Time: 3hrs.   M.M. 80

General Instructions:
1. This Question Paper has 5 Sections A, B, C, D and E.
2. Section A has 20 MCQs carrying 1 mark each
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.

Section-A

1. Which of the following is irrational?

   a) $\sqrt{\frac{4}{9}}$ b) $\sqrt{\frac{12}{3}}$ c) $\sqrt{7}$ d) $\sqrt{81}$

2. $(3\sqrt{2} + 5\sqrt{3}) + (\sqrt{2} + \sqrt{3}) =$

   a) $3\sqrt{2} + 6\sqrt{3}$ b) $4\sqrt{2} + 6\sqrt{3}$ c) $3\sqrt{2} - \sqrt{3}$ d) $5\sqrt{2} + 3\sqrt{3}$

3. Zero of the polynomial $p(x) = 2x - 5$ is

   a) $\frac{-2}{5}$ b) $-\frac{5}{2}$ c) $\frac{2}{5}$ d) $\frac{5}{2}$

4. Degree of zero polynomial is

   a) 0   b) 1   c) any natural number   d) not defined

5. Point $(-5, 3)$ lies in the

   a) First quadrant   b) Second quadrant   c) Third quadrant   d) Fourth quadrant

6. Which of the following is not a solution of the equation $2x + y = 7$?

   a) $(1, 3)$ b) $(3, 1)$ c) $(0, 7)$ d) $(1, 5)$

7. If $(1, -1)$ is a solution of $px - 2y = 0$ then value of p is

   a) 2   b) 1   c) – 1   d) – 2

8. Degree of polynomial $5x^2 - 6x - 2$ is

   a) 2   b) 1   c) 0   d) not defined

9. Euclid stated that all right angles are equal to each other in the form of

   a) an axiom   b) a definition   c) a postulate   d) a theorem

A-1

10. If $AB = QR, BC = PR$ and $CA = PQ$ then

a) $\triangle ABC \cong \triangle PQR$ b) $\triangle CBA \cong \triangle PRQ$ c) $\triangle BAC \cong \triangle RPQ$ d) $\triangle PQR \cong \triangle BCA$

11. Each angle of a rectangle is

a) 75   b) 90^0 c) 80^0 d) 60^0

12. In which of the following figures are the diagonals equal?

a) Parallelogram   b) rhombus   c) Trapezium   d) Rectangle

13. ABCD is a cyclic trapezium in which $AB \parallel DC$ and $\angle A = 60^0$ then $\angle ABC$ is equal to

a) 60^0 b) 55^0 c) 50^0 d) 45^0

14. The area of a right angled triangle with sides 17cm, 15cm and 8cm is

a) $25\ cm^2$ b) $28\ cm^2$ c) $60\ cm^2$ d) $35\ cm^2$

15. If a, b and c are the sides of the triangle and s = semi perimeter then area of a triangle b

Heron's formula is given by

a) $\sqrt{(s-a)(s-b)(s-c)}$ b) $\sqrt{s(s-a)(s-b)(s-c)}$

c) $\sqrt{(s+a)(s+b)(s+c)}$ d) $\sqrt{s(s+a)(s+b)(s+c)}$

16. The radius of a sphere whose surface area is $314\ cm^2$ is

a) 7 cm   b) 6 cm   c) 5 cm   d) none of these

17. The area of the iron sheet required to prepare a cone without base of height 3 cm with radiu

4 cm is

a) $\frac{110}{3}\ m^2$ b) $\frac{220}{7}\ m^2$ c) $\frac{440}{7}\ m^2$ d) $\frac{110}{7}\ m^2$

18. The curved surface area of a solid hemisphere of radius r is

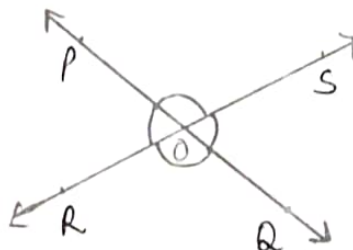a) πr^2 b) $2\pi r^2$ c) $3\pi r^2$ d) $4\pi r^2$

Direction: In the question number 19 and 20, a statement of Assertion (A) is followed by statement of Reason (R).
a) Both A and R are true and Reason (R) is correct explanation of A
b) Both A and R are true but Reason (R) is not the correct explanation of A
c) A is true but R is false
d) A is false but R is true

19. Assertion (A) : If two lines PQ and RS intersect

each other at point O

if $\angle POR : \angle ROQ = 5:7$

then $\angle POS = \angle ROQ = 105^0$

Reason (R) : If two lines intersect each other then vertically opposite angles are equal.

