

SECOND MID TERM TEST - 2022

10 - Std

MATHEMATICS

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Marks : 50

Time : 1.30 Hrs

7 X 1 = 7

I Choose the correct answer.

1. If the constant term of $ax^2 + bx + c = 0$ is zero, then the sum and product of roots are and

a) $\frac{a}{b}, 1$ b) $-\frac{b}{a}, 0$ c) $\frac{c}{a}, 1$ d) $\frac{a}{c}, -1$

2. The tangent is perpendicular to the radius at the
a) centre b) point of contact c) infinity d) chord

3. 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) 45° b) 30° c) 90° d) 60°

4. A tower is 60m height. Its shadow is x metres shorter when the Sun's altitude is 45° then 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

5. 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

6. A spherical ball of radius r_1 units is melted to make 8 new identical balls each of radius r_2 units. Then $r_1 : r_2$ is
a) 2 : 1 b) 1 : 2 c) 4 : 1 d) 1 : 4

7. If A is a 2 X 3 matrix and B is a 3 X 4 matrix, how many columns does AB have
a) 3 b) 4 c) 2 d) 5

II Answer any 5 questions. (Q.No. 14 is compulsory)

5 X 2 = 10

8. Determine the nature of roots for the quadratic equation

$$2x^2 - 2x + 9 = 0.$$

9. If $A = \begin{pmatrix} 5 & 2 & 2 \\ -\sqrt{17} & 0.7 & 5/2 \\ 8 & 3 & 1 \end{pmatrix}$ then verify $(A^T)^T = A$.

10. A kite is flying at a height of 75m above the ground. The string attached to the kite is temporarily tied 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 in the string.
11. 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.
12. A cylindrical drum has a height of 20cm and base radius of 14cm. Find its curved surface area.
13. Find the value of the radius of a sphere whose surface area is 36π square units.
14. Find the length of the tangent drawn from a point whose distance from the centre of a circle is 5cm and radius of the circle is 3cm.

III Answer any 5 questions. (Q.No. 21 is compulsory)

5 X 5 = 25

15. If $A = \begin{pmatrix} 3 & 1 \\ -1 & 2 \end{pmatrix}$, show that $A^2 - 5A + 7I_2 = 0$.
16. State and prove Pythagoras theorem.
17. Two ships are sailing in the sea on either sides of a lighthouse. The angle of elevation of the top of the lighthouse as observed from the ships are 30° and 45° respectively. If the lighthouse is 200m high, find the distance between the two ships. ($\sqrt{3} = 1.732$)
18. An aeroplane at an altitude of 1800m finds that two boats are sailing towards it in the same direction. The angle of depression of the boats as observed from the aeroplane are 60° and 30° respectively. Find the distance between the two boats. ($\sqrt{3} = 1.732$).
19. If the radii of the circular ends of a frustum which is 45cm high are 28cm and 7cm, find the volume of the frustum.
20. If $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ and $I = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ show that $A^2 - (a + d)A = (bc - ad)I_2$.
21. A solid sphere of radius 6cm is melted into a hollow cylinder of uniform thickness. If the external radius of the base of the cylinder is 5cm and its height is 32cm, then find the thickness of the cylinder.

IV Answer the following questions.

1 X 8 = 8

22. Draw a circle of diameter 6cm from a point P, which is 8 cm away from its centre. Draw the two tangents PA and PB to the circle and measure their lengths. (OR)

Draw the graph of $y = 2x^2 - 3x - 5$ and hence solve $2x^2 - 4x - 6 = 0$.