cot x$

This is a linear differential equation of the form **1**

$\frac{dy}{dx} + Py = Q.$

Here $P = \cot x$, $Q = 2x + x^2 \cot x$

Integrating factor = $e^{\int p dx} = e^{\int \cot x\, dx} = e^{\log(\sin x)} = \sin x$ **1**

The solution of the linear differential equation is given by

y (I.F) $= \int [Q.(I.F)]dx + C$

y. sinx = $\int (2x + x^2 \cot x) \sin x\, dx + C$

$\Rightarrow$ y. sinx $= \int 2x \sin x\, dx + \int x^2 \cos x\, dx + C$

$\Rightarrow$ y. sinx $= \int 2x \sin x\, dx + x^2 \sin x - \int 2x \sin x\, dx$ (Using integration by parts) **1**

$\Rightarrow$ y. sinx = $x^2 \sin x$ + C----(1)

	Given that $y = 0$ *when* $x = \frac{\pi}{2}$. Putting $x = \frac{\pi}{2}$ *and* $y = 0$ *in eqn*(1) *we get* $0 = \frac{\pi^2}{4} + C \Rightarrow C = \frac{--\pi^2}{4}$ Therefore particular solution of the given differential equation is $y.\sin x = x^2 \sin x - \frac{\pi^2}{4} \Rightarrow 4y \sin x = 4x^2 \sin x - \pi^2$	**1**
	SECTION –E	
36	Let the increase of ₹ x in annual subscription of ₹ 300 maximize the profit of the company. Due to this increase of ₹ x, x subscriber will discontinue. Therefore Number of subscriber = 500-x Annual subscription = ₹ (300+x) R be the total revenue =(500-x)(300+x) =1500+200x-x^2 $\frac{dR}{dx} = 200 - 2x$ and $\frac{d^2R}{dx^2} = -2$ For critical point $\frac{dR}{dx} = 200 - 2x = 0$, x = 100 $\frac{d^2R}{dx^2} < 0$ at x =100 So R is maximum at x=100 and maximum revenue = 400x400₹=160000₹	**2** **2**
37	(i) $(10+x)\sqrt{(100 - x^2)}$ (ii) $\frac{-2x^2-10x+100}{\sqrt{100-x^2}}$ (iii)(A) $\frac{dA}{dx} = 0$ $\frac{-2x^2-10x+100}{\sqrt{100-x^2}} = 0 \Rightarrow -2x^2 - 10x + 100 = 0$ $\Rightarrow x^2 + 5x - 50 = 0 \Rightarrow (x+10)(x-5) = 0$ $\Rightarrow x = 5$ **OR** (iii)B- maximum volume v = $(10+x)\sqrt{(100 - x^2)}$ $= (10+5)\sqrt{100-25} = 15\sqrt{75}$ $= 75\sqrt{3}$ sq. m	**1** **1** **2**
38	(a) A : Cab B : Metro C : Bike D : other E : Late arrival $P(E) = P(A).P(E/A) + P(B).P(E/B) + P(C).P(E/C) + P(D).P(E/D)$ $= \frac{3}{10}.\frac{1}{4} + \frac{1}{5}.\frac{1}{3} + \frac{1}{10}.\frac{1}{12} + \frac{2}{5}.\frac{1}{10} = \frac{114}{600}$ (b) $P(B/E) = \frac{P(B).P(E/B)}{P(E)} = \frac{1/15}{114/600} = 40/114 = 20/57$	**2** **2**