

COMMON SECOND MID-TERM TEST - 2019

V

Standard X

Reg No.

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Time: 2.30 hours.

MATHEMATICS

Marks: 100

Part - I

I. Choose the correct answer:

14 x 1 = 14

1. Graph of a linear polynomial is a
 a) straight line b) circle c) parabola d) hyperbola
2. The number of points of intersection of the quadratic polynomial $x^2 + 4x + 1$ with the x axis is
 a) 0 b) 1 c) 0 or 1 d) 2
3. For the given matrix $A = \begin{bmatrix} 1 & 3 & 5 & 7 \\ 2 & 4 & 6 & 8 \\ 9 & 11 & 13 & 15 \end{bmatrix}$, the order of the matrix A^T is
 a) 2 x 3 b) 3 x 2 c) 3 x 4 d) 4 x 3
4. Find the matrix X if $2X + \begin{bmatrix} 1 & 3 \\ 5 & 7 \end{bmatrix} = \begin{bmatrix} 5 & 7 \\ 9 & 5 \end{bmatrix}$
 a) $\begin{bmatrix} -2 & -2 \\ 2 & -1 \end{bmatrix}$ b) $\begin{bmatrix} 2 & 2 \\ 2 & -1 \end{bmatrix}$ c) $\begin{bmatrix} 1 & 2 \\ 2 & 2 \end{bmatrix}$ d) $\begin{bmatrix} 2 & 1 \\ 2 & 2 \end{bmatrix}$
5. A tangent is perpendicular to the radius at the
 a) centre b) point of contact c) infinity d) chord
6. How many tangents can be drawn to the circle from an exterior point?
 a) one b) two c) infinite d) zero
7. The two tangents from an external points P to a circle with centre at O are PA and PB. If $\angle APB = 70^\circ$ then the value of $\angle AOB$ is
 a) 100° b) 110° c) 120° d) 130°
8. If the ratio of the height of a tower and the length of its shadow is $\sqrt{3} : 1$, then the angles of elevation of the sun has measure
 a) 45° b) 30° c) 90° d) 60°
9. A tower is 60 m height. Its shadow is x metres shorter when the Sun's altitude is 45° than when it has been 30° , then x is equal to
 a) 41.92 m b) 43.92 m c) 43 m d) 45.6 m
10. The curved surface area of a right circular cone of height 15 cm and base diameter 16 cm is
 a) $60 \pi \text{ cm}^2$ b) $68 \pi \text{ cm}^2$ c) $120 \pi \text{ cm}^2$ d) $136 \pi \text{ cm}^2$
11. The height of a right circular cone whose radius is 5 cm and slant height is 13 cm will be
 a) 12 cm b) 10 cm c) 13 cm d) 5 cm

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12. If the radius of the base of a cone is tripled and the height is doubled then the volume is
 a) made 6 times b) made 18 times
 c) made 12 times d) unchanged
13. A solid sphere of radius x cm is melted and recast into a shape of a solid cone of same radius. The height of the cone is
 a) $3x$ cm b) x cm c) $4x$ cm d) $2x$ cm
14. The ratio of the volumes of a cylinder, a cone and a sphere, if each has 2 m diameter and 2 m height.
 a) 1 : 2 : 3 b) 2 : 1 : 3 c) 1 : 3 : 2 d) 3 : 1 : 2

Part - II

II. Answer any 10 questions: (Ques.No.28 is compulsory)

10 x 2 = 20

15. If the difference between a number and its reciprocal is $\frac{24}{5}$, find the number.
16. Determine the nature of roots of the quadratic equation $15x^2 + 11x + 2 = 0$
17. If the difference between the roots of the equation $x^2 - 13x + k = 0$ is 17, find k .
18. The roots of the equation $2x^2 - 7x + 5 = 0$ are α and β without solving for roots find $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$.

19. if $A = \begin{bmatrix} 5 & 2 & 2 \\ -\sqrt{17} & 0.7 & \frac{5}{2} \\ 8 & 3 & 1 \end{bmatrix}$, then verify $(A^T)^T = A$

20. if $A = \begin{bmatrix} 5 & 4 & -2 \\ \frac{1}{2} & \frac{3}{4} & \sqrt{2} \\ 1 & 9 & 4 \end{bmatrix}$, $B = \begin{bmatrix} -7 & 4 & 3 \\ \frac{1}{4} & \frac{7}{2} & 3 \\ 5 & -6 & 9 \end{bmatrix}$, find $4A - 3B$.

