AIRPORT SENIOR SECONDARY SCHOOL

FIRST TERMINAL EXAMINATION 2022-23

MATHEMATICS **Time: 3 Hrs**

Class : X **Marks: 80**

General Instructions :

1. This Question Paper has 5 Sections A-E.
2. Section A has 20 MCQs carrying 1 mark each
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory.
8. Draw neat figures wherever required. Take π = 22/7;wherever required if not state

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Section – A

Section A consists of 20 questions of 1 mark each:

1. The L.C.M. of x and 18 is 36. The H.C.F. of x and 18 is 2.What is the number x ?
   (a) 1 (b) 2
   (c) 3 (d) 4
2. LCM of smallest two digit composite number and smallest composite number is
   (a) 12 (b) 4
   (c) 20 (d) 44
3. If the nth term of an AP is given by $a_n = 5n - 3$, then The sum of first 10 terms is
   (a) 225 (b) 245
   (c) 255 (d) 270
4. If two positive integers p and q can be expressed as $p = ab^2$ and $q = a^3b$; where a , b being prime numbers, then LCM (p , q) is equal to
   (a) ab (b) a^2b^2
   (c) a^3b^2 (d) a^3b^3
5. The quadratic polynomial, the sum of whose zeroes is -5 and their product is 6, is
   (a) x^2+5x+6 (b) x^2-5x+6
   (c) x^2-5x-6 (d) $-x^2+5x+6$
6. In a number of two digits, unit's digit is twice the tens digit. If 36 be added to the number, the digits are reversed. The number is
   (a) 36 (b) 63
   (c) 48 (d) 84
7. The value of k for which the system of linear equations x + 2y = 3 , 5x + ky + 7 = 0 is inconsistent is

(a) $-\frac{14}{3}$ (b) $\frac{2}{5}$

(c) 5 (d) 10

8. If the sum of the zeroes of the quadratic polynomial $Kx^2 + 2x + 3k$ is equal to their product, then k equals

(a) $\frac{1}{3}$ (b) $-\frac{1}{3}$

(c) $\frac{2}{3}$ (d) $-\frac{2}{3}$

9. $(x^2 + 1)^2 - x^2$ has

(a) Four real roots (b) two real roots

(b) (c) no real roots (d) one real root

10. The 11th term of an AP -5, - 5/2, 0, 5/2 …… is

(a) -20 (b) 20

(c) -30 (d) 30

11. If the centre of a circle is (3, 5) and end points of a diameter are (4, 7) and (2, y), then the value of y is

(a) 3 (b) -3

(c) 7 (d) 4

12. It is given that, $\Delta ABC \sim \Delta EDF$ such that AB = 5 cm, AC = 7 cm, DF = 15 cm and DE = 12 cm then the sum of the remaining sides of the triangles is

(a) 23.05 cm (b) 16.8 cm

(c) 6.25 cm (d) 24 cm

13. The distance between the points (0, 5) and (-5 0) is

(a) 5 (b) $5\sqrt{2}$

(c) $2\sqrt{5}$ (d) 10

14. X -axis divides the line segment joining A(2, -3) and B(5, 6) in the ratio

(a) 2 : 3 (b) 3 : 5

(c) 1 : 2 (d) 2 : 1

15. Which of the following statement is false?

(a) All isosceles triangles are similar. (b) All quadrilateral are similar.

(c) All circles are similar. (d) None of the above

16. The point which divides the line segment joining the points (8, -9) and (2, 3) in the ratio 1 : 2 internally lies in the

(a) I quadrant (b) II quadrant

(c) III quadrant (d) IV quadrant

17. $(\cos^4 A - \sin^4 A)$ is equal to

(a) $1- 2\cos^2 A$ (b) $2\sin^2 A - 1$

(b) $\sin^2 A - \cos^2 A$. (d) $2\cos^2 A - 1$

18. If $\sin \theta = a/b$, then $\cos \theta$ is equal to

(a) $\frac{b}{\sqrt{b^2-a^2}}$ (b) $\frac{b}{a}$

(c) $\frac{\sqrt{b^2-a^2}}{b}$ (d) $\frac{a}{\sqrt{b^2-a^2}}$

19. **Assertion** : Common difference of the AP -5 , -1 , 3, 7, ... is 4.
    Reason : Common difference of the AP a, a+d, a+2d, ... is given by d = $a_2 - a_1$
    (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.
20. **Assertion :** The equation $x^2 + 3x + 1 = (x - 2)^2$ is a quadratic equation.
    Reason: Any equation of the form $ax^2 + bx + c = 0$ where $a \neq 0$ is called a quadratic equation.
    (a) Both assertion (A) and reason ® are true and reason ® is the correct explanation of assertion (A).
    (b) Both assertion (A) and reason ® are true but reason ® is not the correct explanation of assertion (A).
    (c) Assertion (A) is true but reason ®is false.
    (d) Assertion (A) is false but reason ® is true.

