INDIAN SCHOOL SOHAR **No. of printed pages: 5**

PERIODIC TEST III (2023-24)

MATHEMATICS (041) **SET 1**

CLASS: X **MAX.MARKS: 80**

DATE: 02/12/23 **TIME: 3 HOURS**

General Instructions:

This Question Paper has 5 Sections A, B, C, D and E.

Section A has 20 MCQs carrying 1 mark each

Section B has 5 questions carrying 02 marks each.

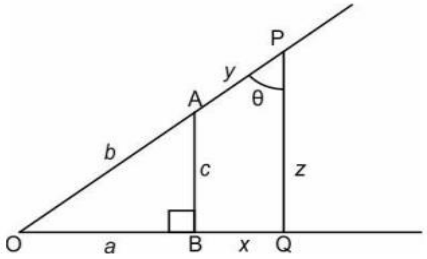
Section C has 6 questions carrying 03 marks each.

Section D has 4 questions carrying 05 marks each.

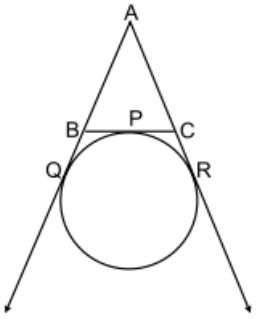
Section E has 3 case based integrated units of assessment (04 marks each) with sub- parts of thevalues of 1, 1 and 2 marks each respectively.

All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and2 Questions of 2 marks has been provided. An internal choice has been provided in the 2marks questions of Section E.

Draw neat figures wherever required. Take π =$\frac{22}{7}$ wherever required if not stated.

	Section A **Section A consists of 20 questions of 1 mark each.**	
1.	If a and b are two consecutive natural numbers then the HCF (a, b) is (a) 1 (b) 0 (c) ab (d) a+b	1
2.	If the product of the zeroes of $x^2 - 3kx + 2k^2 - 1$ is 7, then the values of k are (a) −3 and 3 (b) −2 and 3 (c) −2 and 2 (d) −3 and 2	1
3.	Given below is a pair of linear equations. mx + 4y – 6 = 0 ; ny – 12x + 12 = 0 For which of the following values of m and n do the above equations have infinitely many solutions? (a) m = –1 and n = 2 b) m = –1 and n = 3 c) m = 6 and n = –8 d) m = 6 and n = –2	1
4.	The nature of roots of the quadratic equation $9x^2 – 6x – 2 = 0$ is: (a) No real roots (b) 2 equal real roots (c) 2 distinct real roots (d) More than 2 real roots	1
5.	In the figure shown below, lines AB and PQ are parallel to each other. All measurements are in centimeters. Which of the following gives the value of cosθ?  (a) $\frac{b}{c}$ (b) $\frac{c}{b}$ (c) $\frac{c}{b+y}$ (d) $\frac{a+x}{b+y}$	1
6.	If the sum of first n terms of an AP is $5n^2 + 2n$, then its second term is: (a) 17 (b) 16 (c) 27 (d) 56	1
7.	The point which lies on the perpendicular bisector of the line segment joining the points A(–2, –5) and B(2, 5) is (a) (–2, 0) (b) (0, 2) (c) (2, 0) (d) (0, 0)	1

