Roll Number: _____

THE INDIAN SCHOOL
PERIODIC TEST-II (2024-25)
MATHEMATICS (041)
X
SET-B

Time allowed: 2.5 hours ***Maximum Marks: 60*** ***No. of printed pages: 07***

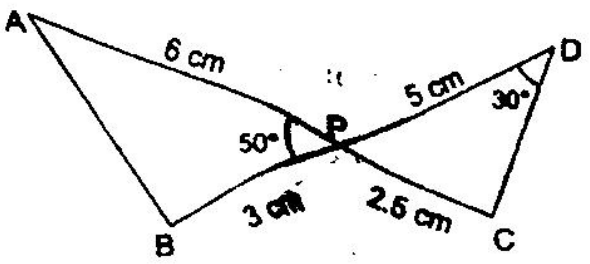
General instructions:

(i) *This question paper consists of **33** questions divided into 5 sections **A, B, C, D and E.***
(ii) *Section A comprises 20 questions carrying 1 mark each including Multiple Choice questions, Assertion and Reasoning based questions.*
(iii) *Section B comprises 5 questions carrying 2 marks each.*
(iv) *Section C comprises 4 questions carrying 3 marks each.*
(v) *Section D comprises 2 questions carrying 5 marks each.*
(vi) *Section E comprises 2 case study-based questions of 4 marks each.*
(vii) *All questions are compulsory. However internal choices have been provided in some of the questions.*
(viii) *Draw neat figures wherever required.*

SECTION-A
Multiple Choice Questions (20 Marks)

Q No.	Question	Marks
1	If n is a natural number, then $2(5^n + 6^n)$ always ends with (a) 1 (b) 4 (c) 3 (d) 2	1
2	The least value of k, for which the quadratic equation $2x^2 + kx - 4 = 0$ has rational roots is (a) $\pm 2\sqrt{2}$ (b) 2 (c) ± 2 (d) $\sqrt{2}$	1
3	If the discriminant of the quadratic equation $3x^2 - 2x + c = 0$ is 16, then the value of c is (a) 1 (b) 0 (c) -1 (d) $\sqrt{2}$	1
4	If α, β are the zeros of the quadratic polynomial $P(x) = x^2 - (k+6)x + 2(2k-1)$, then the value of k, if $\alpha + \beta = \frac{1}{2}\alpha\beta$, is (a) -7 (b) -3 (c) 7 (d) 3	1

5	If the nth term of an AP is $7n + 4$, then the common difference is (a) 7 (b) 4 (c) 1 (d) $7n$	1
6	Which of these is the polynomial whose zeros are $\frac{1}{3}$ and $\left(-\frac{1}{4}\right)$? (a) $12x^2 + 5x - 3$ (b) $12x^2 - 5x - 3$ (c) $12x^2 + 13x + 3$ (d) $12x^2 - 13x - 3$	1
7	What should be added to the polynomial $x^2 - 5x + 4$, so that 3 is the zero of the resulting polynomial? (a) 1 (b) 2 (c) 4 (d) 5	1
8	Which of the following equations has two distinct real roots? (a) $2x^2 - 3\sqrt{2}x + \frac{9}{4} = 0$ (b) $x^2 + x - 5 = 0$ (c) $x^2 + 3x + 2\sqrt{2} = 0$ (d) $5x^2 - 3x + 1 = 0$	1
9	Six bells commence ringing together and ring at intervals of 2, 4, 6, 8, 10 and 12 seconds respectively. In 30 minutes, how many times do they ring together? (a) 4 (b) 10 (c) 15 (d) 16	1
10	In an AP, if the first term $a = 7$, nth term $a_n = 84$ and the sum of the first n terms $S_n = \frac{2093}{2}$, then n is equal to (a) 22 (b) 24 (c) 23 (d) 26	1
11	If the pair of equations $3x - y + 8 = 0$ and $6x - ry + 16 = 0$ represent coincident lines, then the value of 'r' is (a) $\frac{1}{2}$ (b) $-\frac{1}{2}$ (c) -2 (d) 2	1
12	The value of $\left[\frac{5}{8}\sec^2 60^0 - \tan^2 60^0 + \cos^2 45^0\right]$ is equal to (a) $-\frac{5}{3}$ (b) $-\frac{1}{2}$ (c) 0 (d) $\frac{1}{4}$	1
13	A dice is rolled twice. The probability that 5 will not come either time is (a) $\frac{11}{36}$ (b) $\frac{1}{3}$ (c) [illegible]	

