SIM10MTM1920

Series: D4

Roll No. | | | | | | | |

Candidates must write the Code No on the title page of the answer-book

1. Please check that this question paper contains 7 printed pages
2. Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
3. Please check that this question paper contains 40 questions.
4. Please write down the Serial Number of the question before attempting it.
5. 15 minute time has been allotted to read this question paper. During these time students are not allowed to write answers

MID TERM EXAMINATION

SUB: MATHEMATICS **Marks: 80**

Class: X **Time: 3 Hrs**

General Instructions:

1. All question are compulsory.
2. This question paper contains 40 questions and divided into four sections, A,B, C and D
3. Section A comprises 20 questions of 1 mark each.
   Section B comprises 6 questions of 2 mark each.
   Section C comprises 8 questions of 3 mark each.
   Section D comprises 6 questions of 4 mark each.
4. There is no overall choice however internal choice have been provided
5. Use of calculator is not permitted

SECTION – A

I. Choose the correct option from questions

1. If $b\ tan\theta = a$, the value of $\frac{a\sin\theta - b\ cos\theta}{a\sin\theta + b\cos\theta}$ is

(A) $\frac{a-b}{a^2+b^2}$ (B) $\frac{a+b}{a^2+b^2}$

(C) $\frac{a^2+b^2}{a^2-b^2}$ (D) $\frac{a^2-b^2}{a^2+b^2}$

2. In an AP if a = 4.9, d=0 and n = 101 then value of n^{th} term:

(A) 0 (B) 4.9

(C) 105.9 (D) None of these

3. If $x = a\,sec\theta\ and\ y = mtan\theta then,\ b^2x^2 - a^2y^2$ is equal to

(A) ab (B) $a^2 + b^2$

(C) $a^2 - b^2$ (D) a^2b^2

4. The value of $\sqrt{6+\sqrt{6+\sqrt{6}}} + - - - - - - - -$

(A) 4 (B) 3

(C) -2 (D) 3.5

5. The area of the triangle formed by the line $\frac{x}{a} + \frac{y}{b} = 1$ with coordinate axis is :

(A) ab (B) $2ab$ (C) $\frac{1}{2}\,ab$ (D) $\frac{1}{4}\,ab$

6. If $\propto\ \beta\ \gamma$ are the zeroes of the polynomial fx, where $f(x) = ax^3 + bx^2 + cx + d$ then the value of $\frac{1}{\propto} + \frac{1}{\beta} + \frac{1}{\gamma}$ is

(A) $-\frac{b}{d}$ (B) $\frac{c}{d}$ (C) $\frac{-c}{d}$ (D) $\frac{-c}{a}$

7. If the equation $x^2 + 4x + K = 0$ has real and distinct roots then

(A) $K < 4$ (B) $K > 4$ (C) $K \geq 4$ (D) $K \leq 4$

8. The common difference of the A. P.

$\frac{1}{2b}, \frac{1-6b}{2b}, \frac{1-12b}{2b}, \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots is$

(A) $2b$ (B) $-2b$ (C) 3 (D) -3

9. The value of $\sqrt{\frac{1+\cos\theta}{1-cos\theta}}$ is

(A) $cot\theta - cosec\theta$ (B) $cosec\theta + \cot\theta$

(B) $cosec^2\theta + cot^2\theta$ (D) $(\cot\theta + cosec\,\theta)^2$

10. A hexagonal pyramid is 20metre high, right side of the base is 5 m. The volume of the pyramid is

(A) $250\sqrt{3}\ m^3$ (B) $25\sqrt{3}\ m^3$

(C) $250\ m^3$ (D) $25\ m^3$

11. **Assertion (A) –** *Total surface Area of the cylinder having radius of the base* $14\ cm$ *and height* $30cm$ *is* $3872\ cm^2$

Reason (R) - *If* rb *the radius and* h *be the height of the cylinder, them total surface area* $T\ S\ A = 2\pi rh + 2\pi r^2$

(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

12. If $p\ and\ q$ are the roots of the equation $x^2 - px + q = 0$ then, $p = ---$ and $q = \ -----$

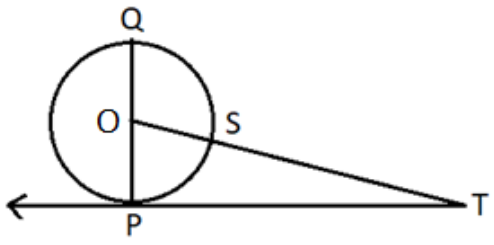
13. The value of K for which the system of equations, $2x + 3y = 5$ and $4x + ky = 10$ has infinite number of solutions is ----------

