तत् त्वं पूषन् अपावृणु

केन्द्रीय विद्यालय संगठन

KENDRIYA VIDYALAYA SANGATHAN

AHMEDABAD REGION

SUBJECT: MATHEMATICS

CLASS: XII

TERM-1

STUDENT SUPPORT MATERIAL

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KENDRIYA VIDYALAYA SANGATHAN AHMEDABAD REGION
TERM – 1 MATHS CONTENT
CLASS: XII
CHAPTER : RELATION AND FUNCTION

Q1	The function f : A → B defined by $f(x) = 4x + 7$, $x \in R$ is (a) one-one (b) Many-one (c) Odd (d) Even
Q2	The number of bijective functions from set A to itself when A contains 6 elements is (a) 6 (b) $(6)^2$ (c) 6! (d) 2^6
Q3	Let L denote the set of all straight lines in a plane. Let a relation R be defined by l Rm if and only if l is perpendicular to m $\forall$ l, m $\in$ L. Then R is (a) reflexive only (b) Symmetric only (c) Transitive only (d) Equivalence relation
Q4	Let N be the set of natural numbers and the function f : N → N be defined by $f(n) = 2n + 3$ $\forall n \in N$. Then f is (a) injective (b) surjective (c) bijective (d) None of these
Q 5	The function f : R → R defined by $f(x) = 3 - 4x$ is (a) Onto (b) Not onto (c) Not one-one (d) None of these

Q 6	Let f(x)= (x−1)/(x+1), then f(f(x)) is (a) 1/x (b) −1/x (c) 1/(x+1) (d) 1/(x−1)
Q 7	Set A has 3 elements and the set B has 4 elements. Then the number of injective mappings that can be defined from A to B is (a) 144 (b) 12 (c) 24 (d) 64
Q 8	The maximum number of equivalence relations on the set A = {1, 2, 3} are (a) 1 (b) 2 (c) 3 (d) 5
Q 9	Let us define a relation R in R as aRb if a ≥ b. Then R is (a) an equivalence relation (b) reflexive, transitive but not symmetric (c) symmetric, transitive but not reflexive (d) neither transitive nor reflexive but symmetric
Q10	Let A = {1, 2, 3} and consider the relation R = {(1, 1), (2, 2), (3, 3), (1, 2), (2, 3), (1, 3)}. Then R is (a) reflexive but not symmetric (b) reflexive but not transitive (c) symmetric and transitive (d) neither symmetric, nor transitive
Q11	Let A = {1, 2, 3, …. n} and B = {a, b}. Then the number of surjections from A into B is (a) 2^n (b) $2^n - 2$ (c) $2^n - 1$ (d) none of these
Q12	Let f : R → R be defined by f(x) = 1/x, ∀ x ∈ R. Then f is (a) one-one

	(b) onto (c) bijective (d) f is not defined
Q13	Which of the following functions from Z into Z are bijective? (a) $f(x) = x^3$ (b) $f(x) = x + 2$ (c) $f(x) = 2x + 1$ (d) $f(x) = x^2 + 1$
Q14	Let $f : R \rightarrow R$ be defined by $f(x) = x^2 + 1$. Then, pre-images of 17 and – 3, respectively, are (a) φ, {4, – 4} (b) {3, – 3}, φ (c) {4, –4}, φ (d) {4, – 4}, {2, – 2}
Q15	For real numbers x and y, define xRy if and only if $x - y + \sqrt{2}$ is an irrational number. Then the relation R is (a) reflexive only (b) Symmetric only (c) Transitive only (d) None of these
Q16	Consider the non-empty set consisting of children in a family and a relation R defined as aRb if a is brother of b. Then R is (a) symmetric but not transitive (b) transitive but not symmetric (c) neither symmetric nor transitive (d) both symmetric and transitive
Q17	If a relation R on the set {1, 2, 3} be defined by R = {(1, 2)}, then R is (a) reflexive (b) Symmetric (c) Transitive (d) None of these
Q18	Let R be a relation on the set N of natural numbers denoted by $nRm \Leftrightarrow n$ is a factor of m (i.e. $n \mid m$). Then, R is

	(a) Reflexive and symmetric (b) Transitive and symmetric (c) Equivalence (d) Reflexive, transitive but not symmetric
Q19	Let S = {1, 2, 3, 4, 5} and let A = S × S. Define the relation R on A as follows: (a, b) R (c, d) iff ad = cb. Then, R is (a) reflexive only (b) Symmetric only (c) Transitive only (d) Equivalence relation
Q20	Let R be the relation "is congruent to" on the set of all triangles in a plane is (a) reflexive (b) symmetric (c) symmetric and reflexive (d) equivalence
Q21	Total number of equivalence relations defined in the set S = {a, b, c} is (a) 5 (b) 3! (c) 23 (d) 33
Q22	The relation R is defined on the set of natural numbers as {(a, b) : 2a =b}. Then, R is given by (a) {(2, 1), (4, 2), (6, 3),….} (b) {(1, 2), (2, 4), (3, 6), ……..} (c) R is not defined (d) None of these
Q23	Let X = {-1, 0, 1}, Y = {0, 2} and a function f : X → Y defined by $y = 2x^4$, is (a) one-one onto (b) one-one into (c) many-one onto (d) many-one into

Q 24	Let $g(x) = x^2 - 4x - 5$, then (a) g is one-one on R (b) g is not one-one on R (c) g is bijective on R (d) None of these
Q 25	The mapping $f : N \to N$ is given by $f(n) = 1 + n^2$, $n \in N$ when N is the set of natural numbers is (a) one-one and onto (b) onto but not one-one (c) one-one but not onto (d) neither one-one nor onto
Q 26	The function $f : R \to R$ given by $f(x) = x^3 - 1$ is (a) a one-one function (b) an onto function (c) a bijection (d) neither one-one nor onto
Q 27	Let $A = \{x : -1 \le x \le 1\}$ and $f : A \to A$ is a function defined by $f(x) = x\|x\|$ then f is (a) a bijection (b) injection but not surjection (c) surjection but not injection (d) neither injection nor surjection
Q 28	The domain of the function $f(x)=\frac{1}{\sqrt{\{\sin x\}+\{\sin(\pi+x)\}}}$ where { } denotes fractional part, is (a) $[0, \pi]$ (b) $(2n + 1)\pi/2$, $n \in Z$ (c) $(0, \pi)$ (d) None of these
Q 29	Range of $f(x)=\sqrt{(1-\cos x)\sqrt{(1-\cos x)\sqrt{(1-\cos x)\ \dots\dots\infty}}}$ (a) [0, 1] (b) (0, 1) (c) [0, 2] (d) (0, 2)

Q 30	The greatest integer function f(x) = [x] is (a) One-one (b) Many-one (c) Both (a) & (b) (d) None of these
	CASE STUDY : 1 Anu and Chhutki are playing Ludo at home during Covid-19. While rolling the dice, Anu's sister Nikki observed and noted that the possible outcomes of the throw every time belong to set {1,2,3,4,5,6}. Let A be the set of players while B be the set of all possible outcomes.  A = {A, C}, B = {1,2,3,4,5,6}
Q 1	Let $R : B \rightarrow B$ be defined by R = $\{(x, y)$: y *is divisible by* x $\}$ is a. Reflexive and transitive but not symmetric b. Reflexive and symmetric and not transitive c. Not reflexive but symmetric and transitive d. Equivalence
Q 2	Nikki wants to know the number of functions from A to B. How many number of functions are possible?

	a. 6^2 b. 2^6 c. 6! d. 2^{12}
Q 3	Let R be a relation on B defined by R = {(1,2), (2,2), (1,3), (3,4), (3,1), (4,3), (5,5)}.Then R is a. Symmetric b. Reflexive c. Transitive d. None of these
Q 4	Nikki wants to know the number of relations possible from A to B. How many numbers of relations are possible? a. 6^2 b. 2^6 c. 6! d. 2^{12}
Q 5	Let $R: B \to B$ be defined by R={(1,1),(1,2), (2,2), (3,3), (4,4), (5,5),(6,6)}, then R is a. Symmetric b. Reflexive and Transitive c. Transitive and symmetric d. Equivalence
	CASE STUDY : 2 An organization conducted bike race under 2 different categories-boys and girls. Totally there were 250 participants. Among all of them finally three from Category 1 and two from Category 2 were selected for the final race. Ravi forms two sets B and G with these participants for his college project. Let B = {b1,b2,b3} G={g1,g2} where B represents the set of boys selected and G the set of girls who were selected for the final race. Ravi decides to explore these sets for various types of relations and functions

	
Q 1	Ravi wishes to form all the relations possible from B to G. How many such relations are possible? a. 2^5 b. 2^6 c. 0 d. 2^3
Q 2	Let R: B→B be defined by R = $\{(x, y)$: x and y are students of same sex$\}$, Then this relation R is________ a. Equivalence b. Reflexive only c. Reflexive and symmetric but not transitive d. Reflexive and transitive but not symmetric
Q 3	Ravi wants to know among those relations, how many functions can be formed from B to G? a. 2^2 b. 2^{12} c. 3^2 d. 2^3

Q 4	Let $R: B \to G$ be defined by R = { (b1,g1), (b2,g2),(b3,g1)}, then R is___________ a. Injective b. Surjective c. Neither Surjective nor Injective d. Surjective and Injective
Q 5	Ravi wants to find the number of injective functions from B to G. How many numbers of injective functions are possible? a. 0 b. 2! c. 3! d. 0!
	CASE STUDY : 3 Raji visited the Exhibition along with her family. The Exhibition had a huge swing, which attracted many children. Raji found that the swing traced the path of a Parabola as given by $y = x^2$. Answer the following questions using the above information.
Q 1	Let $f: R \to R$ be defined by $f(x) = x^2$ is__________ a. Neither Surjective nor Injective b. Surjective c. Injective d. Bijective
Q 2	Let $f: N \to N$ be defined by $f(x) = x^2$ is _________ a. Surjective but not Injective b. Surjective c. Injective d. Bijective
Q 3	Let f: {1,2,3,….}→{1,4,9,….} be defined by $f(x) = x^2$ is ___________ a. Bijective

	b. Surjective but not Injective c. Injective but Surjective d. Neither Surjective nor Injective
Q 4	Let : $N \rightarrow R$ be defined by $f(x) = x^2$. Range of the function among the following is __________ a. {1, 4, 9, 16,...} b. {1, 4, 8, 9, 10,...} c. {1, 4, 9, 15, 16,...} d. {1, 4, 8, 16,...}
Q 5	The function f: Z→Z defined by $f(x) = x^2$ is___________ a. Neither Injective nor Surjective b. Injective c. Surjective d. Bijective

Answers

1. Answer:
   (a) one-one
2. Answer:
   (c) 106!
3. Answer:
   (b) Symmetric only
4. Answer:
   (a) injective
5. Answer:
   (a) Onto
6. Answer:
   (b) −1/x
7. Answer:
   (c) 24
8. Answer:
   (d) 5

9. Answer:
(b) reflexive, transitive but not symmetric
10. Answer:
(a) reflexive but not symmetric
11. Answer:
(b) $2^n - 2$
12. Answer:
(d) f is not defined
13. Answer:
(b) $f(x) = x + 2$
14. Answer:
(c) $\{4, -4\}$, φ
15. Answer:
(a) reflexive only
16. Answer:
(d) both symmetric and transitive
17. Answer:
(a) transitive
18. Answer:
(d) Reflexive, transitive but not symmetric
19. Answer:
(d) Equivalence relation
20. Answer:
(d) equivalence
21. Answer:
(a) 5
22. Answer:
(b) {(1, 2), (2, 4), (3, 6), ……..}
23. Answer:
(c) many-one onto
24. Answer:
(b) g is not one-one on R
25. Answer:
(c) one-one but not onto
26. Answer:
(c) a bijection
27. Answer:
(a) a bijection
28. Answer:
(d) None of these

29. Answer:
(c) [0, 2]
30. Answer:
(b) Many-one

Case Study 1

ANSWERS

1. (a) Reflexive and transitive but not symmetric

2. (a) 62

3. (d) None of these three

4. (d) 212

5. (b) Reflexive and Transitive

Case Study 2

ANSWERS

1. (a) 26

2. (a) Equivalence

3. (d) 23

4. (b) Surjective

5. (a) 0

Case Study 3

ANSWERS

1. (a) Neither Surjective nor Injective

2. (C) Injective

3. (a) Bijective

4. (a) {1, 4, 9, 16,...}

5. (a) Neither Injective nor Surjective

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KENDRIYA VIDYALAYA SANGATHAN AHMEDABAD REGION
TERM – 1 MATHS CONTENT
CLASS: XII MATHEMATICS (041)
CHAPTER:2 INVERSE TRIGONOMETRIC FUNCTIONS

