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MAX. MARKS: 80
DATE: 13/03/2021

MODEL EXAMINATION-3
MATHEMATICS (041)
a fingerprint school
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 $\qquad$
2. If $\triangle A B C \sim \triangle E D F$ and $\triangle A B C \sim \triangle D E F$, then which of the following is not true?
(a) $B C \times E F=A C \times F D$
(b) $A B \times E F=A C \times D E$
(c) $B C \times D E=A B \times E F$
(d) none
3. In an equilateral triangle of side $3 \sqrt{3} \mathrm{~cm}$, then the length of the altitude is $\qquad$
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 $\triangle A B C$, 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 $\tan \left(3 x+30^{\circ}\right)=1$, then the value of $x$ is $\qquad$
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) $60^{\circ}$
(c) $45^{\circ}$
(d) $75^{\circ}$
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 "
(a) $2 / 3$
(b) $1 / 3$
(c) $1 / 6$
(d) none
11. The area of the circle that can be inscribed in a square of side 6 cm is $\qquad$
12. In $\triangle A B C, D E$ is parallel to $B C$. Find the length of side AD , given that $\mathrm{AE}=1.8 \mathrm{~cm}, \mathrm{BD}=7.2 \mathrm{~cm}, \mathrm{CE}=5.4 \mathrm{~cm}$.
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 $40 \mathrm{~cm} \times 22 \mathrm{~cm}$, is to rolled to form a hollow cylinder of height 40 cm . Then the radius of the cylinder is $\qquad$

## 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 $\mathrm{BC}=8 \mathrm{~cm}, \mathrm{CA}=10 \mathrm{~cm}$ and $\mathrm{AB}=12 \mathrm{~cm}$

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
(a) 3 cm
(b) 5 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) $30^{\circ}$
(b) $60^{\circ}$
(c) $45^{\circ}$
(d) none
II) The length of the hypotenuse is
(a) 36 m
(b) 12 m
(c) 6 m
(d) none
III) $\angle C A B=$
(a) $30^{\circ}$
(b) $60^{\circ}$
(c) $90^{\circ}-\angle A C B$
(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) $90^{\circ}$
(b) $40^{\circ}$
(c) $45^{\circ}$
(d) $30^{\circ}$
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) $759.53 \mathrm{~cm}^{2}$
(b) $795.53 \mathrm{~cm}^{2}$
(c) $659.53 \mathrm{~cm}^{2}$
(d) $755.53 \mathrm{~cm}^{2}$
IV) The circumference of the umbrella if the radius of the umbrella is 35 cm ,
is (a) 250 cm
(b) 795 cm
(C) 220 cm
(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) 1100 m
(b) 2200 m
(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 $\qquad$ ( Similar, Congruent)
(ii) All $\qquad$ triangles are similar (isosceles, equilateral)
(iii) Two polygons of the same number of sides are similar, if (a) their corresponding angles are $\qquad$ and (b) their corresponding sides are $\qquad$
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: $\left(1+\tan ^{2} \phi\right)(1+\sin \phi)(1-\sin \phi)$
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 $30^{\circ}$. Find the height of the tower.
25. Find the area of the sector of a circle with radius 4 cm and of angle $30^{\circ}$.
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 $\mathrm{OD}=2 \mathrm{~cm}$, 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 $\triangle A B C, \mathrm{AD}$ is perpendicular to BC . Prove that $A B^{2}+C D^{2}=A C^{2}+B D^{2}$.
31. Prove: $(\sec A+\cos A)^{2}+(\sin A+\operatorname{cosec} A)^{2}=7+\tan ^{2} A+\cot ^{2} A$ (OR)

$$
\left(\sin ^{6} \theta+\cos ^{6} \theta\right)=1-3 \sin ^{2} \theta \cos ^{2} \theta
$$

32. In Fig., XY and $\mathrm{X}^{\prime} \mathrm{Y}^{\prime}$ are two parallel tangents to a circle with centre O and another tangent AB with point of contact C intersecting XY at A and $\mathrm{X}^{\prime} \mathrm{Y}^{\prime}$ at
B. Prove that $\angle \mathrm{AOB}=90^{\circ}$.

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.

(OR)
A point O in the interior of a rectangle ABCD is joined with each of the vertices A, B, C and D. Prove that $O A^{2}+O C^{2}=O B^{2}+O D^{2}$
36. From a point P on the ground the angle of elevation of the top of a 10 m tall building is $30^{\circ}$. A flag is hoisted at the top of the building and the angle of elevation of the top of the flagstaff from P is $45^{\circ}$. Find the length of the flagstaff and the distance of the building from the point P. (You may take $\sqrt{3}=1.732)(\mathbf{O R})$

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