14. Column II give roots of quadratic equations given in column I. Match them correctly:

Column I		Column II	
A	$6x^2 + x - 12 = 0$	i	$(-6, 4)$
B	$8x^2 + 16x + 10 = 202$	ii	$(9\ , 36)$
C	x^2 – 45x + 324 = 0	iii	$-\frac{3}{2}, \frac{4}{3}$
D	$2x^2 - 5x - \ 3 = 0$	iv	$3, -\frac{1}{2}$

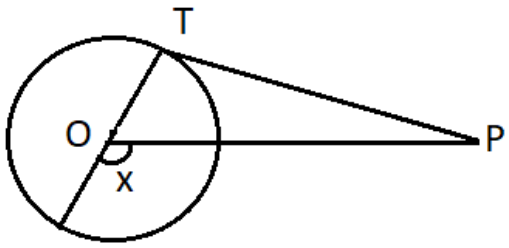
15. Does the cubes of natural numbers from an A. P . give reason?

16. T P is tangent to the circle with centre 0. If $\angle TOQ = 120^0$, find the diameter of the circle when $OT = 10cm$



OR

In the figure if P T is a tangent to the circle with Centre O and $Ut\angle TPO = \ 50^0, the\ find\ x$



17. If $\cos A + \cos^2 A = 1$, $find\ the\ value\ of\ \sin^2 A + \sin^4 A$

18. From a $30\ m$ high bridge, the angle of depression of a boat is 60^0. Find the horizontal distance of the boat from the bridge.

19. Find the ratio $r: h$ if a cone of height $h\ and\ a$ sphere have same $radii\ r$ and same volume.

20. Find the $non-zero$ real root of the quadratic equation $3z - z^2 = 0$

SECTION B

21. If $\sin 3\theta = \sin(\theta - 6^0)$, where 3θ and $(\theta - 6^0)$ are acute angles, then find the value of θ

22. Solve for x,

$$ab\ x^2 + (b^2 - ac)x - bc = 0$$

23. The larger of two supplementary angles exceeds twice the smaller by 20^0. Find both the angles

OR

What is the nature of the roots of $p(x)$ where, $(x) = 2x^2 - 2\sqrt{2}\ x + 1$? Find the root if exist.

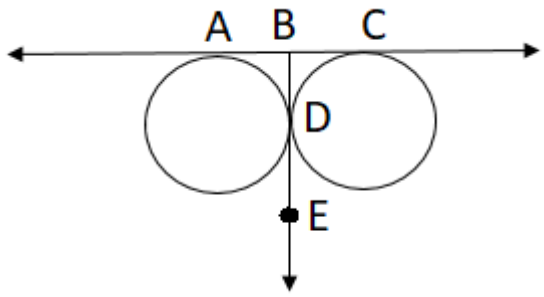
24. If $m\ and\ n$ are the zeroes of $p(x)$ such that $p(x) = 3x^2 + 11x - 4$ then find the value of $\frac{m}{n} + \frac{n}{m}$

25. Three cubes of a metal whose edges are in $the\ ratio\ 3:4:5$ are melted and converted into a single cube whose diagonal is $\sqrt{12}$. Find the edges of three cubes.

OR

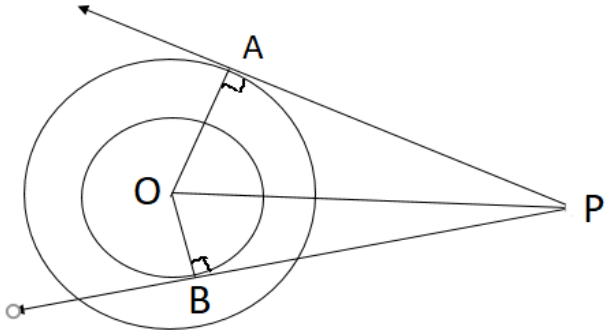
A largest sphere is carved out from a cube of side $14cm$, find the volume of the sphere.

26. In the figure $if\ AB = 4.5\ cm$ find the measure of $AC\ where\ BDE$ is the common tangent to the two circles.



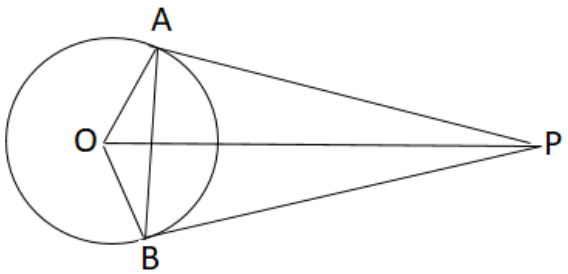
SECTION C

27. Two concentric circles with Centre O, are of radii $5cm\ and\ 3cm$. From an external point, two tangents PA and PB are drawn to these circles respectively. If PA = 12cm then find the length of PB.