Q1	**Which of the following is the principal value branch of** $\cos^{-1}x$ **?** **(a)** $\left[-\frac{\pi}{2},\frac{\pi}{2}\right]$ **(b)** $(0,\pi)$ **(c)** $[0,\pi]$ **(d)** $(0,\pi)-\{\frac{\pi}{2}\}$
Q2	**Which of the following is the principal value branch of** $\operatorname{cosec}^{-1}x$ **?** **(a)** $(-\frac{\pi}{2},\frac{\pi}{2})$ **(b)** $(0,\pi)-\{\frac{\pi}{2}\}$ **(c)** $[-\frac{\pi}{2},\frac{\pi}{2}]$ **(d)** $[-\frac{\pi}{2},\frac{\pi}{2}]-\{0\}$
Q3	**The value of** $\sin^{-1}\left[\cos\left(\frac{33\pi}{5}\right)\right]$ **is……….** **(a)** $\frac{3\pi}{5}$ **(b)** $\frac{-7\pi}{5}$ **(c)** $\frac{\pi}{10}$ **(d)** $\frac{-\pi}{10}$
Q4	**The domain of the function** $\cos^{-1}(2x-1)$ **is ………** **(a)** $[0,1]$ **(b)** $[-1,1]$ **(c)** $[0,1/2]$ **(d)** $[0,\pi]$
Q 5	**The domain of the function defined by** $\sin^{-1}(\sqrt{x-1})$ **is …..** **(a)** $[1,2]$ **(b)** $[-1,1]$ **(c)** $[0,1]$ **(d) None of these**
Q 6	**The value of** $\cos^{-1}\left(\cos\frac{3\pi}{2}\right)$ **is ……….** **(a)** $\frac{\pi}{2}$ **(b)** $\frac{3\pi}{2}$ **(c)** $\frac{5\pi}{2}$ **(d)** $\frac{7\pi}{2}$

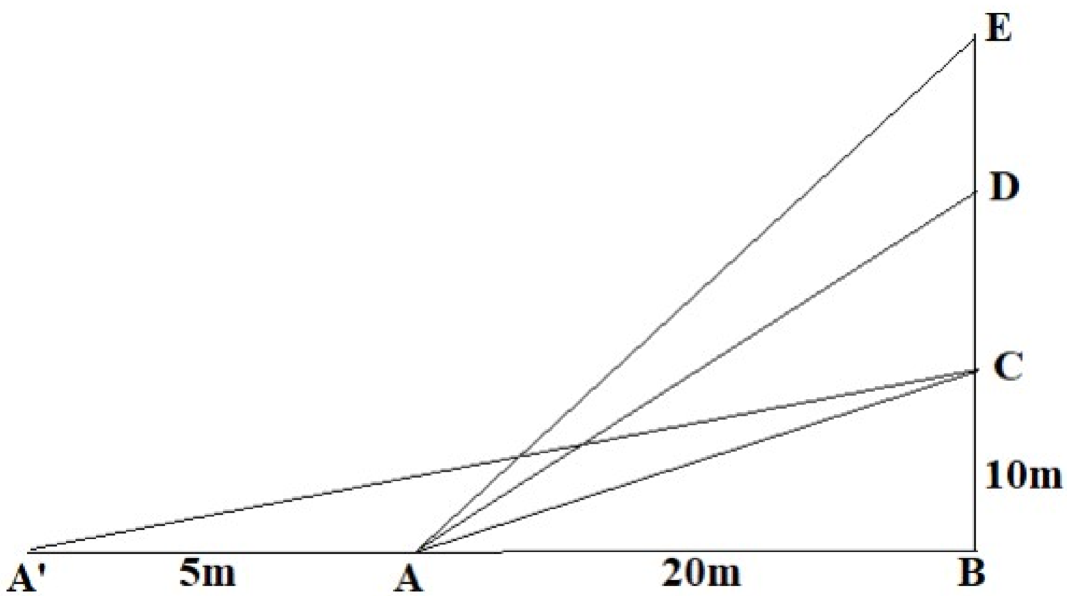
Q 7	**The value of** $2\sec^{-1}(2)+\sin^{-1}\left(\frac{1}{2}\right)$ **is ....** **(a)** $\frac{\pi}{6}$ **(b)**$\frac{5\pi}{6}$ **(c)** $\frac{7\pi}{6}$ **(d)**1
Q 8	**If** $\cos^{-1}x > sin^{-1}x$ **then ....** **(a)** $\frac{1}{\sqrt{2}} < x \leq 1$ **(b)**$0 \leq x < \frac{1}{\sqrt{2}}$ **(c)** $-1 < x \leq \frac{1}{\sqrt{2}}$ **(d)**$x > 0$
Q 9	$\cos^{-1}\left(\cos\frac{7\pi}{6}\right)$**= ....** **(a)** $\frac{\pi}{6}$ **(b)**$\frac{5\pi}{6}$ **(c)** $-\frac{\pi}{6}$ **(d)**$\frac{7\pi}{6}$
Q10	**The value of** $\cos^{-1}\left[\cos\left(-\frac{\pi}{3}\right)\right]$**=.....** **(a)** $-\frac{\pi}{3}$ **(b)**$\frac{\pi}{3}$ **(c)** $\frac{4\pi}{3}$ **(d)**$\frac{2\pi}{3}$
Q11	**The value of** $\sin^{-1}\left[\sin\left(\frac{5\pi}{3}\right)\right]$**=.....** **(a)** $-\frac{\pi}{3}$ **(b)**$\frac{5\pi}{3}$ **(c)** $\frac{\pi}{3}$ **(d)**$\frac{2\pi}{3}$
Q 12	$\cos^{-1}\left(\frac{\sqrt{3}}{2}\right)+2\sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$ **is** **(a)** $\frac{5\pi}{6}$ **(b)**$\frac{\pi}{4}$ **(c)** $\frac{4\pi}{3}$ **(d)**$\frac{4\pi}{6}$

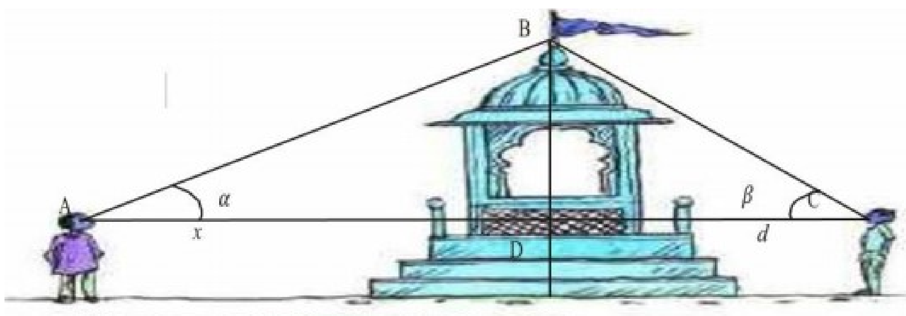
Q13	**The value of** $\sin^{-1}\left[\sin\left(\frac{7\pi}{6}\right)\right]$**=.....** **(a)** $\frac{\pi}{6}$ **(b)**$\frac{5\pi}{6}$ **(c)** $-\frac{\pi}{6}$ **(d)**$\frac{7\pi}{6}$
Q14	$\sin\left\{\frac{\pi}{3}-\sin^{-1}\left(\left(-\frac{1}{2}\right)\right)\right\}$ **(a)** 0 **(b)**$\frac{1}{2}$ **(c)** $\frac{\sqrt{3}}{2}$ **(d)**1
Q15	**Value of** $\sin\left(\cos^{-1}\frac{4}{5}\right)$ is **(a)** $1/2$ **(b)** $3/5$ **(c)** $2/3$ **(d)**$3/4$
Q16	**Value of** $\cos\left(tan^{-1}\frac{4}{3}\right)$ is **(a)** $2/3$ **(b)** $1/2$ **(c)** $3/4$ **(d)**$3/5$
Q 17	$cos^2\left(\sin^{-1}\left(\frac{1}{2}\right)\right)+sin^2\left(\cos^{-1}\left(\frac{1}{2}\right)\right)$ **(a)** $1/2$ **(b)**1 **(c)** $3/2$ **(d)**2
Q 18	$\sin^{-1}\left(\frac{1}{2}\right)+2\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)=\cdots$ **(a)** $\frac{\pi}{2}$ **(b)**π **(c)** $\frac{3\pi}{4}$ **(d)**$\frac{3\pi}{2}$
Q 19	**The value of** $\cos^{-1}\left[\cos\left(\frac{4\pi}{3}\right)\right]$**=.....**

	(a) $\frac{\pi}{3}$ **(b)**$\frac{2\pi}{3}$ **(c)** $\frac{4\pi}{3}$ **(d)**$-\frac{\pi}{3}$
Q 20	**The value of** $\tan^{-1}\left[\tan\left(\frac{7\pi}{4}\right)\right]$**=.....** **(a)** $-\frac{\pi}{4}$ **(b)**$\frac{\pi}{4}$ **(c)** $\frac{3\pi}{4}$ **(d)**$-\frac{3\pi}{4}$
Q 21	$\cos\left(\frac{\pi}{3}+\cos^{-1}(-1)\right)=\cdots$ **(a)** $1/2$ **(b)**$-1/2$ **(c)** 1 **(d)**-1
Q 22	**Domain of** $\sin^{-1}x\ is$ **(a)** $[0,1]$ **(b)**$(-\infty,\infty)$ **(c)** $[0,\pi]$ **(d)**$[-1,1]$
Q 23	$\sin\left[\tan^{-1}(-\sqrt{3})+\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)\right]=\cdots$ **(a)** 1 **(b)**-1 **(c)** 0 **(d)**2
Q 24	**The solution set of** $\sin^{-1}x\le\cos^{-1}x\ is$ **(a)** $\frac{1}{\sqrt{2}}\le x\le 1$ **(b)**$-\frac{1}{\sqrt{2}}\le x\le 1$ **(c)** $-1\le x\le\frac{1}{\sqrt{2}}$ **(d)**$-\frac{1}{\sqrt{2}}\le x\le\frac{1}{\sqrt{2}}$
Q 25	**If** $\tan^{-1}x>\cot^{-1}x\ then\ \ldots$ **(a)**$x>1$ **(b)**$x<1$

	(c) $x = 1$ **(d)** $x \in R$
Q 26	**Value of** $\cos\left[\frac{\pi}{6} + \cos^{-1}\left(-\frac{1}{2}\right)\right] = \cdots$ **(a)** $-\frac{\sqrt{3}}{2}$ **(b)** $\frac{\sqrt{3}-1}{2\sqrt{2}}$ **(c)** $\frac{\sqrt{5}-1}{4}$ **(d)** $\frac{\sqrt{3}+1}{2\sqrt{2}}$
Q 27	**If** $\sin^{-1} x = y, then$ **(a)** $-\frac{\pi}{2} < y < \frac{\pi}{2}$ **(b)** $-\frac{\pi}{2} \le y \le \frac{\pi}{2}$ **(c)** $0 < y < \pi$ **(d)** $0 \le y \le \pi$
Q 28	$\cot^{-1}\left(\frac{\sqrt{1-\sin x}+\sqrt{1+\sin x}}{\sqrt{1-\sin x}-\sqrt{1-\sin x}}\right) = \cdots \quad (0 < x < \frac{\pi}{2})$ **(a)** $\frac{x}{2}$ **(b)** $\frac{\pi}{2} - 2x$ **(c)** $2\pi - x$ **(d)** $\pi - \frac{x}{2}$
Q 29	$\cos\left[\tan^{-1}\left\{\cot\left(\sin^{-1}\frac{1}{2}\right)\right\}\right] = \cdots$ **(a)** 1 **(b)** $1/4$ **(c)** $1/8$ **(d)** $1/2$
Q 30	$\cot^{-1}\left(\frac{\sqrt{1+x^2}-1}{x}\right) = \cdots$ **(a)** $-\frac{1}{2}\tan^{-1} x$ **(b)** $\cot^{-1} x$ **(c)** $\frac{\pi}{2} - \frac{1}{2}\tan^{-1} x$ **(d)** $\frac{\pi}{2} - \frac{1}{2}\cot^{-1} x$
	CASE STUDY: 1 **Read the following text and answer on the basis of the same:** **The value of an inverse trigonometric function which lies in the**

	range of principal branch is called the principal value of that inverse trigonometric function.
Q 1	**Principal value of** $\sin^{-1}\left(\frac{1}{2}\right)$ is **(a)**$\frac{\pi}{6}$ **(b)**$\frac{\pi}{3}$ **(c)**$\frac{\pi}{4}$ **(d)**$\frac{\pi}{2}$
Q 2	**Principal value of** $\tan^{-1}(1)$ is **(a)**$\frac{\pi}{3}$ **(b)** π **(c)**$\frac{\pi}{4}$ **(d)**$\frac{\pi}{6}$
Q 3	**Principal value of** $\cot^{-1}(\sqrt{3})$ is **(a)**$\frac{\pi}{4}$ **(b)**$\frac{\pi}{2}$ **(c)**$\frac{\pi}{6}$ **(d)**$\frac{\pi}{2}$
Q 4	**Principal value of** $\sin^{-1}(1) + sin^{-1}\left(\frac{1}{\sqrt{2}}\right)$ is **(a)**2π **(b)** π **(c)**$\frac{3\pi}{4}$ **(d)**$\frac{\pi}{3}$
Q 5	**Principal value of** $2\cos^{-1}(1) + 5\ sin^{-1}\left(\frac{1}{\sqrt{2}}\right)$ is **(a)**$\frac{3\pi}{4}$ **(b)**$\frac{\pi}{4}$ **(c)**$\frac{\pi}{2}$ **(d)**$\frac{5\pi}{4}$
	CASE STUDY: 2 **The Government of India is planning to fix a hoarding board at the face of a building on the road of a busy market for awareness on COVID-19 protocol. Ram, Robert and Rahim are the three engineers who are working on this project. "A" is considered to be a person viewing the hoarding board 20 metres away from the building, standing at the edge of a pathway nearby. Ram, Robert and Rahim suggested to the firm to place the hoarding board at three different locations namely C, D and E. "C" is at the height of**