21. Find the values of x, y, z if $\begin{bmatrix} x-3 & 3x-z \\ x+y+7 & x+y+z \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 1 & 6 \end{bmatrix}$

22. A man goes 18 m due east and then 24 m due north. Find the distance of his current position from the starting point.
23. The length of the tangent to a circle from a point P, which is 25 cm away from the centre is 24 cm. What is the radius of the circle?
24. Find the angle of the elevation of the top of a tower from a point on the ground, which is 30 m away from the foot of a tower of height $10\sqrt{3}$ m.
25. A player is sitting on the top of a tower of height 20 m observes the angle of depression of a ball lying on the ground as 60° . Find the distance between the foot of the tower and the ball. ($\sqrt{3} = 1.732$)
26. The radius and height of a cylinder are in the ratio 5:7 and its curved surface area is 5500 sq.cm. Find its radius and height.

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27. If the circumference of a conical wooden piece is 484 cm, then find its volume when its height is 105 cm.
28. The volumes of two cones of same base radius are 180 cm^3 and 250 cm^3 . find the ratio of heights.

Part - III**III. Answer any 10 questions: (Ques.No.42 is compulsory)** $10 \times 5 = 50$

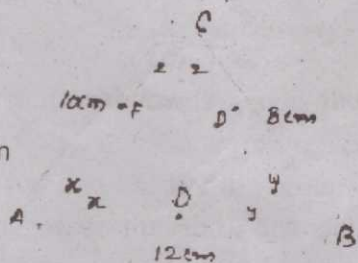
29. A bus covers a distance of 90 km at a uniform speed. Had the speed been 15 km/hour more it would have taken 30 minutes less for the journey. Find the original speed of the bus.
30. A girl is twice as old as her sister. Five years hence, the product of their ages (in years) will be 375. Find their present.
31. If α, β are the roots of the equation $2x^2 - x - 1 = 0$, then form the equation whose roots are $\alpha^2\beta, \beta^2\alpha$

32. If $A = \begin{pmatrix} 1 & -1 & 2 \end{pmatrix}$, $B = \begin{bmatrix} 1 & -1 \\ 2 & 1 \\ 1 & 3 \end{bmatrix}$ and $C = \begin{bmatrix} 1 & 2 \\ 2 & -1 \end{bmatrix}$, show that $(AB)C = A(BC)$

33. If $A = \begin{bmatrix} 5 & 2 & 9 \\ 1 & 2 & 8 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 7 \\ 1 & 2 \\ 5 & -1 \end{bmatrix}$, verify that $(AB)^T = B^T A^T$

34. State and prove Pythagoras theorem.
35. PQ is a chord of length 8 cm to a circle of radius 5 cm. The tangents at P and Q intersect at a point T. Find the length of the tangent TP.

36. A circle is inscribed in $\triangle ABC$ having sides 8 cm, 10 cm and 12 cm as shown in figure, find AD, BE and CF.



37. Two ships are sailing in the sea on either sides of a lighthouse. The angle of elevation of the top of a light house as observed from the ships are 30° and 45° respectively. If the lighthouse is 200 m high, find the distance between the two ships. ($\sqrt{3} = 1.732$)
38. From the top of a tower 50 m high, the angles of depression of the top and bottom of a tree are observed to be 30° and 45° respectively. Find the height of the tree.

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39. If the radii of the circular ends of a frustum which is 45 cm high are 28 cm and 7 cm. Find the volume of the frustum.
- $$\pi \left[R^2 + (Rr) + r^2 \right] h$$
40. A toy is in the shape of cylinder surmounted by a hemisphere. The height of the toy is 25 cm. Find the total surface area of the toy if the common diameter is 12 cm.
41. A right circular cylindrical container of base radius 6 cm and height 15 cm is full of ice cream. The ice cream is to be filled in cones of height 9 cm and base radius 3 cm having a hemispherical cap. Find the number of cones needed to empty the container.
42. A metallic sheet has central angle 216° . The sector is made into a cone by bringing the bounding radii together. Find the volume of the cone formed.

Part - IV

II. Answer any 2 questions:

 $2 \times 8 = 16$

43. Draw a circle of diameter 6 cm from a point P, which is 8 cm away from its centre. Draw two tangents PA and PB to the circle and measure their lengths.
44. Draw a circle of radius 4.5 cm. Take a point on the circle. Draw the tangent at that point using the alternate segment theorem.
45. Take a point which is 11 cm away from the centre of a circle of radius 4 cm and draw the two tangents to the circle from that point.

$$V = \pi r^2 h$$

Formula $\frac{1}{3} \pi r^2 h + \frac{2}{3} \pi r^3$