14	Two AP's have the same common difference. The first term of one A.P. is -1 and the first term of the other A.P. is -8. What is the difference between their 4th terms? (a) -1 (b) -8 (c) 7 (d) -9	1
15	In the given figure, two line segments AC and BD intersect at point P such that PA = 6 cm, PB = 3 cm, PC = 2.5 cm, PD = 5 cm. Given that $\angle APB = 50^0$ and $\angle CDP = 30^0$, what is the measure of $\angle PBA$?  (a) 100^0 (b) 50^0 (c) 60^0 (d) 30^0	1
16	The sine of an angle in a right triangle is $\frac{4}{5}$. Which of these could be the measures of the sides of the triangle? (a) 4 cm, 3 cm and 9 cm (b) 6 cm, 8 cm and 10 cm (c) 4 cm, 5 cm and $\sqrt{41}$ cm (d) 8 cm, 10 cm and $4\sqrt{41}$ cm	1
17	For an event E, if $P(E) + P(\bar{E}) = q$, then the value of $q^2 - 4$ is (a) -3 (b) 3 (c) 5 (d) -5	
18	Two fair coins are tossed. What is the probability of getting, at the most, one head? (a) $\frac{3}{4}$ (b) $\frac{1}{4}$ (c) $\frac{1}{2}$ (d) $\frac{3}{8}$	1
	In question numbers 19 and 20, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option. (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A). (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A). (c) Assertion (A) is true but reason (R) is false. (d) Assertion (A) is false but reason (R) is true.	

9	**Assertion(A)** : ABCD is a trapezium with DC ∥ AB. E and F are points on AD and BC respectively, such that EF ∥ AB. Then $\frac{AE}{ED} = \frac{BF}{FC}$ **Reason (R)** : Any line parallel to the parallel sides of a trapezium divides the non-parallel side proportionally.	1
10	**Assertion(A)** : If $\sin A = \frac{1}{3}(0 < A < 90^0)$, then the value of cosA is $\frac{2\sqrt{2}}{3}$. **Reason (R)** : For every angle θ, $\sin^2\theta + \cos^2\theta = 1$	1

SECTION-B
(10 Marks)

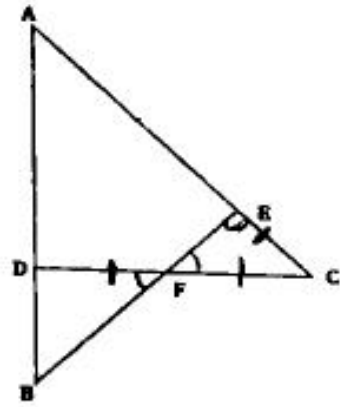
No.	Question	Marks
21	Solve the following for x. $4x^2 - 4a^2x + (a^4 - b^4) = 0$	2
22	If $4\cot^2 45^0 - \sec^2 60^0 + \sin^2 60^0 + p = \frac{3}{4}$, then find the value of p. **OR** If $\tan\theta = \frac{1}{\sqrt{7}}$ then show that $\frac{\text{cosec}^2\theta - \sec^2\theta}{\text{cosec}^2\theta + \sec^2\theta} = \frac{3}{4}$	2
23	Find the smallest natural number by which 1200 should be multiplied so that the square root of the product is a rational number.	2
24	Find c, if the following system of equations $cx + 3y + (3 - c) = 0$; $12x + cy - c = 0$, has infinitely many solutions.	2
25	At t minutes past 2p.m., the time needed by the minute hand of the clock to reach 3 p.m. was found to be 3 minutes less than $\frac{t^2}{4}$ minutes. Find the value of t.	2

SECTION-C
(12 Marks)

No.	Question	Marks
26	Prove that $(\sqrt{2} + \sqrt{3})^2$ is an irrational number, given that $\sqrt{6}$ is an irrational number.	3
27	A train covered a certain distance at a uniform speed. If the train had been 6 km/hr faster, it would have taken 4 hours less than the scheduled time. Conversely, if the train had been 6 km/hr slower, it would have taken 6 hours more than the scheduled time. Find the length of the journey.	

