KENDRIYA VIDYALAYA SANGATHAN, KOLKATA REGION

PRE-BOARD EXAMINATION – 2024-25

CLASS – XII **SUB. – MATHEMATICS (041)**

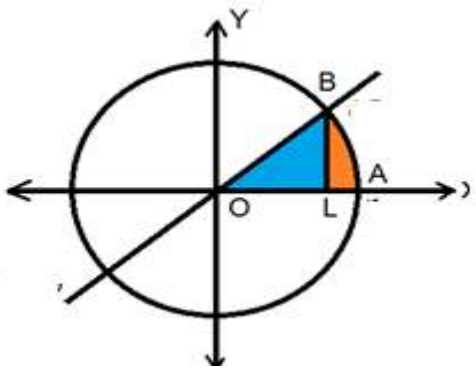
MARKING SCHEME

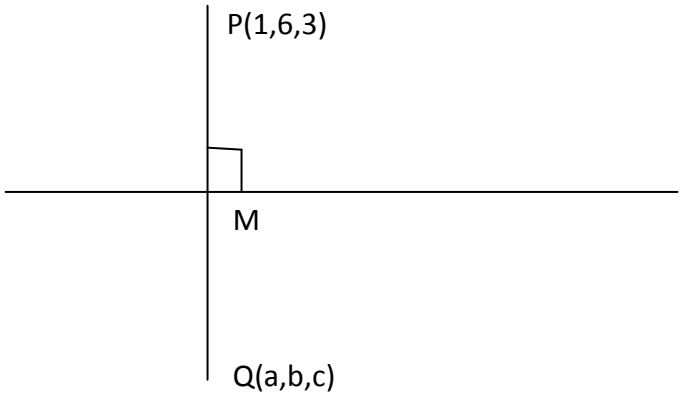
MCQ ANSWERS

1.(B) 2.(A) 3.(A) 4.(D) 5.(D) 6.(A) 7.(D) 8.(D) 9.(A) 10.(C)

11.(C) 12.(A) 13.(C) 14.(C) 15.(B) 16.(D) 17.(C) 18.(D) 19.(A) 20.(D)

Q.NO	ANSWER	VALUE POINTS
21)	For each value of tan^{-1}(-1), $sin^{-1}\left(-\frac{1}{2}\right)$ and $cos^{-1}\left(\frac{-1}{\sqrt{2}}\right)$ For final correct answer	3x$\frac{1}{2}$ $\frac{1}{2}$
22)	(a) Taking $(cosx)^x$ as y and $taking$ $\log$ $both$ $sides$ Differentiating both sides w.r.t. x and finding final answer **OR(b)** Finding the values of $\frac{dy}{d\theta}$ and $\frac{dx}{d\theta}$ Finding $\frac{dy}{dx}$	0.5 1.5 1.5 0.5
23)	Concluding that "a" is critical point Finding $f'(x)$ and $equating$ $f'(a)to\ 0$ to $find$ the $value$ of $a = 120$	0.5 1.5
24)	$\left\|\vec{a}+\vec{b}+\vec{c}\right\|^2 = (\vec{a}+\vec{b}+\vec{c}).(\vec{a}+\vec{b}+\vec{c})$ and using $\vec{a},\vec{b},and\ \vec{c}$ as a unit vector For correct answer -3/2	1 1
25)	(a) Finding adjacent sides of the parallelogram as vectors a □ and b □ Finding area of the parallelogram using $\left\|\vec{a}\times\vec{b}\right\|$ **OR** (b) Using the concept that $\angle ABC$ is the $angle$ $between$ $\overrightarrow{BA}$ and $\overrightarrow{BC}$ Finding the angle between $\overrightarrow{BA}$ and $\overrightarrow{BC}$ using vectors	1 1 0.5 1.5
26)	Writing correct relation $x^2+y^2=25$ and $using$ $\frac{dx}{dt}=2cm/s$	1 1