	10 metres from the ground level. For the viewer A, the angle of elevation of "D" is double the angle of elevation of "C" The angle of elevation of "E" is triple the angle of elevation of "C" for the same viewer. **Look at the figure given and based on the above information answer the following:** 
Q 1	Measure of $\angle CAB$ = **(a)**$\tan^{-1} 2$ **(b)**$\tan^{-1}(\frac{1}{2})$ **(c)**$\tan^{-1} 1$ **(d)**$\tan^{-1} 3$
Q 2	Measure of $\angle DAB$ = **(a)**$\tan^{-1}\frac{3}{4}$ **(b)**$\tan^{-1}(3)$ **(c)**$\tan^{-1}\frac{4}{3}$ **(d)**$\tan^{-1} 4$
Q 3	Measure of $\angle EAB$ = **(a)**$\tan^{-1} 11$ **(b)**$\tan^{-1}(3)$ **(c)**$\tan^{-1}\frac{2}{11}$ **(d)**$\tan^{-1}\frac{11}{2}$
Q 4	**A' is another viewer standing on the same line of observation across the road. If the width of the road is 5 meters, then the difference between** $\angle CAB$**and**$\angle CA'B$ **is**

	(a)$\tan^{-1}\left(\frac{1}{2}\right)$ **(b)**$\tan^{-1}\left(\frac{1}{8}\right)$ **(c)**$\tan^{-1}\frac{2}{5}$ **(d)**$\tan^{-1}\frac{11}{21}$
Q 5	**Domain and range of** $\tan^{-1}x =$ **(a)**$R^{+},\left(-\frac{\pi}{2},\ \frac{\pi}{2}\right)$ **(b)**$R^{-},\left(-\frac{\pi}{2},\ \frac{\pi}{2}\right)$ **(c)**$R\ ,\left(-\frac{\pi}{2},\frac{\pi}{2}\right)$ **(d)**$R\ ,\left(0,\frac{\pi}{2}\right)$
	CASE STUDY: 3  **Two men on either side of a temple of 30 meters high observe its top at the angles of elevation α and β respectively. (As shown in the figure above). The distance between the two men is 40√3 meters and the distance between the first person A and the temple is 30√3 meters.** **Based on the above information answer the following:**
Q 1	$\angle CAB = \alpha =\ldots$ **(a)**$\sin^{-1}\left(\frac{2}{\sqrt{3}}\right)$ **(b)**$\sin^{-1}\left(\frac{1}{2}\right)$ **(c)**$\sin^{-1}(2)$ **(d)**$\sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$
Q 2	$\angle CAB = \alpha =\ldots$ **(a)**$cos^{-1}\left(\frac{1}{5}\right)$ **(b)**$\cos^{-1}\left(\frac{2}{5}\right)$ **(c)**$cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$ **(d)**$cos^{-1}\left(\frac{4}{5}\right)$
Q 3	$\angle B\mathrm{CA} = \beta =\ldots$

	(a)$\tan^{-1}(\frac{1}{2})$ **(b)**$\tan^{-1}(2)$ **(c)**$\tan^{-1}\frac{1}{\sqrt{3}}$ **(d)**$\tan^{-1}\sqrt{3}$
Q 4	$\angle$ABC= **(a)**$\frac{\pi}{4}$ **(b)**$\frac{\pi}{6}$ **(c)**$\frac{\pi}{2}$ **(d)**$\frac{\pi}{3}$
Q 5	**Domain and range of** $COS^{-1}x =$ **(a)**$(-1,1),(0,\pi)$ **(b)**$[-1,1],(0,\pi)$ **(c)**$[-1,1],[0,\pi]$ **(d)**$(-1,1),\left[-\frac{\pi}{2},\ \frac{\pi}{2}\right]$

P.T.O. FOR ANSWERS TO MCQS ON ITF

ANSWERS
TERM – 1 MATHS CONTENT
CLASS: XII MATHEMATICS (041)
CHAPTER:2 INVERSE TRIGONOMETRIC FUNCTIONS

Q1	**(c)** $[0, \pi]$
Q2	**(d)** $[-\frac{\pi}{2}, \frac{\pi}{2}] - \{0\}$
Q3	**(d)** $\frac{-\pi}{10}$
Q4	**(a)** $[0, 1]$
Q 5	**(a)** $[1, 2]$
Q 6	**(a)** $\frac{\pi}{2}$
Q 7	**(b)** $\frac{5\pi}{6}$
Q 8	**(c)** $-1 < x \leq \frac{1}{\sqrt{2}}$
Q 9	**(b)** $\frac{5\pi}{6}$
Q10	**(b)** $\frac{\pi}{3}$
Q11	**(a)** $-\frac{\pi}{3}$
Q 12	**(a)** $\frac{5\pi}{6}$
Q13	**(c)** $-\frac{\pi}{6}$
Q14	**(d)** 1
Q15	**(b)** $3/5$
Q16	**(d)** $3/5$
Q 17	**(c)** $3/2$
Q 18	**(d)** $\frac{3\pi}{2}$
Q 19	**(b)** $\frac{2\pi}{3}$
Q 20	**(a)** $-\frac{\pi}{4}$
Q 21	**(b)** $-1/2$
Q 22	**(d)** $[-1, 1]$
Q 23	**(a)** 1
Q 24	**(c)** $-1 \leq x \leq \frac{1}{\sqrt{2}}$
Q 25	**(a)** $x > 1$
Q 26	**(a)** $-\frac{\sqrt{3}}{2}$
Q 27	**(b)** $-\frac{\pi}{2} \leq y \leq \frac{\pi}{2}$
Q 28	**(d)** $\pi - \frac{x}{2}$

Q 29	**(d)** $1/2$
Q 30	**(c)** $\frac{\pi}{2} - \frac{1}{2}\tan^{-1} x$
	ANSWER TO CASE STUDY: 1
Q 1	**(a)** $\frac{\pi}{6}$
Q 2	**(c)** $\frac{\pi}{4}$
Q 3	**(c)** $\frac{\pi}{6}$
Q 4	**(c)** $\frac{3\pi}{4}$
Q 5	**(d)** $\frac{5\pi}{4}$
	ANSWER TO CASE STUDY: 2
Q 1	**(b)** $\tan^{-1}(\frac{1}{2})$
Q 2	**(c)** $\tan^{-1}\frac{4}{3}$
Q 3	**(d)** $\tan^{-1}\frac{11}{2}$
Q 4	**(b)** $\tan^{-1}\left(\frac{1}{8}\right)$
Q 5	**(c)** $R, \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$
	ANSWER TO CASE STUDY: 3
Q 1	**(b)** $\sin^{-1}\left(\frac{1}{2}\right)$
Q 2	**(c)** $cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$
Q 3	**(d)** $\tan^{-1}\sqrt{3}$
Q 4	**(c)** $\frac{\pi}{2}$
Q 5	**(c)** $[-1, 1], [0, \pi]$

NAME OF TEACHER: RAJENDER PARMAR

NAME OF KV : K V INS VALSURA

KENDRIYA VIDYALAYA SANGATHAN AHMEDABAD REGION
TERM – 1 MATHS CONTENT
CLASS: XII
CHAPTER : MATRICES

1. A matrix is an ordered rectangular array of numbers or functions.
2. A matrix having m rows and n columns is called a matrix of order m X n
3. $[\ a_{ij}\ ]_{m \times 1}$ is a column matrix.
4. $[\ a_{ij}\ ]_{1 \times n}$ is a row matrix .
5. An m X n matrix is a square matrix if m = n
6. A = $[\ a_{ij}\ ]_{m \times m}$ is a diagonal matrix if $a_{ij} = 0$ when $i \neq j$
7. A = $[\ a_{ij}\ ]_{m \times m}$ is a scalar matrix if $a_{ij} = 0$ when $i \neq j$, $a_{ij} = k$ (k is some constant),When $i = j$
8. A = $[\ a_{ij}\ ]_{m \times m}$ is an identity matrix if $a_{ij} = 1$ when $i = j$, $a_{ij} = 0$ when $i \neq j$
9. A = $[\ a_{ij}\ ]$ = $[\ b_{ij}\ ]$ = B if (i) A and B are of same order , (ii) $a_{ij} = b_{ij}$
   For all possible values of i and j
10. K A = k $[\ a_{ij}\ ]_{m \times n}$ = $[\ k\, a_{ij}\ ]_{m \times n}$
11. –A = (-1) A
12. A – B = A + (-B)
13. A + B = B + A where A and B are of same order
14. (A + B) + C = A + (B + c) where A , B and C are of same order.
15. K (A + B) = k A + k B where A and B are of same order , k is constant.
16. (k + m) A = k A + m A where ka dn m are constant.
17. (i) A (BC) = (AB) C (ii) A (B+C) = AB + AC (iii) (A +B) C = AC +BC
18. If A = $[\ a_{ij}\ ]_{m \times n}$ then A' = $[\ a_{ji}\ ]_{n \times m}$
19. (i) $(A')'$ = A (ii) $(k\,A)'$ = k A' (iii) $(A+B)' = A' + B'$

    (iv) $(AB)' = B'\ A'$

20. A is symmetric matrix if A' = A
21. A is skew symmetric matrix if A' = - A
22. Any square matrix A can be represented as the sum of a symmetric $\frac{1}{2}\ (A+A)'$ and a skew symmetric matrix $\frac{1}{2}\ (A-A)'$.
23. If A and B are two square matrix such that AB = BA = I , then B is the inverse of A and is denoted by A^{-1} and A is inverse of B.
24. If A and B are invertible matrices of same order , $(AB)^{-1} = B\ \ A^{-1}$
25. Inverse of a square matrix , if it exists , is unique.

MCQ

Q1	If $A = [\,2\ \ -3\ \ 4\,]$, $B = \begin{bmatrix} 3 \\ 2 \\ 2 \end{bmatrix}$ $X = [\,1\ 2\ 3\,]$, $Y = \begin{bmatrix} 2 \\ 3 \\ 4 \end{bmatrix}$ AB + XY equals to (a) [28] (b) [24] (c) [12] (d) [-28]
Q2	The number of all possible matrices of order 3 X 3 will each entry 0 or 1 is (a) 27 (b) 18 (c) 81 (d) 512.
Q3	If matrix A is both symmetric and skew symmetric , then (a) A is diagonal matrix (b) A is square and zero matrix (c) A is square matrix (d) None of these
Q 4	If A = $\begin{bmatrix} \alpha & 0 \\ 1 & 1 \end{bmatrix}$ and B = $\begin{bmatrix} 1 & 0 \\ 5 & 1 \end{bmatrix}$, then the value of α for which A^2 = B is (a) 1 (b) -1 (c) 4 (d) Not possible to find
Q 5	C is a skew symmetric matrix of order n , X is a column matrix of order n X 1 then X' C X is a (a) square matrix (b) identity matrix (c) zero marix (d) None of these
Q 6	A is a 3 X 4 matrix . A matrix B is such that A' B and B A' are defined .Then the order of B is (a) 3 X 4 (b) 3 X 3 (c) 4 X 4 (d) 4 X 3
Q 7	. If A = $\begin{bmatrix} a & b \\ b & a \end{bmatrix}$ $A^2 = \begin{bmatrix} x & y \\ y & x \end{bmatrix}$ then value of x and y are (a) x = $a^2 + b^2$ y = $a^2 - b^2$ (b) x = 2 a b y = $a^2 + b^2$

