UNIT TEST-6
X-STD

TIME: 3.00 HOURS **MATHEMATICS** **MARKS: 100**

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Instructions: **1)** ***Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.***

2) ***Use Blue or Black ink to write and underline and pencil to draw diagrams.***

PART-A **$14 \times 1 = 14$**

Note: **i)** ***Answer all the questions.***

ii) ***Choose the most appropriate answer from the given four alternatives and write the option code and the corresponding answer.***

1. If $5x = sec\,\theta$ and $\frac{5}{x} = \tan\theta$, then $x^2 - \frac{1}{x^2}$ is equal to

   (a) 5 (b) 25 (c) $\frac{1}{25}$ (d) 1

2. If the ratio of the height of a tower and the length of its shadow is $\sqrt{3}:1$, then the angle of elevation of the sun has measure

   (a) 60° (b) 45° (c) 30° (d) 90°

3. A tower is $60m$ high. Its shadow is x metres shorter when the sun's attitude is 45° than when it has been 30°, Then x is equal to

   (a) $45.6m$ (b) $41.92m$ (c) $43.92m$ (d) $43m$

4. The value of $sin^2\theta + \frac{1}{1+tan^2\theta}$ is equal to

   (a) 1 (b) $tan^2\theta$ (c) $cot^2\theta$ (d) 0

5. If $x = a\tan\theta$ and $y = b\sec\theta$ then

   (a) $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ (b) $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ (c) $\frac{y^2}{b^2} - \frac{x^2}{a^2} = 1$ (d) 0

6. If the line of sight and angle of election is given, then which trigonometric ratio is used to find the height of the building

   (a) $\sin\theta$ (b) $\cos\theta$ (c) $\tan\theta$ (d) $\csc\theta$

7. If $\sin\theta = \cos\theta$, then $2tan^2\theta + sin^2\theta - 1$ is equal to

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

8. $\tan\theta\ cosec^2\theta - tan\theta$ is equal to

$(a)\ cot^2\theta$ $(b)\ \sec\theta$ $(c)\ \cot\theta$ $(d) 1$

9. $(1+\tan\theta+\sec\theta)(1+\cot\theta-cosec\theta)$ is equal to

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

10. The angle of elevation and depression are usually measured by a device called

(a) telescope (b) clinometer (c) theodolite (d) protector

11. The angle of elevation of a cloud from a point h meters above a lake is β. The angle of depression of its reflection in the lake is 45°. The height of location of the cloud from the lake is

$(a)\ \frac{h(1+tan\beta)}{1-tan\beta}$ $(b)\ \frac{h(1-tan\beta)}{1+tan\beta}$ $(c)\ htan(45^\circ-\beta)$ (d) none of these

12. $acot\theta + bcosec\theta = p$ and $bcot\theta + acosec\theta = q$, then $p^2 - q^2$ is equal to

$(a)\ a^2-b^2$ $(b)\ a^2+b^2$ $(c)\ b^2-a^2$ $(d)\ b+a$

13. If $(sin\alpha + cosec\alpha)^2 + (cos\alpha + sec\alpha)^2 = k + tan^2\alpha + cot^2\alpha$, then the value of k is equal to

$(a)\ 7$ $(b)\ 9$ $(c)\ 5$ $(d)\ 3$

14. The angle of depression and angle of elevation are equal become they are

(a) similar (b) corresponding angle (c) alternative angle (d) vertically opposite angle

PART-B $10 \times 2 = 20$

Note: **i)** ***Answer any TEN questions.***

ii) ***Question No.28 is compulsory.***

15. Prove that $tan^2\theta - sin^2\theta = tan^2\theta sin^2\theta$

16. A kite is flying at the height of $75m$ above the ground. The string attached to the kite is temporarily tired to a point on the ground. The inclination of the string with the ground is 60° Find the length of the string, assuming that there is no slack on the string.

17. Find the angle of elevation of the top of a tower from a point on the ground which is $30m$ away from the foot of a tower of height $10\sqrt{3}m$.

18. Prove that $\sqrt{\frac{1+sin\theta}{1-sin\theta}} = sec\theta + tan\theta$

19. A player sitting on the top of a tower of height $20m$ observes the angle of depression of a ball lying on the ground is 60°. Find the distance between the foot of the tower and the ball $[\sqrt{3} = 1.732]$

20. From the top of a tree of height $13m$ the angle of elevation and depression of the top and bottom of another tree are 45° and 30°. Find the height of the second tree $[\sqrt{3} = 1.732]$

21. Prove that $\frac{sinA-sinB}{cosA+cosB} + \frac{cosA-cosB}{sinA+sinB} = 0.$

22. Prove that $\frac{sinA}{1+cosA} + \frac{sinA}{1-cosA} = 2cosecA.$

23. If $cos\theta + \cos^2\theta = 1$,then find $\sin^2\theta + \sin^4\theta$?

24. Calculate $\angle BAC$ in the given triangle $[tan\ 38.7^{\circ} = 0.8011, tan\ 69.4^{\circ} = 2.6604]$

25. Prove that $\sec\theta - \cos\theta = \tan\theta\sin\theta.$

26. A tower stands vertically on the ground. From a point on the ground which is $48m$ away from the foot of the tower, the angle of elevation of the top of the tower is30°. Find the height of the tower.