	For evaluating correct answer -8/3 cm/s	
27)	Finding $f'(x) and\ equating\ to\ zero\ to\ find\ the\ value\ of\ x\ as -1\ and -2$ Finding intervals for increasing and decreasing	1 1+1
28)	(a) For writing $9x^2 + 6x + 5$ as a sum or difference of two squares For evaluating correct answer **OR** (b) $taking\ \int_0^{\frac{\pi}{4}} \log(1 + tanx)\ dx$ as Integral I and applying the property $\int_0^a f(x)\,dx = \int_0^a f(a-x)\,dx$ Adding both integral and finding the value of I as $\frac{\pi}{8}\log 2$	1 2 1 2
29)	(a) d.r. of required line 3,5,6 for correct equation $\frac{x+2}{3} = \frac{y-4}{5} = \frac{z+5}{6}$ **OR** (b) $(\vec{x} - \vec{a}).(\vec{x} + \vec{a}) = 80$, $\lvert\vec{x}\rvert^2 - 1 = 80$ For correct answer $\lvert\vec{x}\rvert$ = 9	1 2 2 1
30)	(a) S = {BB, BG, GB, GG} & taking all the three events For correct answer of both conditional probabilities **OR** (b) Taking X as a number of defective bulbs in a sample of 4 bulbs drawn and X =0,1,2,3,4 For correct probability distribution	1 1+1 1 2
31)	For correct feasible region For corner point, corresponding value of Z and finding solution	1.5 1.5
32)	For the points of intersection, we solve equations of given circles The point of intersection are $(4, 4)$ and $(-4, -4)$ The rough sketch of the given curve is as follows:  	 1 1.5

	The required area = Area of the shaded region OBALO = Area of OBLO + Area of BLAB $= \int_0^4 (y \text{ of line})dx + \int_4^{4\sqrt{2}} (y \text{ of circle})dx$ For integrating and finding the area	1.5 1
33)	Evaluating $\|A\|$ = 9 Evaluating $A^{-1} = \frac{1}{9}\begin{bmatrix} 7 & -3 & 2 \\ 3 & 0 & -3 \\ -1 & 3 & 1 \end{bmatrix}$ Writing equations in Matrix form and Using $X = A^{-1}\mathrm{B}$ and calculating the values of $x, y \text{ and } z$	1 2 2
34)	(a) Expressing improper rational function as proper rational function using division algorithm Doing partial fraction of proper rational function For correct integral values **OR** (b) $writing\ \int_1^4 \|x-2\|\,dx$ as $\int_1^2 \|x-2\|\,dx + \int_2^4 \|x-2\|\,dx$ and similar for others For correct value of definite integral	1 2 2 2 2
35)	(a) Rewriting the vector equation of the line in standard form Writing the values of $\vec{a}_1,\ \vec{a}_2\ ,\ \vec{b}_1 \text{ and } \vec{b}_2$ Using the formula for shortest distance and finding the value of shortest distance **OR** **(b)**  	1 1 3 1

	Writing the general coordinate of the given line and taking them as the coordinate of M Writing direction ratio of given line and line PM Using the concept that line PM is perpendicular to given line to find the coordinate of M Finding the coordinate of image Q using the concept that M is the mid point of PQ	1 1 1 1
36)	(i) No of relations from B to G = 64 (ii) Smallest equivalence relation = $\{(g_1,g_1), (g_2,g_2)\}$ (iii) (a) (A) minimum ordered pairs $(b_1,b_1), (b_2,b_2), (b_3,b_3), (b_1,b_3)$ (B) minimum ordered pairs $(b_1,b_1), (b_2,b_2), (b_3,b_3), (b_1,b_3), (b_3,b_2)$ **OR** (iii) (b) For proving and justifying that f is one-one For proving and justifying that f is one-one	1 1 1 1 1 1
37)	(i) V = (45-2x)(24-2x) x cm^3 (ii) $\frac{dV}{dx} = 1080 - 276x + 12x^3$ (iii) (a) Equating $\frac{dV}{dx} = 0$ and $finding$ x as 5 cm for $maximum$ $value$ of x **OR** (iii) (b) finding maximum value of V for x = 5cm	1 1 2 2
38)	(i) Probability that the doctor arrives late = 0.21 by applying formula of total probability (ii) probability that he comes by cab when it is known that the doctor arrives late = 5/14 by applying Baye's Theorem	2 2