	(c) x = $a^2 + b^2$ y = ab (d) x = $a^2 + b^2$ y = 2 a b
Q 8	If $A = \begin{bmatrix} 1 & 3 \\ 3 & 4 \end{bmatrix}$ and $A^2 - kA - 5I = 0$ then the value of k is (a) 3 (b) 7 (c) 5 (d) 9
Q 9	If $A \begin{bmatrix} 1 & -2 & -5 \\ 3 & 4 & 0 \end{bmatrix} = \begin{bmatrix} -1 & -8 & -10 \\ 1 & -2 & -5 \\ 9 & 22 & 15 \end{bmatrix}$ then A is (a) $\begin{bmatrix} 2 & -1 & 1 \\ 0 & -3 & 4 \end{bmatrix}$ (b) $\begin{bmatrix} 5 & -2 \\ 1 & 0 \\ -3 & 4 \end{bmatrix}$ (c) $\begin{bmatrix} 2 & -1 \\ 1 & 0 \\ -3 & 4 \end{bmatrix}$ (d) $\begin{bmatrix} -1 & 1 & 0 \\ 2 & -3 & 4 \end{bmatrix}$
Q10	If $A = \begin{bmatrix} 1 & -2 & 2 \\ 4 & -3 & 0 \\ 5 & -1 & 6 \end{bmatrix}$ $B = \begin{bmatrix} 1 & 2 & 3 \\ -4 & -5 & -6 \\ 7 & -8 & 9 \end{bmatrix}$ then the element of second column and third row of AB is (a) 1 (b) -44 (c) 30 (d) -33
Q11	The diagonal elements of a skew symmetric matrix are (a) all zeros (b) are all equal to some scalar k not equal to zero (c) can be any number (d) None of these
Q 12	If $A = \begin{bmatrix} 3 & x+1 \\ 2x+3 & x+2 \end{bmatrix}$ is a symmetric matrix , then x is (a) 4 (b) 2 (c) -4 (d) -2
Q 13	Choose the correct statement: (a) Every identity matrix is a scalar matrix . (b) Every scalar matrix is a identity matrix. (c) Each diagonal matrix is a identity matrix. (d) A square matrix with all the elements 1 is an identity matrix.
Q14	If A is square matrix such that $A^2 = A$, then $(I + A)^2 - 3A$ is (a) I (b) 2 A (c) 3 I (d) A

Q15	The values of x , y and z , if $\begin{bmatrix} x+y+z \\ x+z \\ y+z \end{bmatrix} = \begin{bmatrix} 9 \\ 5 \\ 7 \end{bmatrix}$ are (a) x = 2 y = 3 z = 4 (b) x = 2 y = 4 z = 3 (c) x = 3 y = 4 z = 2 (d) x = 3 y = 2 z = 4
Q16	If matrix $A = \begin{bmatrix} a & b \\ c & -a \end{bmatrix}$ is the square root of the 2 X 2 identity matrix , then the relation a between a, b and c is (a) $a^2 + bc - 1 = 0$ (b) $a^2 - bc - 1 = 0$ (c) $a^2 + bc + 1 = 0$ (d) $-a^2 + bc - 1 = 0$
Q 17	Suppose 3 X 3 matrix A = $[aij]$, whose elements are given by $a_{ij} = i^2 - j^2$ Then a_{32} is equal to (a) 5 (b) 1 (c) 2 (d) 3
Q 18	If $\begin{bmatrix} 1 & 2 \\ -2 & -b \end{bmatrix} + \begin{bmatrix} a & 4 \\ 3 & 2 \end{bmatrix} = \begin{bmatrix} 5 & 6 \\ 1 & 0 \end{bmatrix}$, then $a^2 + b^2$ is equal to (a) 20 (b) 22 (c) 12 (d) 10
Q 19	$X \begin{bmatrix} 2 \\ 3 \end{bmatrix} + y \begin{bmatrix} -1 \\ 1 \end{bmatrix} = \begin{bmatrix} 10 \\ 5 \end{bmatrix}$ then the value of x is (a) 0 (b) 3 (c) 7 (d) 10
Q 20	If $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ a & b & -1 \end{bmatrix}$ then A^2 is equal to (a) 0 (b) - A (c) I (d) 2 A
Q 21	If $\begin{bmatrix} x & -5 & -1 \end{bmatrix} \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix} \begin{bmatrix} x \\ 4 \\ 1 \end{bmatrix}$ = O then the value of x is (a) $5\sqrt{5}$ (b) $\pm 4\sqrt{3}$ (c) $\pm 3\sqrt{5}$ (d) $\pm 6\sqrt{5}$
Q 22	If A = $\begin{bmatrix} 1 & 0 \\ -1 & 7 \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, then the value of k so that $A^2 = 8A + kI$ is (a) 4 (b) 5 (c) 6 (d) – 7

Q 23	If X = $\begin{bmatrix} 3 & -4 \\ 1 & -1 \end{bmatrix}$, B = $\begin{bmatrix} 5 & 2 \\ -2 & 1 \end{bmatrix}$ and A = $\begin{bmatrix} p & q \\ r & s \end{bmatrix}$ satisfy the equation AX = B Then the matrix A is equal to (a) $\begin{bmatrix} -7 & 26 \\ 1 & -5 \end{bmatrix}$ (b) $\begin{bmatrix} 7 & 26 \\ 4 & 17 \end{bmatrix}$ (c) $\begin{bmatrix} -7 & -4 \\ 26 & 13 \end{bmatrix}$ (d) $\begin{bmatrix} -7 & 26 \\ -6 & 23 \end{bmatrix}$
Q 24	If A = $[\, a_{ij} \,]_{m \times n}$, then A' is equal to (a) $[\, a_{ji} \,]_{n \times m}$ (b) $[\, a_{ij} \,]_{m \times n}$ (c) $[\, a_{ji} \,]_{m \times n}$ (d) $[\, a_{ij} \,]_{n \times m}$
Q 25	If A and B are symmetric matrices of same order , then AB – BA is a (a) Skew symmetric matrix (b) Symmetric matrix (c) Zero matrix (d) Identity matrix
Q 26	If A = $\begin{bmatrix} 0 & c & -b \\ -c & 0 & a \\ b & -a & 0 \end{bmatrix}$ and B = $\begin{bmatrix} a^2 & ab & ac \\ ab & b^2 & bc \\ ac & bc & c^2 \end{bmatrix}$, then AB is (a) B (b) A (c) O (d) I
Q 27	A square matrix A = $[\, a_{ij} \,]_{n \times n}$ is called a diagonal matrix if $a_{ij} = 0$ for (a) i=j (b) i<j (c) i>j (d) i≠j
Q 28	If A = $\begin{bmatrix} 4 & 1 & 0 \\ 1 & -2 & 2 \end{bmatrix}$, B = $\begin{bmatrix} 2 & 0 & -1 \\ 3 & 1 & x \end{bmatrix}$, C = $\begin{bmatrix} 1 \\ 2 \\ 1 \end{bmatrix}$ and D = $\begin{bmatrix} 15 + x \\ 1 \end{bmatrix}$ such that (2 A – 3 B) C = D , then x = (a) 3 (b) -4 (c) -6 (d) 6
Q 29	If A = $\begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ a & 2 & b \end{bmatrix}$ is a matrix satisfying A A^T = 9 I_3 , then the values of a and b respectively are (a) 1, 2 (b) -2 , -1 (c) -1 , 2 (d) -2 , 1

Q 30	If $\begin{bmatrix} 3 & -4 \\ 1 & -1 \end{bmatrix}$ is sum of a symmetric matrix B and a skew symmetric matrix C, then C is (a) $\begin{bmatrix} 1 & -5/2 \\ 5/2 & 0 \end{bmatrix}$ (b) $\begin{bmatrix} 1 & -5/2 \\ 5/2 & 1 \end{bmatrix}$ (c) $\begin{bmatrix} 0 & -5/2 \\ 5/2 & 0 \end{bmatrix}$ (d) $\begin{bmatrix} 1 & -3/2 \\ 5/2 & 1 \end{bmatrix}$
Q 31	If A = $\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$, then A^{16} is equal to : (a) $\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$ (b) $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ (c) $\begin{bmatrix} -1 & 0 \\ 0 & 1 \end{bmatrix}$ (d) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$
Q 32	If A = $\begin{bmatrix} 0 & 2 \\ 3 & -4 \end{bmatrix}$ and k A = $\begin{bmatrix} 0 & 3a \\ 2b & 24 \end{bmatrix}$, then the values of k , a and b are respectively (a) -6,-12,-18 (b) -6,4,9 (c) -6,-4,-9 (d) -6,12,18
	CASE STUDY : 1 Two farmers Ram Kishan and Gurcharan Singh cultivate only three varities of rice namely X , Y and Z . The sale (in ₹) of these varities of rice by both the farmers in the month of September and October are given by the following matrices A and B September sales (in ₹) $A = \begin{array}{c} \begin{array}{ccc} X & Y & Z \end{array} \\ \begin{bmatrix} 10{,}000 & 20{,}000 & 30{,}000 \\ 50{,}000 & 30{,}000 & 10{,}000 \end{bmatrix} \end{array} \begin{array}{l} \\ \textit{RAM KISHAN} \\ \textit{GURCHARAN SINGH} \end{array}$

	October sales (in ₹) $$B = \begin{array}{c} \\ \end{array}\begin{array}{ccc} X & Y & Z \\ \end{array}$$ $$B = \begin{bmatrix} 5,000 & 10,000 & 6,000 \\ 20,000 & 10,000 & 10,000 \end{bmatrix} \begin{array}{l} RAMKISHAN \\ GURCHARAN\ SINGH \end{array}$$ Based on the above information answer the following question:
Q 1	The combined sales in September and October for each farmer in each variety is (a) $\begin{bmatrix} 5,000 & 10,000 & 24,000 \\ 30,000 & 20,000 & 0 \end{bmatrix}$ (b) $\begin{bmatrix} 15,000 & 30,000 & 36,000 \\ 70,000 & 40,000 & 20,000 \end{bmatrix}$ (c) $\begin{bmatrix} 15,000 & 30,000 & 36,000 \\ 30,000 & 20,000 & 0 \end{bmatrix}$ (d) $\begin{bmatrix} 5,000 & 10,000 & 24,000 \\ 70,000 & 40,000 & 20,000 \end{bmatrix}$
Q 2	The change in sales from September to October is (a) $\begin{bmatrix} 5,000 & 10,000 & 24,000 \\ 30,000 & 20,000 & 0 \end{bmatrix}$ (b) $\begin{bmatrix} 15,000 & 30,000 & 36,000 \\ 70,000 & 40,000 & 20,000 \end{bmatrix}$ (c) $\begin{bmatrix} 15,000 & 30,000 & 36,000 \\ 30,000 & 20,000 & 0 \end{bmatrix}$ (d) $\begin{bmatrix} 5,000 & 10,000 & 24,000 \\ 70,000 & 40,000 & 20,000 \end{bmatrix}$
Q 3	If Ram Kishan receive 2 percent profit on gross rupees sales, the profit of Ram Kishan for each variety sold in October is (a) $[\ 200 \quad 200 \quad 120\ ]$ (b) $[\ 100 \quad 100 \quad 120\ ]$ (c) $[\ 100 \quad 200 \quad 220\ ]$ (d) $[\ 100 \quad 200 \quad 120\ ]$
Q 4	If Gurcharan receive 3 percent profit on gross rupees sales , the profit of Gurcharan Singh for each variety sold in October is (a) $[\ 600 \quad 600 \quad 300\ ]$ (b) $[\ 600 \quad 600 \quad 600\ ]$ (c) $[\ 600 \quad 300 \quad 300\ ]$ (d) $[\ 300 \quad 300 \quad 300\ ]$
	CASE STUDY : 2 Three schools DPS , CVC and KVS decided to organize a fair for collecting money for helping the food victims They sold handmade fans , mats and plates from recycled material at a cost of ₹ 25 , ₹ 100 and ₹ 50 each respectively. The numbers of articles sold are given as

School / Article	DPS	CVC	KVS
Handmade fans	40	25	35
Mats	50	40	50
Plates	20	30	40

Based on the information given above , answer the following questions.

Q 1 What is the total money (in ₹) collected by the school DPS?

(a) 700 (b) 7000 (c) 6125 (d) 7875

Q 2 What is the total amount of money (in ₹) collected by schools CVC and KVS?

(a) 14000 (b) 15725 (c) 21000 (d) 13125

Q 3 What is the total amount of money (in ₹) collected by all three schools DPS , CVC and KVS ?

(a) 15775 (b) 14000 (c) 21000 (d) 17125

Q 4 If the number of handmade fans and plates are interchanged for all the schools , then what is the total money (in ₹) collected by all the schools?

(a) 18000 (b) 6750 (c) 5000 (d) 21250

Q 5 How many articles (in total) are sold by three schools ?

(a) 230 (b) 130 (c) 430 (d) 330

CASE STUDY : 3

On her birthday , Seema decided to donate some money to children of an orphanage home.