A - 2

20. Assertion (A) : In a circle, AB is diameter and P is any point in the interior of the circle then $\angle APB = 90^0$

Reason (R): Angle in semicircle is always a right angle.

Section – B

21. Find the value of k if $(x-1)$ is a factor of $4x^3 + 3x^2 - 4x + k$

22. If a point C lies between two points A and B such that AC = BC then prove that $AC = \frac{1}{2}AB$

Explain by drawing the figure.

23. BE and CF are two equal altitudes of a triangle ABC. Using RHS congruence rule, prove that the triangle ABC is isosceles

24. The sides of a triangular plot are in ratio 3: 5: 7 and perimeter is 300 m. Find its area.

25. Expand $(3a + 4b + 5c)^2$

Section – C

26. Simplify (i) $\frac{(8)^{1/3} \times (16)^{1/3}}{(32)^{-1/3}}$ (ii) Express $0.\overline{235}$ in $\frac{p}{q}$ form

27. Evaluate (i) 102^3 (ii) 107×93 using identities

28. Write co-ordinates of the point.

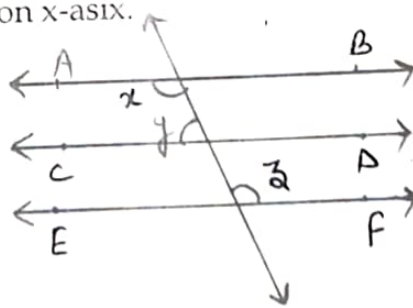a) Whose ordinate is -5 and which lies on y-axis.

b) Which lies on x and y axes both.

c) Whose adscissa is -3 and which lies on x-asix.

29. If $AB \parallel CD$, $CD \parallel EF$

and $y : z = 3 : 7$

find x, y and z

30. Prove that the quadrilateral formed by the internal angle bisectors of any quadrilateral is cyclic.

31. A hemispherical bowl made of brass has inner diameter 10.5 cm. Find the cost of tinplating it on the inside at the rate of Rs. 16 per 100 cm².

Section – D

32. A chord of a circle is equal to the radius of the circle. Find angle subtended by the chord at point on the minor arc and also at a point on the major arc.

33. Simplify $\dfrac{4+\sqrt{5}}{4-\sqrt{5}} + \dfrac{4-\sqrt{5}}{4+\sqrt{5}}$

34. A dome of the building is in the form of hemisphere. From inside it was white washed at the cost of Rs. 4989.60. If the cost of white washing is Rs. 20 per square metre. Find :
    a) Inside surface area of dome   B) Ratio of S and S'

35. Represent the following data of marks obtained by two groups of class IX in a Government school in the form of frequency polygons on same axes.

Marks	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Group A	16	7	9	20	22	2	3
Group B	10	12	25	14	15	5	1

SECTION E

(Case study based questions are compulsory.)

36. One day Homesh was going on a road trip with his father. They started his jouney on a straight road. Later walking some distance they reach a crossroads where one straight road intersects another at 45° as shown in the figure.
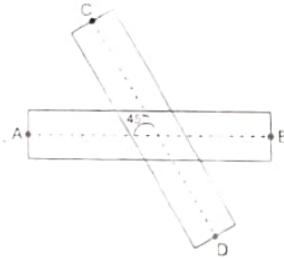
    Based on above information, answer the following questions :

    (i) Find the measure of ∠BOC.
    (ii) Find the measure of ∠BOD.
    (iii) Find the reflex ∠BOC.