OR

In the given figure OP is equal to the diameter of the circle. Prove that ABP is an equilateral triangle.



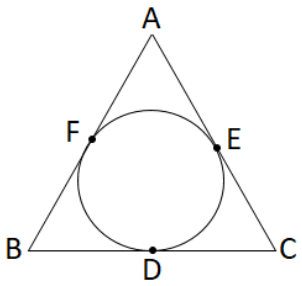
28. Solve the following pair of equation:

$$\frac{2xy}{x+y} = \frac{3}{2} \qquad \frac{xy}{2x-y} = \frac{-3}{20},$$

$$x + y \neq 0, \qquad 2x - y \neq 0$$

29. In the figure side $AB, BC\ and\ CA$ of ΔABC touch $a\ circle\ at\ , F, Dand\ E$ respectively prove that

$$AF + BD + CE = \frac{1}{2}(\ Perimeter\ of\ \Delta ABCD)$$



30. If the equation$(1 + m^2)\, n^2\, x^2 + 2mncx + \, c^2 - \, a^2 = 0$ has equal roots, prove that $c^2 = \, a^2(1 + m^2)$

31. If sum of first m terms of an A. P is n and the sum of first $n\ terms\ is\ m,$ then show that the sum of its first $(m \, + \, n\,)\ terms\ in \, - \, (m + n)$

32. The angle of elevation of the top of a tower from two points at a distance of $10\ metres\ and\ 5\ metres$ from the base of the tower and in the same straight line with it, are $complementary.$ Find the height of the tower.

OR

The angle of elevation of the top of the tower from certain point is 30^0. If the observer moves $20\ metres$ towards the tower, the angle of elevation of the top increases by 15^0. Find height of the tower.

33. If $\cos\theta + \sin\theta = p\ and \sec\theta + cosec\theta = q$ then show that $q(p^2 \, - 1) = 2p\ hence\ q = \frac{2p}{p^2-1}$

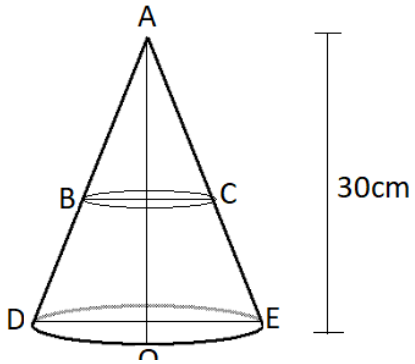
OR

If $\tan A = a \tan B\ and \sin A = b \sin B,\ then\ prove\ that\ cos^2 A = \frac{b^2-1}{a^2-1}$

SECTIOND

34. The well of diameter $4m$ is dug $21m$ deep the earth taken out of it has been spread evenly all around it in the shape of a circular ring of width $3m$ to form an embankment. Find the height of embankment.

35. The height of a cone is 30cm. A small cone is cut off at the top by a plane parallel to the base. If its volume is $^1/_{27}$ of the given cone, at what height above the base is the section made?



OR

A birthday conical cap is cut by a plane parallel to its base and the upper part is used as a new cap for a toy. The curved surface area of this new cap is $\frac{1}{9}$ of that of the whole cone. Find the ratio of the line segment into which the cone's altitude is divided by the plane.

36. If $cosec\ \theta - sin\theta = m$ and $\sec\theta - \cos\theta = n$ prove that $(m^2n)^{\frac{2}{3}} + (mn^2)^{\frac{2}{3}} = 1$

37. The angle of elevation of a cloud form a point 100m above the surface of a lake is 30^0 and the angle of depression of the reflection of the cloud in the lake is 60^0 find the height of the cloud.

38. Express $\left(\frac{4x-3}{2x+1}\right) - 10\left(\frac{2x+1}{4x-3}\right) = 3, x \neq \frac{-1}{2}\ and\ x \neq \frac{3}{4}$) in the standard form and then find its roots by factorization method.

OR

Solve for x

$$\left(\frac{2x}{x-5}\right)^2 + \left(\frac{10x}{x-5}\right) - 24 = 0, x \neq 5$$

39. If the polynomial $6x^4 + 8x^3 - 5x^2 + ax + b$ is exactly divisible by the polynomial $2x^2 - 5$ then find the values of $a\ and\ b$

40. Find the sum:

$$\left(4 - \frac{1}{n}\right) + \left(7 - \frac{2}{n}\right) + \left(10 - \frac{3}{n}\right) + \ - - - - - - - - - - up\ to\ n\ term$$

OR

The sum of first n terms of $three\ A.Ps\ are\ S_1, S_2\ and\ S_3$. The first term of each $A.P$ is unity and their common differences 1,2,3 respectively. Prove that $S_1 + S_2 = 2S_2$