	 If there were 8 children less , everyone would have got Rs 10 more.However , if there were 16 children more,everyone would have got Rs 10 less.Let the number of children be x and the amount distributed by Seema for one child be y (in ₹) Based on the information given above , answer the following questions.
Q 1	The equations in terms are (a) 5x - 4y = 40 , 5x – 8y = - 80 (b) 5x - 4y = 40 , 5x + 8y = 80 (c) 5x - 4y = 40 , 5x + 8y = - 80 (d) 5x + 4y = 40 , 5x – 8y = - 80
Q 2	Which of following matrix equations represent the information given above? (a) $\begin{bmatrix} 5 & 4 \\ 5 & 8 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 40 \\ -80 \end{bmatrix}$ (b) $\begin{bmatrix} 5 & -4 \\ 5 & -8 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 40 \\ 80 \end{bmatrix}$ (c) $\begin{bmatrix} 5 & -4 \\ 5 & -8 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 40 \\ -80 \end{bmatrix}$ (d) $\begin{bmatrix} 5 & 4 \\ 5 & -8 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 40 \\ -80 \end{bmatrix}$
Q 3	The number of children who were given some money by Seema, is (a) 30 (b) 40 (c) 23 (d) 32
Q 4	How much amount (in ₹) is given to each child by Seema ? (a) 32 (b) 30 (c) 62 (d) 26
Q 5	How much amount Seema spends in distributing the money to all the students of the Orphanage?

	(a) ₹609 (b) ₹ 960 (c) ₹906 (d) ₹ 690

ANSWERS

Q 1	A	Q 2	D	Q 3	B	Q 4	d
Q 5	C	Q 6	A	Q 7	D	Q 8	c
Q 9	C	Q 10	D	Q 11	A	Q 12	d
Q 13	a	Q 14	A	Q 15	b	Q 16	a
Q 17	a	Q 18	A	Q 19	b	Q 20	c
Q 21	b	Q 22	D	Q 23	a	Q 24	a
Q 25	a	Q 26	C	Q 27	d	Q 28	c
Q 29	b	Q 30	C	Q 31	d	Q 32	c

Case study 1:

1 – b 2 – a 3 – d 4 – c

Case study 2:

1 – b 2 – a 3 – c 4 – d 5 – d

Case study 3 :

1 – a 2 – c 3 – d 4 – b 5 – b

NAME OF TEACHER : SHILPA TANEJA

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KENDRIYA VIDYALAYA SANGATHAN AHMEDABAD REGION

TERM – 1 MATHS CONTENT

CLASS: XII

CHAPTER: DETERMINANTS

Q1	If the area of a triangle with vertices (-3, 0), (3, 0) and (0, k) is 9 sq units. Then the value of k will be (a)9 (b)3 (c)-9 (d)6
Q2	If $\begin{vmatrix} 2x & 5 \\ 8 & x \end{vmatrix} = \begin{vmatrix} 6 & -2 \\ 7 & 3 \end{vmatrix}$, then value of x is (a) 3 (b) ± 3 (c) ± 6 (d) 6
Q3	If A = $\begin{vmatrix} 2 & \lambda & -3 \\ 0 & 2 & 5 \\ 1 & 1 & 3 \end{vmatrix}$, then A^{-1} exists, if (a) $\lambda = 2$ (b) $\lambda \neq 2$ (c) $\lambda \neq -2$ (d) None of these
Q4	If A and B are matrices of order 3 and $\vert A\vert$ = 5, and $\vert B\vert = 3$, then $\vert 3AB\vert$ is equal to (a) 45 (b) 405 (c) 135 (d) None of these

Q 5	If there are two values of 'a' which makes determinant, $\begin{vmatrix} 1 & -2 & 5 \\ 2 & a & -1 \\ 0 & 4 & 2a \end{vmatrix}$ =86, then sum of these numbers is (a) 4 (b) -5 (c) -4 (d) 9
Q 6	If A is a square matrix of order 3, with $\lvert A \rvert = 9$, then the value of $\lvert 2 \,.\, adj\ A \rvert$ (a) 648 (b) 54 (c) 72 (d) 108
Q 7	If A is a square matrix of order 2 and $\lvert A \rvert$,then value of $\lvert 2\ A\ A' \rvert$ is (a)64 (b) 8 (c) 16 (d) 32
Q 8	If matrix $\begin{bmatrix} 2 & 3 & -1 \\ x+4 & -1 & 2 \\ 3x+1 & 2 & -1 \end{bmatrix}$ is a singular matrix, then the value of x is (a) $\frac{-3}{16}$ (b) $\frac{3}{16}$ (c) $\frac{4}{13}$ (d) $\frac{8}{10}$

Q 9	For matrix $A = \begin{bmatrix} 2 & 5 \\ -11 & 7 \end{bmatrix}$, $(adjA)'$ is equal to: (a) $\begin{bmatrix} -2 & -5 \\ 11 & 7 \end{bmatrix}$ (b) $\begin{bmatrix} 7 & 5 \\ 11 & 2 \end{bmatrix}$ (c) $\begin{bmatrix} 7 & 11 \\ -5 & 2 \end{bmatrix}$ (d) $\begin{bmatrix} 7 & -5 \\ 11 & 2 \end{bmatrix}$
Q10	Given that A = $[a_{ij}]$ is a square matrix of order 3×3 and |A| = −7, then the value of $\sum_{i=1}^{3} a_{i1}\ A_{i1}$, where A_{ij} denotes the cofactor of element a_{ij} is: (a)7 (b)-7 (c) 0 (d)49
Q11	Given that A is a non-singular matrix of order 3 such that $A^2 = 2A$, then value of |2A| is: (a) 4 (b) 8 (c) 64 (d) 16
Q12	Let A = $\begin{vmatrix} 1 & sin\theta & 1 \\ -sin\theta & 1 & sin\theta \\ -1 & -sin\theta & 1 \end{vmatrix}$,where $0 \le \theta \le 2\pi. Then$ (a) Det(A) =0 (b) Det(A) ∈ (2, ∞)

	(c) Det(A) ∈ (2, 4) (d) Det(A) ∈ [2, 4]
Q13	For the matrix $A = \begin{bmatrix} 3 & 2 \\ 1 & 1 \end{bmatrix}$, $A^2 + aA + bI = O$, then the values of numbers a and b is (a) a = 3, b = 2 (b) a = 4, b =3 (c) a = -4, b = 1 (d) a = -3, b = 2
Q14	If A is an invertible matrix of order 3 and $\|A\| = 5$, then value $\|adj\ A\|$ is (a) 15 (b) 45 (c) 35 (d) 25
Q15	If A is a singular matrix, then A (adj A) is (a) Null matrix (b) Scalar matrix (c) Identity matrix (d) None of these
Q16	If A is 3×3 square marix such that A (adj A) = 2I, where I is the identity matrix, The value of $\|adj\ A\|$ is (a) 4 (b) -4 (c) 0 (d) none of these

Q17	If the value of a third order determinant is 12, then the value of the determinant formed by replacing each element by its cofactors will be (a) 12 (b) 144 (c) -12 (d) 13
Q18	If A is a square matrix of order 3×3 such that $\|A\| = 2$, then the value of $\|adj(adj\ A)\|$ is (a)-16 (b) 16 (c) 0 (d) 2
Q19	If A is a square matrix of order 3×3 such that $\|A\| = 4$, then the value of $\|A\ (adj\ A)\|$ is (a) 4 (b) 16 (c) 12 (d) 48
Q20	If A is a square symmetric matrix of order 3 then the value of $\|A\|$ is (a)0 (b)3 (c)9 (d)27
Q21	If $A = \begin{bmatrix} a & 0 & 0 \\ 0 & a & 0 \\ 0 & 0 & a \end{bmatrix}$,then (adj A) is equal to (a) a^{27} (b) a^6 (c) a^9 (d) a^3

Q22	Let $A = \begin{bmatrix} 200 & 50 \\ 10 & 2 \end{bmatrix}$ and B $= \begin{bmatrix} 50 & 40 \\ 2 & 3 \end{bmatrix}$,then $\|AB\|$ is equal to (a) 460 (b) 2000 (c) 3000 (d)-7000
Q23	The value of determinant $\begin{bmatrix} cos20^{\circ} & sin20^{\circ} \\ sin70^{\circ} & cos70^{\circ} \end{bmatrix}$ is (a) 1 (b)-1 (c) 0 (d) $\frac{1}{2}$
Q24	If A is a skew symmetric matrix of odd order n, then (a) $\|A\| = 0$ (b) $\|A\| = 1$ (c) $\|A\| = -1$ (d) None of these
Q25	The minors of the diagonal elements of the determinant $\begin{vmatrix} 3 & -1 & 2 \\ 4 & -1 & 3 \\ 2 & 0 & -1 \end{vmatrix}$ are (a) 1, 7, 1 (b) -1,7,1 (c) 1, -7,1 (d) None of these
Q26	If $\Delta = \begin{vmatrix} a & h & g \\ h & b & f \\ g & f & c \end{vmatrix}$, then the cofactor A_{21} is

	(a) – (hc + fg) (b) fg - hc (c) fg + hc (d) hc - fg
Q27	The matrix is $A = \begin{bmatrix} 2 & 1 & 3 \\ 4 & -1 & 0 \\ -7 & 2 & 1 \end{bmatrix}$ is (a) Singular matrix (b) Non - singular (c) Symmetric matrix (d) Skew symmetric matrix
Q28	The adjoint of the matrix $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ is (a) $\begin{bmatrix} 4 & -2 \\ -3 & 1 \end{bmatrix}$ (b) $\begin{bmatrix} 4 & -3 \\ -2 & 1 \end{bmatrix}$ (c) $\begin{bmatrix} 4 & -2 \\ -3 & -1 \end{bmatrix}$ (d) $\begin{bmatrix} 4 & -2 \\ 1 & -3 \end{bmatrix}$
Q29	If $A = \begin{bmatrix} 1 & 4 \\ 3 & 15 \end{bmatrix}$, then $\lvert A^{-1} \rvert$ is equal to (a) $\frac{-1}{3}$ (b) $\frac{1}{3}$ (c) $\frac{2}{3}$ (d) $\frac{4}{3}$

30	If $A = \begin{bmatrix} 3 & 0 & -1 \\ 2 & 3 & 0 \\ 0 & 4 & 1 \end{bmatrix}$, then find $\lvert adj\ (adj(A)\rvert$ (a)-1 (b)0 (c)1 (d)None of these
	Case Study Based Question Two schools SWAMIVIVEKANANDA and SGRR wants to award their selected students on the basis of values of sincerity, truthfulness and helpfulness. SWAMIVIVEKANANDA wants award ₹x each, ₹y each and ₹z each for three respective values to 3, 2 and 1 students respectively with a total award money of ₹1600. SGRR wants to spend ₹2300 to award its 4,1,3 students on respective values (by giving the same amount to the three values as before). The total amount of the award for one prize on each is ₹900. Based on the given information, answer the following questions :
Q31	The value x + y + z is (a 800 (b)900 (c1000 (d)12000
Q32	The value of 4x + y + z is (a) 1600 (b) 1200 (c) 900 (d) 2300
Q33	The value of y is (a) 200 (b) 250 (c) 300

	(d) 350
Q34	The value of 2x + 3y is (a) 1000 (b) 1100 (c) 1200 (d) 1300
Q35	Y − x is equal to (a) 100 (b) 200 (c) 300 (d) 400
	Case Study Based question A factory produces three items every day. Their production on certain day is 45 Tons. It is found that the production of third item exceeds the production of first item by 8 tons while the total production of first and third item is twice the production of second item. Based on the given information, answer the following questions:
Q36	If x, y, z respectively denotes the quantity (in tons) of first, second and third item produced, then which of the following is true? (a)x + y + z =45 (b)x + 8 = z (c)x − 2y + z =0 (d)All of these
Q37	If $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 0 & -2 \\ 1 & -1 & 1 \end{bmatrix}^{-1} = \frac{1}{6}\begin{bmatrix} 2 & 2 & 2 \\ 3 & 0 & -3 \\ 1 & -2 & 1 \end{bmatrix}$ Then the inverse of $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 0 & -1 \\ 1 & -2 & 1 \end{bmatrix}$ is

	$(a).\begin{bmatrix}\frac{1}{3} & \frac{1}{3} & \frac{1}{3}\\ \frac{1}{2} & 0 & \frac{-1}{2}\\ \frac{1}{6} & \frac{-1}{3} & \frac{1}{6}\end{bmatrix}$ $(b)\begin{bmatrix}\frac{1}{3} & \frac{1}{2} & \frac{1}{6}\\ \frac{1}{3} & 0 & \frac{-1}{3}\\ \frac{1}{6} & \frac{-1}{3} & \frac{1}{6}\end{bmatrix}$ $(c).\begin{bmatrix}\frac{1}{2} & 0 & \frac{-1}{2}\\ \frac{1}{3} & \frac{1}{3} & \frac{1}{3}\\ \frac{1}{6} & \frac{-1}{3} & \frac{1}{6}\end{bmatrix}$ D .None of these
Q38	$x : y : z\ is\ equal\ to$ (a)12: 13 : 20 (b)11: 15: 19 (c)15: 19: 11 (d)13: 12: 20
Q39	Which of the following is not true? (a) $\lvert adj\ A\rvert = \lvert A\rvert^{n-1}$,where n is order of the matrix A (b) $(A')^{-1} = (A^{-1})'$ (c)A is skew symmetric matrix of odd then $\lvert A\rvert = 0$