Section – B

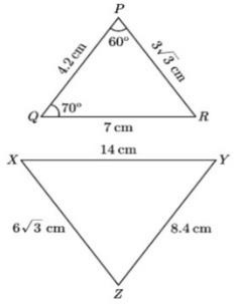
Section B consists of 5 questions of 2 marks each.

21. Show that 7^n cannot end with the digit zero, for any natural number n.
22. Show that $\tan^4\theta + \tan^2\theta = \sec^4\theta - \sec^2\theta$.
23. Solve the following pair of linear equations by Substitution method:
    $3x + 2y - 7 = 0$
    $4x + y - 6 = 0$
24. If α and β are zeroes of the polynomial $f(x) = x^2 - x - k$ such that $\alpha - \beta = 9$, find k.

OR

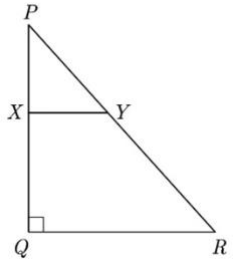
Find the zeroes of the quadratic polynomial $\sqrt{3}\,x^2 - 8x + 4\sqrt{3}$

25. In the given figures, find the measure of $\angle X$.



OR

In figure, PQR is a triangle right angled at Q and XY || QR. If PQ = 6cm, PY = 4 cm



and PQ : XQ = 1:2. Calculate the length of PR and QR.

Section – C

Section c consists of 6 questions of 3 marks each.

26. Show that $5 + 3\sqrt{2}$ is irrational
27. Solve the pair of linear equations graphically
    $4x – y = 4$; $3x + 2y = 14$
28. For what value of k , the roots of the quadratic equation $kx(x - 2\sqrt{5}) + 10 = 0$ are equal?
29. The 17^{th} term of an AP is 5 more than twice its 8^{th} term. If 11^{th} term of the AP is 43, then find its n^{th} term.

OR

How many terms of the AP 24, 21, 18, ... must be taken so that their sum is 78?

30. Find the area of the rhombus of vertices (3, 0), (4, 5), (-1, 4) and (-2, -1) taken in order.
31. Prove that $(1 + \cot A – \text{cosec } A)(1 + \tan A + \sec A) = 2$

Section – D

Section D consists of 4 questions of 5 marks each.

32. Determine graphically the coordinates of the vertices of triangle , the equations of whose sides are given by
    $2y – x = 8$; $5y – x = 14$ and $y - 2x = 1$

OR

Draw the graphs of the equations $x - y + 1 = 0$ and $3x + 2y – 12 = 0$. Determine the coordinates of the vertices of the triangle formed by these lines and shade the triangular region.

33. The digit of a positive number of three digits are in AP and their sum is 15. The number obtained by reversing the digits is 594 less than the original number. Find the number.
34. Prove that if a line is drawn parallel to one side of a triangle intersecting the other two sides in distinct points, then the other two sides are divided in the same ratio.

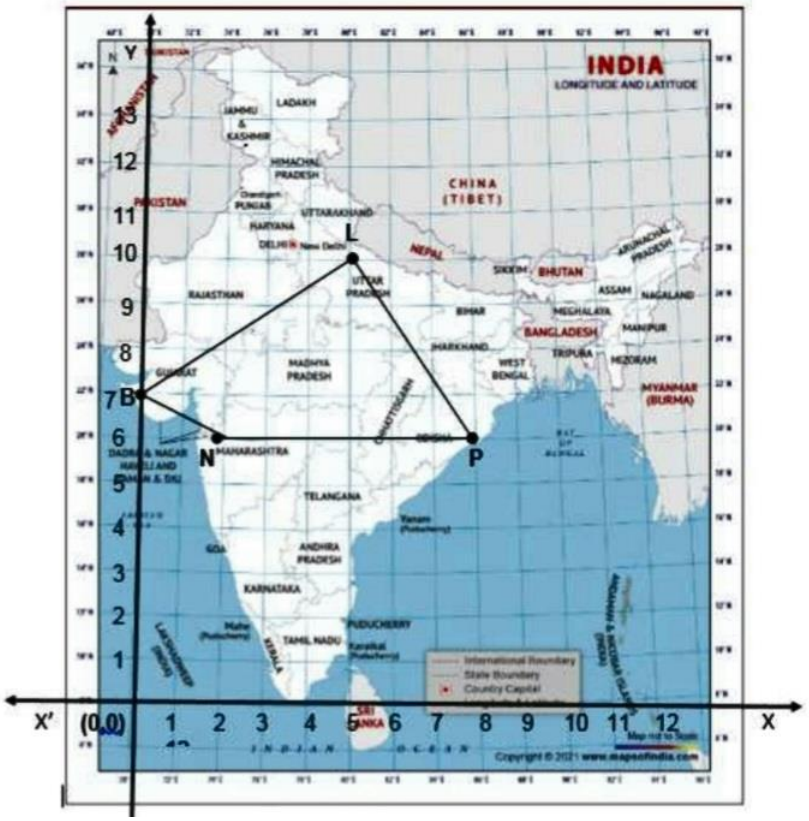
    Using the above theorem, prove that a line through the point of intersection of the diagonals and parallel to the base of the trapezium divides the non parallel sides in the same ratio.