8.	The perimeter of a triangle with vertices (0, 4), (0, 0) and (3, 0) is (a) 5 (b) 12 (c) 11 (d) 7 + √5	1
9.	What is the probability of getting the sum as a prime number if two dice are thrown? (a) $\frac{5}{24}$ (b) $\frac{5}{12}$ (c) $\frac{5}{30}$ (d) $\frac{1}{4}$	1
10	A quadrilateral PQRS is drawn to circumscribe a circle. If PQ = 12 cm, QR = 15 cm and RS = 14 cm, then find the length of SP is (a) 15 cm (b) 14 cm (c) 12 cm (d) 11 cm	1
11	Find the value of (1 + tan θ + sec θ) (1 + cot θ – cosec θ). (a) 0 (b) 1 (c) 2 (d) -1	1
12	The value of $2Sin^2 30° - 3Cos^2 45° + tan^2 60° + 3Sin^2 90°$ is (a) 1 (b) 5 (c) 0 (d) None of the these	1
13	If sin x + cosec x= 2, the value of $sin^{19} x + cosec^{20} x$ is (a) 2^{19} (b) 2 (c) 2^{20} (d) 2^{39}	1
14	If the perimeter of a circle is equal to that of a square, then the ratio of their areas is (a) 22 : 7 (b) 11 : 14 (c) 7 : 22 (d) 14 : 11	1
15	If a quadrant is cut off from the circle of circumference 44 cm, then area of the remaining portion is (a) 120 cm^2 (b) 115.5 cm^2 (c) 125.5 cm^2 (d) none of these	1
16	The angle through which the minute hand of the clock moves from 8am to 8 : 35am is (a) 210° (b) 90° (c) 60° (d) 45°	1
17	A card is drawn from a deck of 52 cards. The event E is that card is not an ace of hearts. The number of outcomes favourable to E is (a)4 (b) 13 (c)48 (d) 51	1
18	The empirical relationship between the three measures of central tendency is (a)3 Median= Mode + 2 Mean (b) 2 Median= Mode + 3 Mean (c) 3 Median= 2 Mode + Mean (d) 3 Median= Mode − 2 Mean	1
Questions number 19 and 20 are Assertion and Reason based questions carrying 1 mark each. Two statements are given, one labelled as Assertion (A) and the other is labelled as Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below. (a)Both Assertion(A) and Reason(R) are true and Reason (R) is the correct explanation of the Assertion (A). (b)Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A). (c)Assertion (A) is true, but Reason (R) is false. (d)Assertion (A) is false, but Reason (R) is true		
19	Assertion (A): The nth term of an AP is 7−4n then its common difference is –4. Reason (R): Common difference of the AP given by $d = a_{n+1} - a_n$.	1
20	Assertion(A):D and E are points on the sides AB and AC respectively of a ΔABC such that AB = 10.8 cm, AD = 6.3 cm, AC = 9.6 cm and EC = 4 cm then DE is parallel to BC. Reason (R): If a line is parallel to one side of a triangle then it divides the other two sides in the same ratio.	1
	Section B **Section B consists of 5 questions of 2 marks each.**	
21.	Prove that √3 is irrational.	2
22.	Diagonals AC and BD of a trapezium ABCD with AB ‖ DC intersect each other at the point O.	2

	Show that $\frac{OA}{OB} = \frac{OC}{OD}$.	2
23.	In the figure, a circle touches the side BC of triangle ABC at P and touches AB and AC produced at Q and R respectively. Show that AQ = $\frac{1}{2}$ (Perimeter of ΔABC).  	2
24.	If sin(A + B) = 1 and sin (A – B)= $\frac{1}{2}$; 0° < A + B < 90°; A > B, find A and B. OR Find the value of x if $2\text{cosec}^2 30° + x \sin^2 60° - \frac{3}{4}\tan^2 30° = 10$.	2
25.	To warn ships for underwater rocks, a lighthouse spreads a red colored light over a sector of angle 80° to a distance of 16.5 km. Find the area of the sea over which the ships are warned. (Use π = 3.14) OR A chord of a circle of radius 10 cm subtends a right angle at the centre. Find the area of the corresponding: (i) minor segment (ii) major sector.	2
	Section C **Section C consists of 6 questions of 3 marks each.**	
26.	Obtain zeroes of $4\sqrt{3}x^2 + 5x - 2\sqrt{3}$ and verify relation between its zeroes and coefficients.	3
27.	A dining hall has a length of 8.25 m, breadth of 6.75 m, and height of 4.50 m. What is the length of the longest unmarked ruler that can exactly measure the three dimensions of the hall?	3
28.	Solve for x and y: $152x - 378y = -74$; $-378x + 152y = -604$ **OR** From a shop Sudhir bought 2 books of Mathematics and 3 books of Physics of class X for ₹850 and Suman bought 3 books of Mathematics and 2 books of Physics of class X for ₹900. Considering the price of one Mathematics book and that of one Physics book be ₹x and ₹y respectively, find the value of x+y.	3
29.	Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that ∠ PTQ = 2 ∠ OPQ. **OR** Prove that the parallelogram circumscribing a circle is a rhombus.	3
30.	If $\cos\theta + \sin\theta = \sqrt{2}\cos\theta$, show that $\cos\theta - \sin\theta = \sqrt{2}\sin\theta$.	3
31.	If the median of the distribution given below is 28.5, find the values of x and y.	3

Class	0-10	10-20	20-30	30-40	40-50	50-60	Total
Frequency	5	x	20	15	y	5	60

Section D

Section D consists of 4 questions of 5 marks each.