	(d) All above
Q40	If a matrix B is both symmetric and skew symmetric, then $\|B\|\ is\ equal\ to$ (a)1 (b-1 (c) 0 (d)None of these
	Case Study Based question Mahesh wants to donate a rectangular plot of land for a school of her village. When she was asked by construction agency to give dimensions of the plot, she said that if its length(x) is decreased by 50m and breadth(y) is increased by 50m, then its area will remain same, but if length is decreased by 10m and breadth is decreased by 20m, then its area will be decrease by 5300 m^2. Based on above information answer the following questions:
Q41	The equations in terms of x and y are (a)x-y=50, 2x – y =550 (b)x – y = 100, 2x + y =550 (c) x + y = 50 ,2x + y = 550 (d) x + y = 50, 2x –y =550
Q42	Which of the following matrix equation is represented by the given information? $(a)\begin{bmatrix}1 & -1\\2 & 1\end{bmatrix}\begin{bmatrix}x\\y\end{bmatrix}=\begin{bmatrix}50\\550\end{bmatrix}$ $(b)\begin{bmatrix}1 & 1\\2 & 1\end{bmatrix}\begin{bmatrix}x\\y\end{bmatrix}=\begin{bmatrix}50\\550\end{bmatrix}$ $(c)\begin{bmatrix}1 & 1\\2 & 1\end{bmatrix}\begin{bmatrix}x\\y\end{bmatrix}=\begin{bmatrix}-50\\-550\end{bmatrix}$ $(d)\begin{bmatrix}1 & 1\\2 & -1\end{bmatrix}\begin{bmatrix}x\\y\end{bmatrix}=\begin{bmatrix}50\\550\end{bmatrix}$

Q43	The value of x (length of rectangular plot is (a)150m (b)400m (c) 200m (d)320m
Q44	The value of y (breadth of rectangular plot) is (a)150m (b)200m (c) 430m (d)350m
Q45	How much is the area of rectangular field? (a)60000sq. m (b)30000sq.m (c) 40000sq.m (d) 20000sq.m

ANSWERS

1.b 2.c 3.d 4.c 5.c 6.d 7.a 8.a 9.c 10.b 11.b 12.d 13.c 14.d

15.a 16.a 17.b 18.b 19.a 20.a 21.b 22.d 23.c 24.a 25.

26.b 27.b 28.a 29.b 30.c 31.b 32. D 33. C 34.d 35.a 36.d

37.c 38. B 39.d 40.c 41.b 42.a 43.c 44.a 45.b

NAME OF TEACHER: LAXAMN SINGH RAWAT

NAME OF KV :KV NO-3, AFS, MAKARPURA, VADODARA

CONTINUITY AND DIFFERENTIABILITY

SL.NO.	QUESTION
1.	The function $y = \|x-5\|$ is (a) Continuous at x = 5 (b) Differentiable at $x = 5$ (c) Both continuous and differentiable at $x = 5$ (d) Neither continuous nor differentiable at $x = 5$
2	At how many points the function $y = sinx$ is not differentiable? (a) One (b) Two (c) All (d) No
3	$f(x)$ is a polynomial function with degree 7. Which order derivative of the function will be zero? (a) 6 (b) 7 (c) 8 (d) 9
4	The derivative of the function $f(x) = x^x$ w.r.t. 'x' is (a) $1 + \log x$ (b) $x^x(1 + \log x)$ (c) $1+x^x$ (d) None of these
5	The derivative of $\log_{10} x$ w.r.t. 'x' is (a) $\frac{1}{x}$ (b) $\frac{x}{10}$ (c) $\frac{10}{x}$ (d) None of these
6	If $x^y = e^{x-y} then\ \frac{dy}{dx}\ is$ .... (a) $\frac{1+x}{1+lox\ x}$ (b) $\frac{1-\log x}{1+lox\ x}$ (c) Not defined (d) $\frac{\log x}{(1+\log x)^2}$
7	If $y = sin^{-1}\left(\frac{1-x^2}{1+x^2}\right)$, then $\frac{dy}{dx} = \cdots$. (a) $\frac{-2}{1+x^2}$ (b) $\frac{2}{1+x^2}$ (c) $\frac{1}{2-x^2}$ (d) $\frac{2}{2-x^2}$
8	For the curve $\sqrt{x} + \sqrt{y} = 1$, $\frac{dy}{dx}\ at\ \left(\frac{1}{4}, \frac{1}{4}\right)\ is$ ... (a)½ (b) 1 (c) -1 (d) 2
9	Let $f(x) = \|x\| + \|x-1\|$ then (a) f(x) is continuous at x=0 as well as at x=1 (b) f(x) is continuous at x=0 as but not at x=1 (c) f(x) is continuous at x=1 but not at x=0 (d) None of these
10	The value of b for which the function $f(x) = \begin{cases} 5x-4, 0 < x \le 1 \\ 4x^2 + 3bx, 1 < x < 2 \end{cases}$ is continuous at every point of its domain is… (a) -1 (b) 0 (c) 13/3 (d) 1

11	If $y = \sqrt{\sin x + y}$ then dy/dx =... (a)$\frac{\cos x}{2y-1}$ (b) $\frac{\cos x}{1-2y}$ (c) $\frac{\sin x}{1-2y}$ (d) $\frac{\sin x}{2y-1}$
12	If $y = \log(\frac{1-x^2}{1+x^2})$ then dy/dx =... (a)$\frac{4x^3}{1-x^4}$ (b) $\frac{-4x}{1-x^4}$ (c) $\frac{1}{4-x^4}$ (d) $\frac{-4x^3}{1-x^4}$
13	If $y = \sqrt{\tan x}$ then dy/dx at $x = \frac{\pi}{4}$ is given by.. (a)∞ (b) 1 (c) 0 (d) 1/2
14	Which of the followings is true about the greatest integer function $f(x) = [x]$? (a) Everywhere continuous on R (b) Nowhere continuous on R (c) Continious on R – Z (d) None of these
15	If $y = x\|x\|$ then dy/dx for x < 0 is (a)2x (b) -2x (c) 0 (d) None of these
16	Let $f(x) = \begin{cases} x + a \ if \ x \geq 1 \\ ax^2 + 1 \ if \ x < 1 \end{cases}$ then f is differentiable at x = 1 if (a)a= 1 (b) a=0 (c) a=2 (d) a = ½
17	The function $f(x) = sin^{-1}(\cos x) \ \ is$.. (a) discontinuous at x = 0 (b) continuous at x =0 (c) Differentiable at x = 0 (d) None of these
18	If $x = 2at \ and \ y = at^2, where \ a \ is \ a \ constant \ then \ \frac{d^2y}{dx^2} \ at \ x = \frac{1}{2} \ is$ (a)$\frac{1}{2a}$ (b) 1 (c) 2a (d) None of these
19	If $x = t^2 and \ y = \ t^3 \ then \ \frac{d^2y}{dx^2} =$ (a)3/2 (b) 3/4t (c) 3/2t (d) 3t/2
20	If $y = \ e^{tanx} \ then \ (cos^2x)y_2 = \cdots$ (a)(1-sin 2x) y_1 (b) – (1+ sin 2x) y_1 (c) (1+ sin 2x) y_1 (d) None of these
21	The derivative of sin x w.r.t. cosx is (a) 1 (b) -1 (c) 0 (d) None of these
22	Sin (x+y) = log (x+y) then $\frac{d^2y}{dx^2} = \cdots$

	(a) 2 (b) -2 (c) 1 (d) -1
23	Y = a sin mx + b cos mx then $\frac{d^2y}{dx^2} = \cdots$ (a) $-m^2y$ (b) m^2y (c) -my (d) my
24	y = a x^{n+1} + b x^{-n} then $x^2 \frac{d^2y}{dx^2} = \cdots$ (a) n (n-1) y (b) n (n+1)y (c) ny (d) n^2y
25	The derivative of $\cos^{-1}(2x^2-1)$ with respect to $\cos^{-1}x$ is…. (a) 2 (b) $\frac{1}{2\sqrt{x^2-1}}$ (c) 2/x (d) $1-x^2$
26	The derivative of $(\sin x)^{\sin x}$ w.r.t. x is (a) $(\sin x)^{\sin x}$ (1 + log(sinx)) (b) $(\sin x)^{\sin x}$ (1 + log(sinx)) cosx (c) $(\sin x)^{\sin x}$ (1 - log(sinx)) cosx (d) None of these
27	$\frac{d}{dx}\{tan^{-1}\left(\frac{\cos x}{1+sinx}\right)\}$ = … (a) 1/2 (b) -1/2 (c) 1 (d) -1
28	Derivative of x^2 w.r.t. x^3 is…. (a) $\frac{3}{2x}$ (b) $\frac{2}{3x}$ (c) $\frac{3x}{2}$ (d) None
29	Derivative of $\sin x^0$ w.r.t. x is…. (a) Cos x (b) $\cos x^0$ (c) $\frac{180}{\pi}\cos x^0$ (d) None of these

CASE STUDY QUESTIONS

Q-1

Let f(x) be a real valued function, then its

Left Hand Derivative (L.H.D) at the point **a** is **f'(a-) =** $\lim_{x\to 0}\frac{f(a-h)-f(a)}{-h}$ and

Right Hand Derivative (R.H.D) at the point **a** is **f'(a+) =** $\lim_{x\to 0}\frac{f(a+h)-f(a)}{h}$, also a

function f(x) is said to be differentiable at **x= a** and if its L.H.D and R.H.D at **x = a**

exist and are equal. For the function f(x) = $\begin{cases} |x-3| & , x \geq 1 \\ \frac{x^2}{4} - \frac{3x}{2} + \frac{13}{4} & , x < 1 \end{cases}$

Answer the following questions:

1 L.H.D of f(x) at x = 1 is

(a) 1	(b). -1
(c) 0	(d) 2

2 f(x) is non differentiable at

(a) x = 1	(b) x = 2
(c) x = 3	(d) x = 4

3 Find the value of f'(2)

(a) 1	(b) 2
(c) 3	(d) -1

4 Find the value of f'(-1)

(a) x = 1	(b) x = 2
(c) x = -2	(d) x = -1

5 R.H.D of f(x) at x = 1 is

(a) 1	(b) -1
(c) 0	(d) 2

Q-2

A function f(x) is said to be continuous in an open interval (a,b) , if it is continuous at every point in the interval.

A function f(x) is said to be continuous in an closed interval [a,b] , if f(x) is continuous in (a,b) and

$\lim_{h\to 0} f(a+h)$ = f(a) and $\lim_{h\to 0} f(b-h)$ = f(b).

If function f(x) = $\begin{cases} \dfrac{\sin(a+1)x+\sin x}{x}, & x<0 \\ c, & x=0 \\ \dfrac{\sqrt{x+bx^2}-\sqrt{x}}{bx^{\frac{3}{2}}}, & x>0 \end{cases}$

Is continuous at x = 0 ,**then answer the following questions**:

1 The value of **a**is :

(a)	-3/2	(b)	1/2
(c)	0	(d)	-1/2

2 The value of **b**is :

(a)	1	(b)	-1
(c)	0	(d)	Any real number except 0

3 The value of **c**is :

(a)	1	(b)	1/2
(c)	-1	(d)	-1/2

4 The value of **c - a** is :

(a)	1	(b)	-1
(c)	0	(d)	2

5 The value of **a +c** is :

(a)	1	(b)	-1
(c)	0	(d)	2

PREPARED BY

SHIRINKUMAR PANDYA

PGT-MATHS

KV-2 KRIBHCO (SURAT)

KENDRIYA VIDYALAYA SANGATHAN AHMEDABAD REGION
TERM – 1 MATHS CONTENT
CLASS: XII
CHAPTER : APPLICATION OF DERIVATIVES

Q1	The function f(x) ,defined as $f(x) = 4 - 3x + 3x^2 - x^3$ is: (a) Decreasing on R (b) Increasing on R (c) strictly increasing on R (d) Strictly decreasing on R
Q2	The interval in which function $y=x^2e^{-x}$ is increasing is: (a) $(-\infty,\infty)$ (b) $(-2,0)$ (c) $(2,\infty)$ (d) $(0,2)$
Q3	The function f(x)= cos x-sin x has maximum or minimum value at x= (a) $\frac{\pi}{4}$ (b) $\frac{3\pi}{4}$ (c) $\frac{\pi}{2}$ (d) $\frac{\pi}{3}$
Q4	The interval in which the function $f(x) = \sin^4 x + \cos^4 x,\ 0 \le x \le \frac{\pi}{2}$ is strictly increasing is: (a) $(\frac{\pi}{3},\frac{\pi}{2})$ (b) $(\frac{\pi}{4},\frac{\pi}{2})$ (c) $(\frac{\pi}{6},\frac{\pi}{2})$ (d) $(0,\frac{\pi}{2})$
Q 5	The function f(x)=ax+b is strictly decreasing for all $x \in R$ iff: (a) a=0 (b) a<0