28	If α and β are zeros of the quadratic polynomial $p(x) = x^2 - 5x + 4$, then find the value of $\frac{1}{\alpha} + \frac{1}{\beta} - 2\alpha\beta$.	3
29	The diagonals of a quadrilateral ABCD intersect each other at the point O such that $\frac{AO}{BO} = \frac{CO}{DO}$. Show that ABCD is a trapezium. OR AD and PM are median of triangles ΔABC and ΔPQR respectively where $\Delta ABC \sim \Delta PQR$. Prove that $\frac{AB}{PQ} = \frac{AD}{PM}$.	3

SECTION-D
(10 Marks)

Q No.	Question	Marks
30	(a) State and prove the Basic Proportionality Theorem. (b) In the given figure, $\angle CEF = \angle CFE$. F is the midpoint of DC. Prove that $\frac{AB}{BD} = \frac{AE}{FD}$.  	5
31	(a) If $\tan A = n \tan B$ and $\sin A = m \sin B$, prove that $\cos^2 A = \frac{m^2 - 1}{n^2 - 1}$. (b) Prove that: $\frac{\cos^4 x - \sin^4 x}{1 - \tan x} = \frac{\cot x + 1}{\sec x \operatorname{cosec} x}$. OR (a) Prove that: $\frac{\tan^2 A}{\tan^2 A - 1} + \frac{\operatorname{cosec}^2 A}{\sec^2 A - \operatorname{cosec}^2 A} = \frac{1}{1 - 2\cos^2 A}$ (b) $1 + \sin^2\theta = 3 \sin\theta \cos\theta$. Prove that $\tan\theta = 1$ or $\frac{1}{2}$.	5

SECTION-E
(8 Marks)

Q No.	Question	Marks
32	Case Study - The Treasure Hunt Arithmetic Progression	4

Treasure Hunt is an exciting and adventurous game where participants follow a series of clues, numbers or maps to discover hidden treasures. Players engage in a thrilling quest, solving puzzles and riddles to uncover the location of the coveted prize. While playing a treasure hunt game, some clues (numbers) are hidden in various spots, collectively forming an arithmetic progression (A.P.). If the number on the nth spot is given by 20 + 4n, then answer the following questions to help the players in spotting the clues.

Based on the above information answer the following questions.

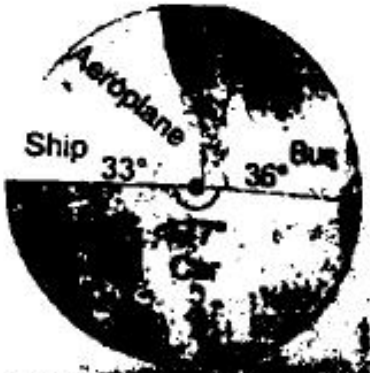
(i) Which number is on the first spot?

(ii) Which spot is numbered as 112?

OR

(ii) What is the sum of all the numbers on the first 10 spots?

(iii) Which number is on the $(n-2)^{th}$ spot?

33	**Case Study - Holiday Transport Survey** In a survey on holidays, 120 people were asked to state which type of transport they used on their last holiday. The following pie chart shows the result of the survey. 	4

Based on the above information answer the following questions.

(i) If one person is selected at random, find the probability that he/ she travelled by bus or by ship.

(ii) A person is selected at random. If the probability that he did not use train is $\frac{4}{5}$, find the number of people who used the train.

OR

(ii) The probability that a randomly selected person used the aeroplane is $\frac{7}{60}$. Find the revenue collected by the airline company at the rate of ₹5,000 per person.

(iii) Which is the favourite mode of transport and how many people used it?