INDIAN SCHOOL AL WADI AL KABIR

Practice Paper

Mid-Term Examination (2022-23)

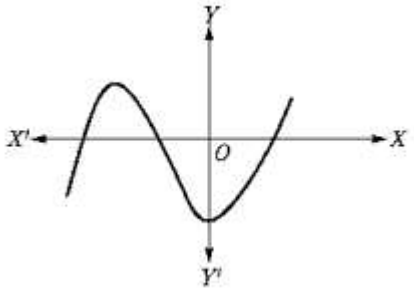
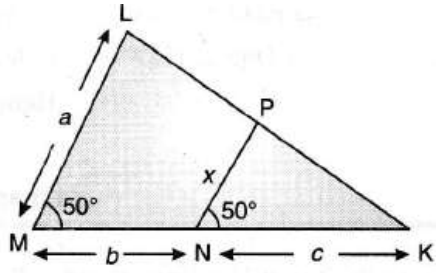
Class: X | Sub: MATHEMATICS (041) | Max Marks: 80

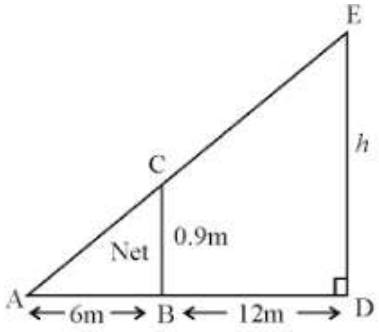
Date: 01-09-2022 | Time: 3 hours

General Instructions:

1. This question paper is divided in to 2 sections- A and B
2. Section A : Part(1) comprises of 16 questions of 1 mark each,
   Part (2) comprises of 6 MCQ's of 1 mark each
   Part (3) comprises of 4 Case study-based questions of 4 marks each.
3. Section B : Part(1) comprises of 5 questions of 2 marks each.
   Part (2) comprises of 4 questions of 3 marks each.
   Part (3) comprises of 4 questions of 5 marks each.
4. Internal choice has been provided for certain questions.

Section A Part – 1 (1 mark each)	
Q.1.	If cot A + $\frac{1}{\cot A}$ = 2, then find the value of $cot^2A + \frac{1}{cot^2A}$. **OR** What is the value of (1 + $tan^2\theta$) (1 – sin θ) (1 + sin θ)
Q.2.	If HCF(336, 54) = 6, find LCM (336, 54) **OR** Find the least number that is divisible by all numbers between 1 and 10 (both inclusive).
Q.3.	Two dice are thrown simultaneously. What is the probability that the sum of the two numbers appearing on the top is 13?
Q.4.	Find the distance between the points (m, -n) and (-m, n). **OR** Find the quadrant in which the point which divides the line segment joining the points (7, –6) and (3, 4) in ratio 1: 2 internally lie.

Q.5.	In given figure, the graph of a polynomial p(x) is shown. Find the number of zeroes of p(x). 
Q.6.	If one of the zeroes of the quadratic polynomial $(k - 1)x^2 + kx + 1$ is – 3, then find the value of k. **OR** Find a quadratic polynomial, whose zeroes are -3 and 4.
Q.7.	Find the sum of exponents of prime factors in the prime-factorization of 196.
Q.8.	Three different coins are tossed together. What is the probability of getting exactly two heads? **OR** What is the probability of getting 53 Fridays in a leap year?
Q.9.	Given the linear equation 3x + 4y = 9. Write another linear equation in these two variables such that the geometrical representation of the pair so formed is intersecting lines.
Q.10.	In the given figure, find x.  **OR** The perimeter of two similar triangles ABC and LMN are 60cms and 48cms respectively. If LM = 8cm, then what is the length of AB?
Q.11.	If 3x + 4y : x + 2y = 9 : 4, then find 3x + 5y : 3x – y.
Q.12.	If the distance between the points (4, k) and (1, 0) is 5, then what can be the possible values of k.