	(c) a>0 (d) none of these
Q 6	The function $f(x)=x^x$ is decreasing in the interval:. (a) (0,e) (b) (0,1/e) (c) (0,1) (d) none of these
Q 7	The function $f(x)= [x(x-3)^2]$ is increasing in: (a) $(0,\infty)$ (b)$(-\infty,0)$ (c) (1,3) (d)$(0,3/2)\cup(3,\infty)$
Q 8	The function f(x)=tan x-4x is strictly decreasing on the interval: (a)$(\frac{-\pi}{3},\frac{\pi}{3})$ (b)$(\frac{\pi}{3},\frac{\pi}{2})$ (c)$(-\frac{\pi}{3},\frac{\pi}{2})$ (d)$(\frac{\pi}{2},\pi)$
Q 9	Tangents to the curve $y=x^3+3x$ at x=1 and x=-1 are: (a) parallel (b) intersecting obliquely but not at an angle of 45^0 (c) intersecting at right angle (d) intersecting at an angle of 60^0
Q10	The equation of normal to the curve $3x^2-y^2=8$ which is parallel to the line x+3y=8 is: (a) x+3y=8 (b) x+3y+8=0 (c) x+3y=0 (d)$x+3y\pm8=0$
Q11	The point on curve $y=(x-3)^2$, where the tangent is parallel to the chord joining (3,0) and (4,1) is: (a) (-7/2,1/4) (b) (5/2,1/4)

	(c) (-5/2,1/4) (d)(7/2,1/4)
Q 12	The line y=x+1 is a tangent to the curve y^2=4x at the point (a)(1,2) (b)(2,1) (c) (1,-2) (d)(-1,2)
Q13	The point on the curve y^2=x where tangent makes an angle of $\frac{\pi}{4}$ with x-axis is: (a) (1/2,1/4) (b) (1/4,1/2) (c) (4,2) (d) (1,1)
Q14	The slope of the normal to the curve: x= a(cos $\theta + \theta sin\theta)$, $y = a(\sin\theta - \theta\cos\theta)$ at any point θ is (a) cot θ (b) -tan θ (c) -cot θ (d) tan θ
Q15	.The equation of all lines having slope 2 which are tangent to the curve y=$\frac{1}{x-3}, x \neq 3$ is (a) y=2 (b)y=2x (c)y=2x+3 (d)none of these
Q16	If y=4x-5 is a tangent to the curve y^2=px^3+q at (2,3) then (a) p=-2,q=-7 (b) p=-2,q=7 (c) p=2,q=-7 (d) p=2,q=7
Q 17	The angle of intersection of curves y=x^2 and 6y=7-x^3 at (1,1) is: (a) $\frac{\pi}{2}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{3}$

	(d)π
Q 18	The greatest value of f(x)=$(x+1)^{1/3}$-$(x-1)^{1/3}$ on [0,1] is (a) 1 (b) 2 (c) 3 (d)1/3
Q 19	Twenty meters of wire is available for fencing off a flower bed in the form of a circular sector. Then the maximum area in sq. meters of the flower bed is: (a) 25 (b)30 (c) 12.5 (d)10
Q 20	The shortest distance of the point (0,a) from the curve y=x^2 is (a)$\frac{\sqrt{4a+1}}{2}$ (b) $\frac{\sqrt{1-4a}}{2}$ (c) $\frac{\sqrt{4a-1}}{2}$ (d) $\frac{\sqrt{4a+1}}{3}$
Q 21	Two positive numbers x and y whose sum is 35 and product is x^2y^5 is maximum are (a) 11,24 (b)10,25 (c) 0,35 (d)17,18
Q 22	The minimum value of f(x)=$e^{(2x^2-2x+1)sin^2x}$ (a) 0 (b)1 (c) 2 (d)3
Q 23	If the curves x^2=9A(9-y) and x^2=A(y+1) intersect orthogonally, then the value of A is

	(a) 3 (b)4 (c) 5 (d)7
Q 24	If y= $\frac{ax-b}{(x-1)(x-4)}$ has a turning point P(2,-1),then the value of a and b respectively are (a) 1,2 (b)2,1 (c) 0,1 (d)1,0
Q 25	The height of cylinder of maximum volume that can be inscribed in a sphere of radius a is: (a) 2a/3 (b) 2a/$\sqrt{3}$ (c) a/3 (d) a/5
Q 26	The maximum value of $(\frac{1}{x})^x$ is (a) e (b)e^e (c)1/e^e (d)$(\frac{1}{e})^{\frac{1}{e}}$
Q 27	If a point on the hypotenuse of a triangle is at a distance a and b from the sides of a triangle , then the minimum length of hypotenuse is (a) $(a^{\frac{2}{3}} + b^{\frac{2}{3}})$ (b) $(a^{\frac{2}{3}} + b^{\frac{2}{3}})^{3/2}$ (c) $(a^{\frac{1}{3}} + b^{\frac{1}{3}})^{3/2}$ (d)none of these
Q 28	If a cone of maximum volume is inscribed in a given sphere, then the ratio of height of the cone to diameter of sphere is (a)3/4 (b)1/3 (c) 1/4 (d)2/3

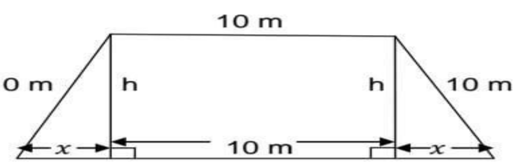
Q 29 If f(x)=a log x+bx^2+x has its extremum values at x=-1 and x=2 then

(a) a=-1/2,b=2
(b) a=1,b=-1
(c) a=-1,b=1
(d) a=2,b=-1/2

Q 30 Semi vertical angle of a right circular cone of given total surface area and maximum volume is

(a) $\cos^{-1}\frac{2}{3}$
(b) $\sin^{-1}\frac{1}{3}$
(c) $\tan^{-1}\sqrt{2}$
(d) $\tan^{-1}\frac{1}{3}$

CASE STUDY : 1 The front gate of a building is in the shape of a trapezium as shown below. Its three sides other than base are 10m each. The height of the gate is h meter. On the basis of this information and figure given below, answer the following questions:



Q 1 The area A of the gate expressed as a function of x is

(a) $(10+x)\sqrt{(100+x^2)}$
(b) $(10-x)\sqrt{(100+x^2)}$
(c) $(10+x)\sqrt{(100-x^2)}$
(d) $(10-x)\sqrt{(100-x^2)}$

Q 2 The value of $\frac{dA}{dx}$ is

(a) $\frac{2x^2+10x-100}{\sqrt{100-x^2}}$

	(b) $\frac{2x^2-10x-100}{\sqrt{100-x^2}}$ (c) $\frac{2x^2+10x+100}{\sqrt{100-x^2}}$ (d) $\frac{-2x^2-10x+100}{\sqrt{100-x^2}}$
Q 3	Value of x, for which $\frac{dA}{dx} = 0$ (a) 10 (b) 5 (c) 20 (d) 15
Q 4	If at the value of x ,where $\frac{dA}{dx}$ =0,area of trapezium is maximum, then maximum area of trapezium is given by: (a) $25\sqrt{3}$ sq. m (b) $100\sqrt{3}$ sq. m (c) $75\sqrt{3}$ sq. m (d) $50\sqrt{3}$ sq. m
Q 5	If area of trapezium is maximum, then value of $\frac{d^2y}{dx^2}$ is: (a) Positive (b) Negative (c) Zero (d) None of these
	CASE STUDY : 2 A company which is located in Surat, Gujarat is manufacturing toys for the kids. If $P(x) = -5x^2 + 125x + 37500$ is the total profit function of a company, where x is the production of the company.

	 Based on above information, answer the following questions:
Q 1	What will be the production when the profit is maximum? a. 37500 b. 12.5 c. -12.5 d. −37500
Q 2	What will be the maximum profit? a. Rs 38,28,125 b. Rs 38281.25 c. Rs 39,000 d. None
Q 3	Check in which interval the profit is strictly increasing . a. (12.5,∞) b. for all real numbers c. for all positive real numbers d. (0, 12.5)
Q 4	When the production is 2 units what will be the profit of the company? a. 37,500 b. 37,730 c. 37,770 d. None
Q 5	What will be production of the company when the profit is Rs 38250? a. 15

	b. 30 c. 2 d. data is not sufficient to find
	CASE STUDY : 3 A student of class XII wants to construct a rectangular tank for his house that can hold 80 cubic feet of water. The top of the tank is open. The width of tank will be 5 ft but length and heights are variables. Building the tank cost Rs 20 per sq. foot for the base and Rs. 10 per square foot for the side.  Based on above information, answer the following :
Q 1	In order to make a least expensive water tank, Student need to minimize its: (a) Cost (b) Curved surface area (c) Volume (d) Base
Q 2	Total cost of tank as a function of h can be represented as (a) $C(h)= 100h-320\ h-720\ h^2$ (b) $C(h)= 100+320\ h+1600\ h^2$ (c) $C(h)=100\ h-320-1600\ h$ (d) $C(h)=100\ h+320+\frac{1600}{h}$
Q 3	Range of h is (a) (0,8) (b) (0,∞) (c) (0,3) (d) (3,5)

Q 4	Value of h at which c(h) is minimum is (a) 6 (b) 6,7 (c) 4 (d) 5
Q 5	The cost of least expensive tank is (a) 1120 (b) 1220 (c) 1100 (d) 1020

ANSWER KEY

1	a
2	a
3	a
4	b
5	b
6	b
7	d
8	a
9	a
10	d
11	d
12	a
13	b
14	c
15	d
16	c

17	a
18	b
19	a
20	c
21	b
22	b
23	b
24	d
25	b
26	c
27	b
28	d
29	c
30	b
	CASE STUDY 1
1	C
2	d
3	b
4	C
5	b
	CASE STUDY 2
1	b
2	b
3	*a*
4	*b*

5	*a*
	CASE STUDY 3
1	a
2	d
3	b
4	c
5	a

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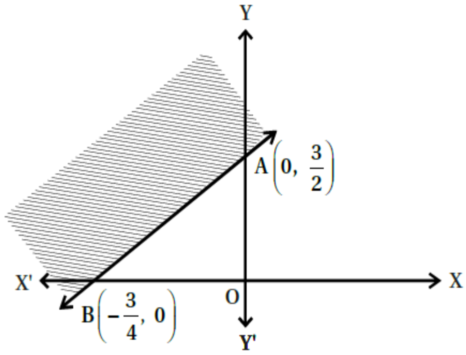
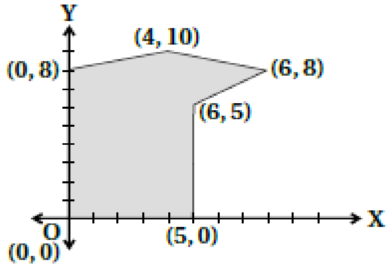
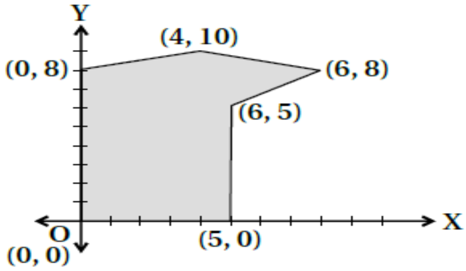
NAME OF KV : KV ONGC MEHSANA

KENDRIYA VIDYALAYA SANGATHAN AHMEDABAD REGION
TERM – 1 MATHS CONTENT
CLASS: XII
CHAPTER : LINEAR PROGRAMMING PROBLEM

Q1	Corner points of the feasible region for an LPP are (0, 2), (3, 0), (6, 0), (6, 8) and (0, 5). Let F = 4x+ 6y be the objective function. The Minimum value of F occurs at .... (a) only (0, 2) (b) only (3, 0) (c) the mid-point of the line segment joining the points (0, 2) and (3, 0) only (d) any point on the line segment joining the points (0, 2) and (3, 0).
Q2	Solution set of the inequality 2x+ y> 5 is .... (a) The half plane containing origin (b) The open half plane not containing origin (c) xy- plane excepts the points on the line 2x+ y= 5 (d) None of these
Q3	The optimal value of the objective function is attained at the points........ (a) given by intersection of inequations with the axes only (b) given by intersection of inequations with X- axis only (c) given by corner points of the feasible region (d) None of these
Q4	Objective function of a LPP is .... (a) constant graph (b) a function to be optimized (c) inequality (d) quadratic equation
Q 5	The maximum value of Z = x+ 4y subject to the constraints 3x+ 6y≤6, 4x+ 8y≥16, x ≥0, y ≥0 is .... (a) 4 (b) 8

