

SNS academy

a fingerprint school



MAX. MARKS: 80

DATE: 13/03/2021

MATHEMATICS (041)

MODEL EXAMINATION-3

GRADE: 10 TIME: 3 HOURS

General Instructions:

1. This question paper contains two parts A and B.

2. Both Part A and Part B have internal choices.

Part-A

1. It consists two sections- I and II.

2. Section I has 16 questions of 1 mark each. Internal choice is provided in 5 questions.

3. Section II has 4 questions on case study. Each case study has 5 case-based subparts. An examinee is to attempt any 4 out of 5 sub-parts.

Part-B

1. Question No 21 to 26 are Very short answer Type questions of 2 mark each

- 2. Question No 27 to 33 are Short Answer Type questions of 3 marks each
- 3. Question No 34 to 36 are Long Answer Type questions of 5 marks each.

PART-A

Section-I

- 1. If a ladder 10 m long reaches a window 8 m above the ground, then the distance of the foot of the ladder from the base of the wall is_____
- 2. If $\triangle ABC \sim \triangle EDF$ and $\triangle ABC \sim \triangle DEF$, then which of the following is not true? (a) $BC \times EF = AC \times FD$ (b) $AB \times EF = AC \times DE$ (c) $BC \times DE = AB \times EF$ (d) none
- 3. In an equilateral triangle of side $3\sqrt{3}$ cm, then the length of the altitude is_____
- 4. Two concentric circles are of radii 10 cm and 6 cm. length of the chord of the larger circle which touches the smaller circle is

5. If $\cos A = \frac{4}{5}$, $\tan A =$

6. In $\triangle ABC$, right angled at C, then find the value of sin(A+B)

(a) 0 (b) 1 (c) $\frac{2}{\sqrt{3}}$ (d) not defined

7. If
$$tan(3x+30^{\circ})=1$$
, then the value of x is____

8. If the height of a vertical pole is $\sqrt{3}$ times the length of its shadow on the ground, then the angle of elevation of the Sun at that time is

(a)
$$30^{\circ}$$
 (b) 60° (c) 45° (d) 75°

9. The surface areas of two spheres are in the ratio 16:9. The ratio of their volumes is

(a)
$$64:27$$
 (b) $16:9$ (c) $4:3$ (d) $16^3:9^3$

10. A die is thrown once. Find the probability of getting "at most 2"

- 11. The area of the circle that can be inscribed in a square of side 6 cm is_____
- 12. In $\triangle ABC$, *DE* is parallel to *BC*. Find the length of side AD, given that AE = 1.8 cm, BD = 7.2 cm, CE = 5.4 cm.
- 13. If a circle can be inscribed in a parallelogram how will the parallelogram change?
- 14. $\sin A = \cos A$, when A = ?
- 15. If the radius of the circle is doubled, then what about its area?
- 16. A rectangular sheet of paper 40 cm x 22 cm, is to rolled to form a hollow cylinder of height 40 cm. Then the radius of the cylinder is____

SECTION-II

Case study based questions are compulsory. Attempt any four sub parts of each question. Each subpart carries 1 mark

17. A circular ground touches all three sides of a triangular field. The sides of a triangle are BC=8 cm, CA=10cm and AB =12 cm



I) The semi perimeter of a triangle ABC is (a) 30 cm (b) 15 cm (c) 20 cm (d) 16 cm II) The length of the tangent AD is (a) 3 cm (b) 7 cm (c) 5 cm (d) 6 cm III) The length of the tangent CF is (b) 5 cm (a) 3 cm (c) 4 cm (d) none IV) The length BE is equal to (a) EC (b) BD (c) AF (d) none V) The sum of the lengths AD and AF is (a) 12 cm (b) 10 cm (c) 14 cm (d) 15 cm

18. A tree is broken at a height of 6 m from the ground and its top touches the ground at a distance of 12 m from the base of the tree.



I) The angle of inclination to the point A from the ground is

- (a) 30° (b) 60° (c) 45° (d) none
- II) The length of the hypotenuse is
- (a) 36 m (b) 12m (c) 6 m (d) none

III) $\angle CAB =$ (a) 30° (b) 60° (c) $90^{\circ} - \angle ACB$ (d) none IV) The total height of the tree is

- (a) 180 m (b) 5+180 (c) $\sqrt{5}(6+\sqrt{5})$ (d) none
- 19. An umbrella has 8 ribs which are equally spaced . Assuming umbrella to be a flat circle of radius 45 cm.