35. Do as directed
    (a) If $\sin\theta + \cos\theta = \sqrt{3}$, then prove that $\tan\theta + \cot\theta = 1$
    (b) If $x = r \sin A \cos C$, $y = r \sin A \sin C$ and $z = r \cos A$, then prove that $x^2 + y^2 + z^2 = r^2$

Section – E

Case study questions are compulsory

36. In a GPS, The lines that run east-west are known as lines of latitude, and the lines running north-south are known as lines of longitude. The latitude and the longitude of a place are its coordinates and the distance formula is used to find the distance between two places. The distance between two parallel lines is approximately 150 km. A family from Uttar Pradesh planned a round trip from Lucknow (L) to Puri (P) via Bhuj (B) and Nashik (N) as shown in the given figure below.



(a) Find the distance between Lucknow (L) to Bhuj(B).

(b) If Kota (K), internally divide the line segment joining Lucknow (L) to Bhuj (B) into 3 : 2 then find the coordinate of Kota (K).

(c) Name the type of triangle formed by the places Lucknow (L), Nashik (N) and Puri (P)

[OR]

Find a place (point) on the longitude (y-axis) which is equidistant from the points Lucknow (L) and Puri (P).

37. The school auditorium was to be constructed to accommodate at least 1500 people. The chairs are to be placed in concentric circular arrangement in such a way that each succeeding Circular row has 10 seats more than the previous one.

(a) If the first circular row has 30 seats, how many seats will be there in the 10^{th} row?

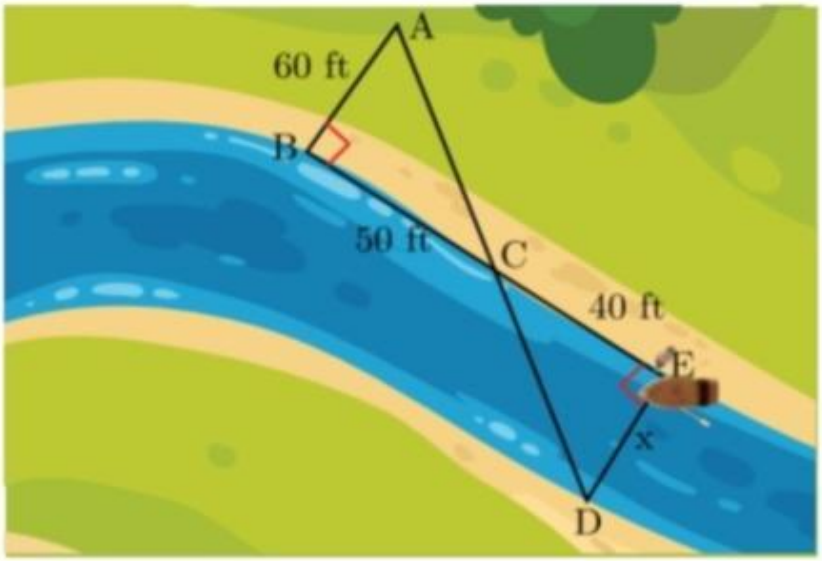
(b) If there were 17 rows in the auditorium, how many seats will be there in the middle row?

(c) For 1500 seats in the auditorium, how many rows need to be there?

OR

If 1500 seats are to be arranged in the auditorium, how many seats are still left to be put after 10^{th} row?

38. Tania is very intelligent in maths. She always try to relate the concept of maths in daily life. One day she plans to cross a river and want to know how far it is to the



other side. She takes measurements on her side of the river and make the drawing as shown below.

(i) Which similarity criterion is used in solving the above problem ?

(ii) Consider the following statement :

S_1 : $\angle ACB = \angle DCE$

S_2 : $\angle BAC = \angle CDE$

Which of the above statement is/are correct.

(a) S_1 and S_2 both
(b) S_1
(c) S_2
(d) None

(iii) Consider the following statement :

$S_3 : \frac{AB}{DE} = \frac{CA}{CD}$

$S_4 : \frac{BC}{CE} = \frac{AB}{DE}$

$S_5 : \frac{CA}{CD} = \frac{DE}{AB}$

Which of the above statements are correct?

(a) S_3 and S_5
(b) S_4 and S_5
(c) S_3 and S_4
(d) All three