Q.13.	Find the smallest positive rational number by which $\frac{1}{7}$ should be multiplied so that its decimal expansion terminates after 2 places of decimal.
Q.14.	If ad ≠bc, then find whether the pair of linear equations ax + by = p and cx + dy = q has unique solution, infinitely many solution or no solution.
Q.15.	Find the condition that zeroes of polynomial p(x) = ax^2+ bx + c are reciprocals of each other.
Q.16.	Find the value of the height "h" in the adjoining figure, at which the tennis ball must be hit, so that it wil1 just pass over the net and land 6m away from the base of the net. 

Section A Part – 2 MCQ (1 mark each)

Q.17.	If sin A = $\frac{3}{4}$, then sec A is							
	A	$\frac{3}{\sqrt{7}}$	**B**	$\frac{4}{5}$	**C**	$\frac{4}{\sqrt{7}}$	**D**	$\frac{3}{5}$
Q.18.	The value of 'a' such that the point (3, a), lies on the line represented by 2x – 3y =5.							
	A	5	**B**	$\frac{1}{5}$	**C**	3	**D**	$\frac{1}{3}$
Q.19.	DE is drawn parallel to base BC of Δ ABC, meeting AB at D and AC at E. If $\frac{AB}{BD}$ = 4 and CE = 2cm, then the length of AE is							
	A	8cm	**B**	6cm	**C**	4cm	**D**	5cm

Q.20.	The lines represented by the equations 5x – 4y + 8 = 0; 7x + 6y - 9 = 0 will							
	A	intersect at a point	**B**	be coincident	**C**	be parallel	**D**	none of these
Q.21.	If α and β are the zeroes of the polynomial p(x) = x^2 - 5x + 6, then the value of $\alpha + \beta - 3\alpha\beta$ is							
	A	-5	**B**	-13	**C**	13	**D**	6
Q.22.	If ΔABC is right angled at C, then the value of cos (A+B) is							
	A	0	**B**	1	**C**	$\frac{1}{2}$	**D**	$\frac{\sqrt{3}}{2}$

Section A

Part – 3 Case study-based (4 marks each)

Q.23.

<u>Case study-based – 1</u> (Read the situation below and answer any 4 questions)

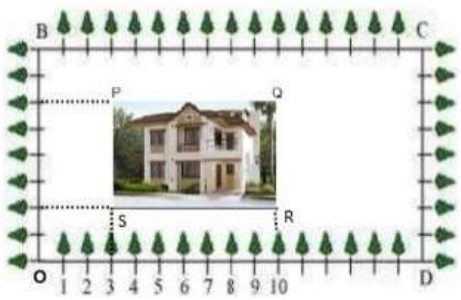
CARTESIAN- PLANE

Using Cartesian Coordinates we mark a point on a graph by how far along and how far up it is.

The left-right (horizontal) direction is commonly called X-axis.

The up-down (vertical) direction is commonly called Y-axis.

In Green Park, New Delhi Ramesh is having a rectangular plot ABCD as shown in the following figure. Sapling of Gulmohar is planted on the boundary at a distance of 1m from each other. In the plot, Ramesh builds his house in the rectangular area PQRS. In the remaining part of plot, Ramesh wants to plant grass.



(i)	The coordinates of vertices P and S of rectangle PQRS are respectively							
	A	(2,3), (6,3)	**B**	(3,2) (3,6)	**C**	(6,3) (2,3)	**D**	(3,6) (3,2)
(ii)	Find the coordinates of mid-point of diagonal QS.							
	A	$(\frac{13}{2}, 4)$	**B**	$(\frac{13}{4}, 2)$	**C**	$(\frac{4}{13}, 2)$	**D**	$(\frac{2}{13}, 4)$
(iii)	The coordinates of vertices R and Q of rectangle PQRS are respectively							
	A	(10,6), (10,2)	**B**	(2,10), (10,6)	**C**	(10,2), (10,6)	**D**	(2,10), (6,1)
(iv)	The length and breadth of rectangle PQRS respectively are							
	A	4, 7	**B**	7, 4	**C**	6, 4	**D**	4, 4
(v)	Find the area of rectangle PQRS.							
	A	24 m^2	**B**	16 m^2	**C**	20 m^2	**D**	28 m^2

Q.24.