	(c) unbounded feasible region (d) Does not exist feasible region
Q 6	Cake-A requires 200 g of flour and 25 g of fat. Cake-B requires 100 g of flour and 50 g of fat. Find the maximum number of cakes which can be made from 5kg of flour and 1 kg of fat. The mathematical form of this LPP is .... (a) $Z = x+ y$, $2x+ y \leq 50$, $x+ 2y \leq 40$, $x \geq 0$, $y \geq 0$ (b) $Z = x+ y$, $2x+ y \leq 5$, $x+ 2y \leq 1$, $x \geq 0$, $y \geq 0$ (c) $Z = x+ y$, $200x+ 100y \leq 5$, $25x+ 50y \leq 1$, $x \geq 0$, $y \geq 0$ (d) $Z = x+ y$, $200x+ 100y > 5$, $25x+ 50y \geq 1$, $x \geq 0$, $y \geq 0$
Q 7	The point at which the maximum value of $Z = 3x+ 2y$ subject to the constraints $x+ 2y \leq 2$, $x \geq 0$, $y \geq 0$ is .... (a) (0, 0) (b) (1.5, – 1.5) (c) (2, 0) (d) (0, 2)
Q 8	The feasible region of the inequality $x+ y \leq 1$ and $x- y \leq 1$ lies in .... quadrants. (a) Only I and II (b) Only I and III (c) Only II and III (d) All the four
Q 9	The position of the points O(0, 0) and P(2, −1) is ...., in the region of the inequality $2y- 3x< 5$. (a) O is inside the region and P is outside the region (b) O and P both are inside the region (c) O and P both are outside the region (d) O is outside the region and P is inside the region

Q10	The constraints $x+ y\leq 4$, $3x+ 3y \geq 18$, $x\geq 0$, $y\geq 0$ defines on .... (a) bounded feasible region (b) unbounded feasible region (c) feasible region in first and second quadrants (d) does not exist
Q11	The production of item A is x and the production of item B is y. If the corner points of the bounded feasible region are (1, 0), (2, 0), (0, 2) and (0, 1) then the maximum profit $z= 2000x+ 5000y$ is .... (a) 20,000 (b) 5,000 (c) 4,000 (d) 10,000
Q 12	The vertices of the feasible region determined by some linear constraints are (0, 2), (1, 1),(3, 3), (1, 5). Let $Z = px+ qy$ where $p, q> 0$. The condition on p and q so that the maximum of Z occurs at both the points (3, 3) and (1, 5) is .... (a) $p= q$ (b) $p= 2q$ (c) $q= 2p$ (d) $p= 3q$
Q13	The maximum value of $Z = 3x+ 4y$ subject to constraints $x+ y \leq 4$, $x\geq 0$, $y\geq 0$ is .... (a) 16 (b) 12 (c) 0 (d) not possible
Q14	The shaded region in the given figure is a graph of .... (a) $4x- 2y\leq 3$ (b) $4x- 2y\leq -3$ (c) $2x- 4y\geq 3$ (d) $2x- 4y\leq -3$ 

Q15	The feasible solution for a LPP is shown in Figure Let $z = 3x - 4y$ be the objective function. Minimum of Z occurs at (a) (0, 0) (b) (0, 8) (c) (5, 0) (d) (4, 10) 
Q16	The feasible solution for a LPP is shown in Figure Let $z = 3x - 4y$ be the objective function. (Maximum value of z + Minimum value of z) is equal to (a) 13 (b) 1 (c) −13 (d) −17 
Q 17	The region represented by the inequation $x - y \leq -1$, $x - y \geq 0$, $x \geq 0$, $y \geq 0$ is .... (a) bounded (b) unbounded (c) do not exist (d) triangular region
Q 18	The maximum value of $Z = x + 3y$ subject to the constraints $2x + y \leq 20$, $x + 2y \leq 20$, $x \geq 0$, $y \geq 0$ is .... (a) 10 (b) 60 (c) 40 (d) 30
Q19	The solution set of the constraints $x + 2y \geq 11$, $3x + 4y \leq 30$, $2x + 5y \leq 30$, $x \geq 0$, $y \geq 0$ includes the point. (a) (2, 3) (b) (3, 2) (c) (3, 4) (d) (4, 3)

Q20	The corner points of the bounded feasible region are (0, 1), (0, 7), (2, 7), (6, 3) (6, 0) (1, 0). For the objective function Z = 3*x* − *y* .... (i) At which point, Z is minimum ? (ii) At which point, Z is maximum ? (iii) The maximum value of Z is .... (iv) The minimum value of Z is .... (a) (i) (2, 7) (ii) (6, 3) (iii) 20 (iv) −1 (b) (i) (0, 7) (ii) (6, 0) (iii) 18 (iv) −7 (c) (i) (0, 1) (ii) (6, 3) (iii) 18 (iv) −1 (d) (i) (0, 7) (ii) (6, 0) (iii) 15 (iv) −7
Q 21	A furniture manufacturer produces tables and bookshelves made up of wood and steel. The weekly requirement of wood and steel is given as below. Material Product p Wood Steel Table (x) 8 2 Book shelf (y) 11 3 The weekly variability of wood and steel is 450 and 100 units respectively. Profit on a table \`1000 and that on a bookshelf is \`1200. To determine the number of tables and bookshelves to be produced every week in order to maximize the total profit, formulation of the problem as L.P.P. is (a) Maximize Z = 1000x + 1200 y Subject to 8x + 11y ≥ 450, 2x + 3y ≤ 100, x ≥ 0, y ≥ 0 (b) Maximize Z = 1000x + 1200 y Subject to 8x + 11y ≤ 450, 2x + 3y ≥ 100, x ≥ 0, y ≥ 0 (c) Maximize Z = 1000x + 1200 y Subject to 8x + 11y ≤ 450, 2x + 3y ≥ 100, x ≥ 0, y ≥ 0 (d) Maximize Z = 1000x + 1200 y Subject to 8x + 11y ≥ 450, 2x + 3y ≥ 100, x ≥ 0, y ≥ 0
Q 22	The feasible solution of LPP .... (A) satisfy all the constraints (B) satisfy some of the constraints (C) always corner points of feasible solution (D) always optimal value of objective function
Q 23	The point at which the maximum value of (3x + 2y) subject to the constraints x + y ≤2, x ≥ 0, y ≥ 0 is obtained, is (a) (0, 0) (b) (1.5, 1.5) (c) (2, 0) (d) (0, 2)

Q 24

The maximum value of $z = 4x + 2y$ subject to constraints $2x + 3y \leq 18$, $x + y \geq 10$ and $x, y \geq 0$, is

(a) 36

(b) 40

(c) 20

(d) None

Q 25

The solution set of the following system of inequations: $x + 2y \leq 3$, $3x + 4y$ t 12, $x \geq 0$, $y \geq 1$, is

(a) bounded region

(b) unbounded region

(c) only one point

(d) empty set

Q 26

A printing company prints two types of magazines A and B. The company earns `10 and `15 on each magazine A and B respectively. These are processed on three machines I, II & III and total time in hours available per week on each machine is as follows:

Magzine →	A(x)	B(y)	Time available
Machine↓			
I	2	3	36
II	5	2	50
III	2	6	60

The number of constraints is

(a) 3

(b) 4

(c) 5

(d) 6

Q 27

Inequation $y - x \leq 0$ represents

(a) The half plane that contains the positive X-axis

(b) Closed half plane above the line $y = x$, which contains positive Y-axis

(c) Half plane that contains the negative X-axis

(d) None of these

Q 28

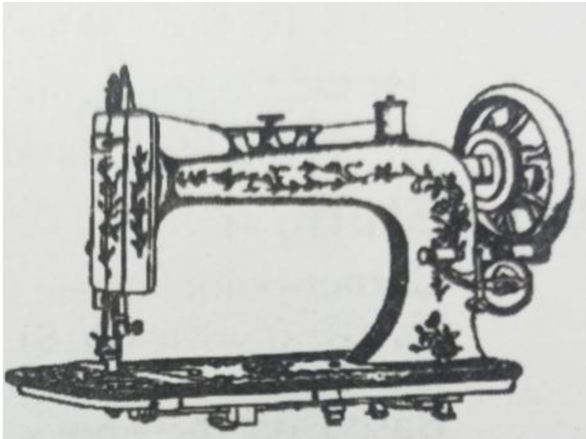
The region represented by the inequalities $x \geq 6$, $y \geq 2$, $2x + y \leq 10$, $x \geq 0$, $y \geq 0$ is

(a) unbounded

(b) a polygon

(c) exterior of a triangle

(d) None of these

Q 29	L.P.P. has constraints of (a) one variables (b) two variables (c) one or two variables (d) two or more variables
Q 30	Which of the following statement is correct? (a) Every L.P.P. admits an optimal solution (b) A L.P.P. admits a unique optimal solution (c) If a L.P.P. admits two optimal solutions, it has an infinite number of optimal solutions (d) The set of all feasible solutions of a L.P.P. is not a convex set.
	CASE STUDY : 1 Suppose a dealer in rural area wishes to purchase a number of sewing machines. He has only Rs. 5760 to invest and has space for at most 20 items for storage. An electronic sewing machine costs him Rs. 360 and a manually operated sewing machine Rs. 240. He can sell an electronic sewing machine at a profit of Rs. 22 and a manually operated sewing machine at a profit of Rs.18. Based on the above information, answer the following questions. 
Q 1	Let x and y denote the number of electronic sewing machines and manually operated sewing machines purchased by the dealer. If it is assumed that the dealer purchased atleast one of the given machines then: (a) $x+y \geq 0$ (b) $x+y < 0$ (c) $x+y > 0$ (d) $x+y \leq 0$
Q 2	Let the constraints in the given problem is represented by the following inequalities: $x+y \leq 20$; $360x+240y \leq 5760$ and $x,y \geq 0$. Then which of the following point lie in its feasible region.

	(a) (0,24) (b) (8,12) (c) (20,2) (d) None of these
Q 3	If the objective function of the given problem is maximize Z = 22x+18y, then its optimal value occur at: (a) (0,0) (b) (16,0) (c) (8,12) (d) (0,2)
Q 4	Suppose the following shaded region APDO, represent the feasible region corresponding to mathematical formulation of the given problem. Then which of the following represent the coordinates of one of its corner points. (a) (0,24) (b) (12,8) (c) (8,12) (d) (6,14)
Q 5	If an LPP admits optimal solution at two consecutive vertices of a feasible region, then (a) The required optimal solution is at a mid pointof the line joining two points. (b) The optimal solution occurs at every point on the line joining these two points. (c) The LPP under consideration is not solvable. (d) The LPP under consideration must be reconstructed
	CASE STUDY : 2

	A manufacturing company makes two models X and Y of a product. Each piece of model X requires 9 labour hours for fabricating and 1 labour hour for finishing. Each piece of model Y requires 12 labour hours of fabricating and 3 labour hours for finishing, the maximum labour hours available for fabricating and finishing are 180 and 30 respectively. The company makes a profit of Rs. 8000 on each piece of model X and Rs. 12000 on each piece of model Y. Assume x is the number of pieces of model X and y is the number of pieces of model Y.  Based on the above information, answer the following questions
Q 1	Which among these is not a constraint for this LPP? (a) $9x+12y \geq 180$ (b) $3x+4y \leq 60$ (c) $x+3y \leq 30$ (d) None of these
Q 2	The shape formed by the common feasible region is: (a) Triangle (b) Quadrilateral (c) Pentagon (d) Hexagon
Q 3	Which among these is a corner point for this LPP? (a) (0,20) (b) (6,12) (c) (12,6) (d) (10,0)
Q 4	Maximum of Z occurs at (a) (0,20) (b) (0,10) (c) (20,10) (d) (12,6)
Q 5	The sum of maximum value of Z is: (a) 168000 (b) 160000

	(c) 120000 (d) 180000
	CASE STUDY : 3 A train can carry a maximum of 300 passengers. A profit of Rs. 800 is made on each executive class and Rs. 200 is made on each economy class. The IRCTC reserves at least 40 tickets for executive class. However, atleast 3 times as many passengers prefer to travel by economy class, than by executive class. It is given that the number of executive class ticket is Rs. x and that of economy class ticket is Rs. y. Optimize the given problem.  Based on the above information, answer the following questions.
Q 1	The objective function of the LPP is: (a) Max Z = 800x+200y (b) Max Z =200x+800y (c) Min Z = 800x+200y (d) Min Z= 200x+800y
Q 2	Which among these is a constraint for this LPP? (a) $x+y \geq 300$ (b) $y \geq 3x$ (c) $x \leq 40$ (d) $y \leq 3x$
Q 3	Which among these is not a corner point for this LPP? (a) (40,120) (b) (40,260) (c) (30,90) (d) (75,225)

Q 4	The maximum profit is: (a) Rs.56000 (b) Rs.84000 (c) Rs.205000 (d) Rs.105000
Q 5	Which corner point the objective function has minimum value? (a) (40,120) (b) (40,260) (c) (30,90) (d) (75,225)

Answers

1.d	2.b	3.c	4.b	5.d	6.a
7.c	8.d	9.b	10.d	11.d	12.a
13.a	14.b	15.b	16.d	17.c	18.d
19.c	20.b	21.b	22.a	23.c	24.d
25.d	26.c	27.a	28.d	29.d	30.c
CASE STUDY 1	1.c	2.b	3.c	4.c	5.b
CASE STUDY 2	1.a	2.b	3.c	4.d	5.a
CASE STUDY3	1.a	2.b	3.c	4.d	5.a

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