- I) Angle made by two consecutive ribs at the centre is
 - (a) 90° (b) 40° (c) 45° (d) 30°
- II) Area of the sector between two consecutive ribs is
- (a) $\frac{1}{8}\pi \times 45 \times 45$ (b) $\frac{40}{360}\pi \times 45 \times 45$ (c) $\frac{1}{8} \times 45 \times 45$ (d) $\frac{\theta}{180^0}\pi \times 45 \times 45$
- III) Area of the sector of a circle of radius 45 cm is
- (a) $759.53cm^2$ (b) $795.53cm^2$ (c) $659.53cm^2$ (d) $755.53cm^2$

IV) The circumference of the umbrella if the radius of the umbrella is 35 cm, is (a) 250cm (b) 795 cm (C) 220cm (d) none

20. The given figure depicts a racing track whose left and right ends are semicircular. The distance between the two inner parallel line segments is 60 m and they are each 106 m long. If the track is 10 m wide, find : (i) the distance around the track along its inner edge (ii) the area of the track.



I) Diameter of the outer semicircle is

(a) 40 m (b) 80 m (c) 20 m (d) 30 m

II) The distance around the track along its outer edge is

(a) 463.43 m(b) 400.57 m (c) 212 m (d) none

III) The area of the semicircular regions is

(a) 1100m (b) 2200m (c) 4400 (d) none

IV) The area of the track is

(a) 4230 sq. m (b) 4320 sq.m (c) 2340 sq.m (d) none

PART-B

All questions are compulsory. In case of internal choices, attempt any one.

21. (i)All circles are ____ (Similar, Congruent)

(ii) All _____ triangles are similar (isosceles, equilateral)

(iii) Two polygons of the same number of sides are similar, if (a) their corresponding angles are _____ and (b) their corresponding sides are _____

22. In the given figure , find $\angle F$

23. Simplify:
$$\frac{\cos 30^{\circ} + \sin 60^{\circ}}{1 + \cos 60^{\circ} + \sin 30^{\circ}}$$
 (OR)
Simplify: $(1 + \tan^2 \phi)(1 + \sin \phi)(1 - \sin \phi)$



- 24. The angle of elevation of the top of a tower from a point on the ground, which is 30 m away from the foot of the tower, is 30°. Find the height of the tower.
- 25. Find the area of the sector of a circle with radius 4 cm and of angle 30° .
- 26. Raghul and Sarath are friends. What is the probability that both will have (i) the same birthday (ii) different birthdays (ignoring a leap year).

(OR)

Gokul buys a fish from a shop for his aquarium. The shopkeeper takes out one fist at random from a tank consisting 5 male fish ad 8 female fish. What is the probability that the fish taken out is not a male fish?

PART-B

All questions are compulsory . In case of internal choice, attempt anyone.

- 27. Prove: The lengths of tangents drawn from an external point to a circle are equal.
- 28. From each corner of a square of side 4 cm a quadrant of a circle of radius 1 cm is cut and also a circle of diameter 2 cm is cut as shown in figure. Find



the area of the remaining portion of the square.

In figure, OACB is a quadrant of a circle with centre O and radius 3.5 cm. If OD = 2 cm, find the area of the (i) quadrant OACB, (ii) shaded region.



29. A tent is in the shape of a cylinder surmounted by a conical top. If the height and diameter of the cylindrical part are 2.1 m and 4 m, and slant height of the top is 2.8 m, find the area of the canvas used for making the tent. **(OR)**

A solid is in the shape of a cone standing on a hemisphere with both radii being equal to 1 cm and the height of the cone is equal to its radius. Find the volume of the solid.

30. In $\triangle ABC$, AD is perpendicular to BC. Prove that $AB^2 + CD^2 = AC^2 + BD^2$.

31. Prove:
$$(\sec A + \cos A)^2 + (\sin A + \cos ecA)^2 = 7 + \tan^2 A + \cot^2 A$$
 (OR)
 $(\sin^6 \theta + \cos^6 \theta) = 1 - 3\sin^2 \theta \cos^2 \theta$

32. In Fig., XY and X'Y' are two parallel tangents to a circle with centre O and another tangent AB with point of contact C intersecting XY at A and X'Y' at



B. Prove that $\angle AOB = 90^{\circ}$.

33. If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio. (OR)

In a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

PART-B

All questions are compulsory. In case of internal choices, attempt anyone.

- 34. Draw a line segment AB of length 8 cm. Taking A as centre, draw a circle of radius 4 cm and taking B as centre, draw another circle of radius 3 cm. Construct tangents to each circle from the centre of the other circle.
- 35. PQ is a chord of length 8 cm of a circle of radius 5 cm. The tangents at P and Q intersect at a point T (see Fig.,). Find the length TP.



A point O in the interior of a rectangle ABCD is joined with each of the vertices A, B, C and D. Prove that $OA^2 + OC^2 = OB^2 + OD^2$

36. From a point P on the ground the angle of elevation of the top of a 10 m tall building is 30°. A flag is hoisted at the top of the building and the angle of elevation of the top of the flagstaff from P is 45°. Find the length of the flagstaff and the distance of the building from the point P. (You may take $\sqrt{3} = 1.732$) (**OR**)

The shadow of a tower standing on a level ground is found to be 40 m longer when the Sun's altitude is 30° than when it is 60° . Find the height of the tower