<u>Case study-based – 2</u> (Answer any four questions)

A deck of playing cards consists of 52 cards which are divided into 4 suits of 13 cards each—spades (♠), hearts (♥), diamonds (♦) and clubs (♣). Clubs and spades are of black colour, while hearts and diamonds are of red colour. The cards in each suit are ace, king, queen, jack, 10, 9, 8, 7, 6, 5, 4, 3 and 2. Kings, queens and jacks are called face cards.

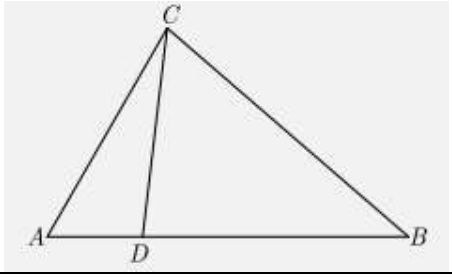
A card is drawn at random from a well – shuffled pack of 52 cards.

(i)	Find the probability of getting a red king card.							
	A	$\frac{1}{52}$	**B**	$\frac{1}{13}$	**C**	$\frac{1}{26}$	**D**	$\frac{4}{13}$
(ii)	Find the probability of getting a queen or a jack card.							
	A	$\frac{2}{13}$	**B**	$\frac{1}{13}$	**C**	$\frac{5}{13}$	**D**	$\frac{3}{13}$
(iii)	The king, queen and jack of clubs are removed from a deck of 52 playing cards and the rest are shuffled. What is the probability of getting a card of queen?							
	A	$\frac{4}{51}$	**B**	$\frac{3}{49}$	**C**	$\frac{3}{29}$	**D**	$\frac{2}{51}$
(iv)	What is the probability that the card drawn is '10' of a black suit?							
	A	$\frac{2}{13}$	**B**	$\frac{1}{13}$	**C**	$\frac{1}{26}$	**D**	$\frac{3}{13}$
(v)	What is the probability of an event which is sure (or certain) to occur?							
	A	0	**B**	1	**C**	$\frac{1}{2}$	**D**	-1

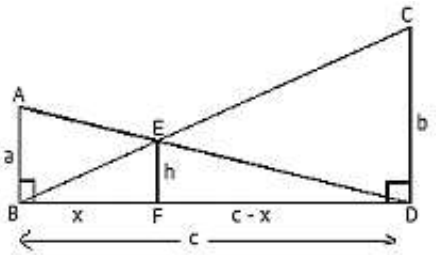
Q.25.

Case study-based – 3

The department of Computer Science and Technology is conducting an International Seminar. In the seminar, the number of participants in Mathematics, Science and Computer Science are 192, 240 and 168 respectively. The coordinator has made the arrangement such that in each room, the same number of participants are to be seated and all of them being in the same subject.

	(i) Find the maximum number of participants in each room, if the same number of participants are to be seated in each room and all of them being in the same subject. (ii) Find the minimum number of rooms required for the participants.
Q.26.	**Case study-based – 4** Tickets for a play can be booked online as well as purchased from the theatre. A 10% discount is available on online ticket purchase. Simran likes to watch plays. She purchased the ticket online for a play. The ticket and food cost her Rs 600. The cost of food was one-third the cost of the ticket. (i) Represent the relation between the cost of the ticket and the cost of food for Simran algebraically. Also represent the relation between the cost of the ticket and the cost of food for Simran and money spent algebraically. (ii) In the theatre canteen, two packets of popcorn and a mango drink cost Rs 330. One packet of popcorn and two mango drinks cost Rs 300. What is the cost of the packet of popcorn?
Section B **Part-1**(2 marks each)	
Q.27.	If the line segment joining the points A (2, 1) and B (5, -8) is trisected at the points P and Q, then find the coordinates of P. **OR** The base QR of an equilateral triangle PQR lies on x-axis. The coordinates of point Q are (-4, 0) and the origin is the midpoint of the base. Find the coordinates of the point P and R.
Q.28.	In the given figure, if ∠ ACB = ∠ CDA, AC = 6cm and AD = 3cm, then find the length of AB. 