32. Two water taps together can fill a tank in $9\frac{3}{8}$ hours. The tap of larger diameter takes 10 hours less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank. — 5

OR

Solve for x: $\frac{1}{(a+b+x)} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x}$, $[a \neq 0, b \neq 0, x \neq 0, x \neq -(a+b)]$

33. Prove Basic Proportionality theorem. In ΔABC, D and E are points on AB and AC respectively and DE ∥ BC. If AD = x, BD = x–1, AE = x–3 and CE = x–5, find the value of x. — 5

34. There are two identical solid cubical boxes of side 7cm. From the top face of the first cube a hemisphere of diameter equal to the side of the cube is scooped out. This hemisphere is inverted and placed on the top of the second cube's surface to form a dome. Find (i) the total surface area of the two new solids formed
(ii) volume of each new solid formed. — 5

OR

A double cone is formed by a revolving right triangle having sides 5 cm, 12 cm and 13 cm about its hypotenuse. Find Total Surface Area and volume of double cones so formed.

35. The following frequency distribution gives the monthly consumption of 68 consumers of a locality. Find mean and mode of the data. — 5

Monthly consumption of electricity (in units)	Number of consumers
65-85	4
85-105	5
105-125	13
125-145	20
145-165	14
165-185	8
185-205	4

Section E

Section E has 3 case based integrated units of assessment with sub- parts of the values of 1, 1 and 2 marks each respectively.

36 **Case Study – 1**

India is competitive manufacturing location due to the low cost of manpower and strong technical and engineering capabilities contributing to higher quality production runs. The production of TV sets in a factory increases uniformly by a fixed number every year. It produced 16000 sets in 6th year and 22600 in 9th year.

Based on the above information answer the following questions:

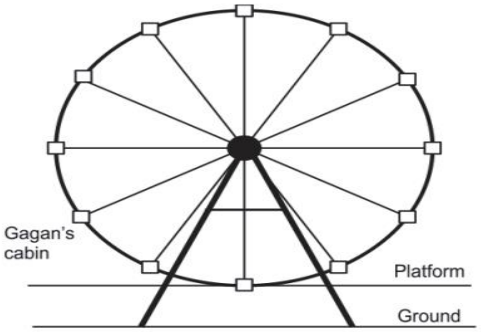
(i) What is the production during first year? — 1

(ii)What is the fixed number by which the production increases every year? — 1

(iii)What is the total production during the first 3 years? — 2

OR

(iii)In which year will the production reach 29200? — 2

37	**Case Study – 2** In the giant wheel shown below, Gagan is sitting in one of cabins which is 12m high from the platform. Jyoti and Karan are sitting in the lowest and the highest cabins from the platform respectively. From Gagan the angle of depression of Jyoti and the angle of elevation of Karan is 30^o and 60^o respectively.  *(Note: The figure is not to scale.)* Based on the above, answer the following questions: (i)What is the angle of elevation of Gagan from Jyoti? (ii)If α= angle of elevation of Gagan from Jyoti and β= angle of depression of Gagan from Karan, then find the value of sin α+ cos β. (iii)Find the diameter of the giant wheel. OR (iii)Find the distance between Gagan's cabin and Karan's cabin.	 1 1 2 2
38.	**Case Study – 3** In a hall, people are seated at a distance of 1m from each other. Three people sit at points P, Q and R whose coordinates are (6, -2) ,(9,4) and (10,6) respectively. (i)What is the distance between P and R? (ii)Find the midpoint of the line segment joining P and R? (iii)Find the ratio in which Q divides the line segment joining P and R. OR (iii)If a point S, lying on the straight-line joining Q and R such that it divides the distance between them in the ratio of 1:2, then find the coordinates of S.	 1 1 2 2

*****THE END*****