27. If $\frac{cos\alpha}{cos\beta} = m\ and\ \frac{cos\alpha}{sin\beta} = n$ prove that $(m^2 + n^2)cos^2\beta = n^2$

28. Prove that $sin^2Acos^2B + cos^2Asin^2B + cos^2Acos^2B + sin^2Asin^2B = 1$

29. A road is flanked on either side by continuous rows of houses of height $4\sqrt{3}$ m with no space in between them. A pedestrian is standing on the median of the road facing a row house. The angle of elevation from the pedestrian to the top of the house is 30°. Find the width of the road.

PART-C **$10 \times 5 = 50$**

Note: **i)** ***Answer any TEN questions.***

ii) ***Question No.42 is compulsory.***

30. A statue $1.6m$ tall stands on the top of a pedestal. From a point on the ground, the angle of elevation of the top of the statue is 60° and from the same point the angle of elevation of the top of the pedestal is 40°. Find the height of the pedestal. $(tan40^{\circ} = 0.8391, \sqrt{3} = 1.732)$

31. A pole $5m$ high is fixed on the top of a tower. The angle of elevation of the top of the pole observed from a point '*A*' on the ground is 60° and the angle of depression to the point '*A*' from the top of the tower is 45°.

Find the height of the tower. ($\sqrt{3} = 1.732$)

32. If $\frac{cos^2\theta}{sin\theta} = p \; and \; \frac{sin^2\theta}{cos\theta} = q$, then prove that $p^2q^2(p^2 + q^2 + 3) = 1$

33. A bird is sitting on the top of a $80m$ high tree. From a point on the ground, the angle of elevation of the bird is 45°. The bird flies away horizontally in such away that it remained at a constant height from the ground. After 2 seconds, the angle of elevation of the bird from the same point is 30° . Determine the speed at which the bird flies.($\sqrt{3} = 1.732$)

34. A TV tower stands vertically on a bank of a canal. The tower is watched from a point on the other bank directly opposite to it. The angle of elevation of the top of the tower is 58° . From another point $20m$ away from this point on the line joining this point to the foot of the tower, the angle of elevation of the top of the tower is 30° . Find the height of the tower and the width of the canal. ($\tan 58° = 1.6003$)

35. The top of a $15m$ high tower makes an angle of elevation of 60° with the bottom of an electronic pole and angle of elevation of 30° with the top of the pole. What is the height of the electric pole?

36. State and prove Alternate segment theorem.

37. If $\frac{cos\theta}{1+sin\theta} = \frac{1}{a}$, then prove that $\frac{a^2-1}{a^2+1} = sin\theta$.

38. A man is standing on the deck of a ship, which is 40 m above water level. He observes the angle of elevation of the top of a hill as 60° and the angle of depression of the base of the hill as 30° . Calculate the distance of the hill from the ship and the height of the hill $(\sqrt{3} = 1.732)$.

39. From the top of a $12m$ high building, the angle of elevation of the top of a cable tower is 60° and the angle of depression of its foot is 30°. Determine the height of the tower.

40. If $cosec\theta + cot\theta = p$ then prove that $cos\theta = \frac{p^2-1}{p^2+1}$

41. From the top of the tower $60m$ high the angles of depression of the top and bottom of a vertical lamp post are observed to be 38° and 60° respectively. Find the height of the lamp post. ($tan38^\circ = 0.7831, \sqrt{3} = 1.732$)

42. A building and a statue are in opposite side of a street from each other $35m$ apart. From a point on the roof of building the angle of elevation of the top of statue is24° and the angle of depression of base of the statue is 34° . Find the height of the statue. ($tan\ 24^\circ = 0.4452,\ tan\ 34^\circ = 0.6745$)

PART-D **$2 \times 8 = 16$**

Note: ***Answer ALL the questions.***

43. (a)Construct a triangle similar to a given triangle PQR with its sides equal to $\frac{7}{3}$ of the corresponding sides of the triangle PQR (scale factor $\frac{7}{3}$). $(\boldsymbol{or})$

(b)Draw a triangle PQR such that $PQ = 6.8$cm, vertical angle 50^o and the bisector of vertical angle meets the base at D where $PD = 5.2cm$.

44. (a) A two wheeler parking zone near bus stand charges as below

Time (in hours) (x)	4	8	12	24
Amount $\boldsymbol{Rs}$ (y)	60	120	180	360

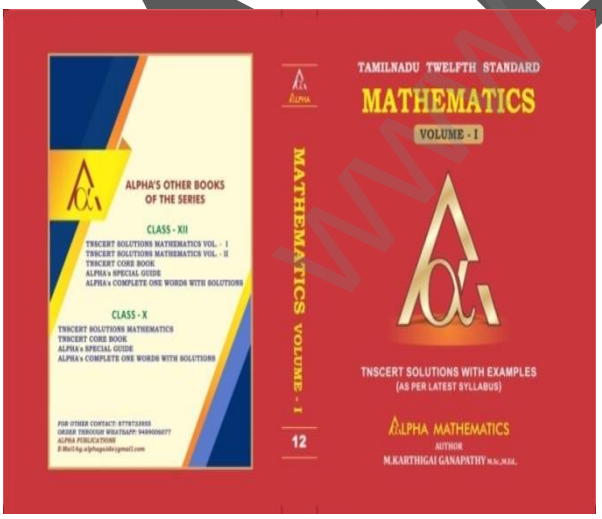
Check if the amount charged are in direct variation or in inverse variation to the parking time.

Graph the data. Also (i) find the amount to be paid when parking time is 6 hrs

(ii) find the parking duration when the amount paid is $Rs.150$. $(\boldsymbol{or})$

(b) Draw the graph of $y = (x-1)(x+3)$ and hence Use it to be solve $x^2 - x - 6 = 0$.

********** *ALL THE BEST* **********



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