Q.29.	Prove that $\sqrt{\frac{1-\cos A}{1+\cos A}}$ = cosec A – cot A **OR** Evaluate: $sin^2 60° + 2 \tan 45° - cos^2 30°$
Q.30.	Show that 7^n cannot end with the digit zero, for any natural number n.
Q.31.	Cards marked with numbers 3, 4, 5, ...50 are placed in a bag and mixed thoroughly. One card is drawn at random from the bag. Find the probability that number on the card drawn (i) is a perfect square (ii) is divisible by 7
Section B **Part-2** (3 marks each)	
Q.32.	If AD and PM are medians of triangles ABC and PQR, respectively where ΔABC ~ ΔPQR, prove that $\frac{AB}{PQ} = \frac{AD}{PM}$.
Q.33.	If a and b are the zeroes of the polynomial x^2 - x – 6, then find a quadratic polynomial whose zeroes are (3a + 2b) and (2a + 3b). **OR** Find the zeroes of the quadratic polynomial $\sqrt{3}x^2$ - 8x + $4\sqrt{3}$
Q.34.	Prove that $\frac{tan^2 A}{tan^2 A - 1} + \frac{cosec^2 A}{sec^2 A - cosec^2 A} = \frac{1}{1 - 2cos^2 A}$
Q.35.	If (a, b) is the midpoint of the segment joining the points A(10, - 6) and B(k, 4) and a - 2b = 18, find the value of k and the distance AB.
Section B Part-3 (5 marks each)	
Q.36.	In an election contested between A and B, A obtained votes equal to twice the no. of persons on the electoral roll who did not cast their votes and this later number was equal to twice his majority over B . If there were 18,000 persons on the electoral roll. How many votes did B get?

Q.37.	Prove that $\frac{tan^3\theta}{1+tan^2\theta} + \frac{cot^3\theta}{1+cot^2\theta}$ = sec θ cosec θ - 2 sin θ cos θ **OR** If tan A + sin A = m and tan A – sin A = n, show that $m^2 - n^2 = 4\sqrt{mn}$
Q.38.	Two poles of height a and b (b > a) are c metres apart. Prove that the height h (in metres) of the point of intersection of the lines joining the top of each pole to the foot of the opposite pole is $\frac{ab}{a+b}$. 
Q.39.	What is the sum of the digits of the smallest number, which leaves remainder 2 upon being divided by 10, 15 and 25? Also, find the greatest 6 digit number which is exactly divisible by 24, 15 and 36.

Answers							
Q.1	2, 1	Q.2	3024, 2520	Q.3	0	Q.4	$2\sqrt{m^2+n^2}$, IV quadrant.
Q.5	3	Q.6	$\frac{4}{3}$, x^2 - x - 12	Q.7	4	Q.8	$\frac{3}{8}$, $\frac{2}{7}$
Q.9	3x – 5y = 10	Q.10	$\frac{ac}{b+c}$, 10cm	Q.11	7 : 1	Q.12	k = $\pm$4
Q.13	$\frac{7}{100}$	Q.14	unique solution 3	Q.15	c = a	Q.16	2.7m
Q.17	C	Q.18	D	Q.19	B	Q.20	A
Q.21	B	Q.22	A	Q.23	(i) D (ii) A(iii) C (iv) B (v) D	Q.24	(i) C (ii) A (iii) B (iv) C (v) B
Q.25	(i) 24 (ii) 25 rooms	Q.26	(i) x = 3y, x + 3y = 600 (ii) ₹ 120	Q.27	P (3, -2) OR R(4, 0) P(0, $4\sqrt{3}$) P(0, $-4\sqrt{3}$)	Q.28	12cm
Q.29	2	Q.31	$\frac{1}{8}$, $\frac{7}{48}$	Q.33	x^2 - 5x, $\frac{2}{\sqrt{3}}$ and $2\sqrt{3}$	Q.35	k= 22, AB=$2\sqrt{61}$units
Q.36	6000	Q.39	8, 999720				