37. One day Sangeeta's mother bought an icecream brick, empty cones and a hemispherical scoop to pour the icecream into the cones. The dimensions of the above items were as below :
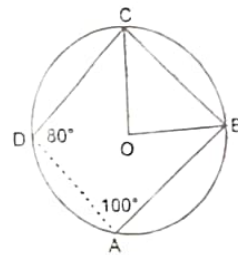
    Icecream brick – 15 cm × 35 cm × 8 cm, one cone – height – 15 cm, radius – 3.5 cm
    Scoop – radius – 3.5 cm.

    Now answer the following questions :

    (i) Find the volume of icecream in the brick in litres.
    (ii) What is the volume of one cone?
    (iii) What is the volume of the scoop?

38. There was a circular park in a colony in Delhi. For fencing purpose poles A, B, C and D were erected at the circumference of the park.

    Wires were tied from A to B, B to C and C to D. A nylon rope was tied from pole D to A temporarily. It was found that ∠A = 100° and ∠D = 80°.

    The point O in the middle of the park is the center of the circle.

    Now answer the following questions :

    1) Find the value of ∠BCD.
    2) Quadrilateral ABCD is a _____ quadrilateral
    3) Write the property of a cyclic quadrilateral.

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Section-A

1. Every rational number is

   a) a natural number   b) an integer   c) A real number   d) A whole number

2. $2\sqrt{3} + \sqrt{3} - 2\sqrt{3}$ is equal to

   a) $2\sqrt{6}$ b) $\sqrt{3}$ c) $4\sqrt{3}$ d) 5

3. $\sqrt{2}$ is a polynomial of degree

   a) 2   b) 0   c) 1   d) $\frac{1}{2}$

4. The value of polynomial $5x - 4x^2 + 3$ when $x = -1$ is

   a) -6 b) 6   c) 2   d) -2

5. Zero of the polynomial $p(x) = 2x + 5$ is

   a) $\frac{-2}{5}$ b) $\frac{-5}{2}$ c) $\frac{2}{5}$ d) $\frac{5}{2}$

6. Point $(-5, 3)$ lies in the

   a) First quadrant   b) Second quadrant   c) Third quadrant   d) Fourth quadrant

7. The value of a is

   a) 75^0

   b) 15^0

   c) 60^0

   d) 105^0

B-1
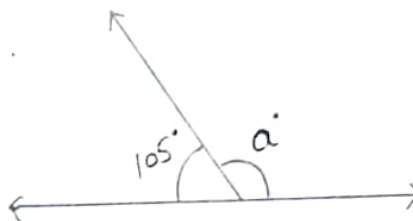
8. If $\triangle ABC, BC = AB, \angle B = 80^0, \angle A$ is equal to

a) 80^0 b) 40^0 c) 50^0 d) 100^0

9. Which of the following is not a parallelogram?

a) Trapezium b) Square c) Rectangle d) Rhombus

10. If diagonals of a parallelogram are equal it is a

a) Parallelogram b) Rhombus c) Rectangle d) None of these

11. Which of the following is not a solution of the equation $2x + y = 7$?

a) $(1, 3)$ b) $(3, 1)$ c) $(0, 7)$ d) $(1, 5)$

12. If $(1, -1)$ is a solution of $px - 2y = 0$ then value of p is

a) 2 b) 1 c) -1 d) -2

13. A proof of required for

a) A postulate b) An axiom c) Theorem d) Definitions

14. Area of triangle with sides 5cm, 12cm and 13cm is

a) 30 cm^2 b) 40 cm^2 c) 50 cm^2 d) 55 cm^2

15. The base of a right triangle is 8 cm and hypotenuse is 10 cm. Its area will be

a) 8 cm^2 b) 16 cm^2 c) 24 cm^2 d) 30 cm^2

16. The radius of a sphere whose surface area is 314 cm^2 is

a) 7 cm b) 6 cm c) 5 cm d) none of these

17. The volume of a right circular cone is $100\,\pi\ cm^3$ and its height is 12 cm. Then its curved surface area is

a) $60\,\pi\ cm^2$ b) $63\,\pi\ cm^2$ c) $65\,\pi\ cm^2$ d) $69\,\pi\ cm^2$

18. The curved surface area of a solid hemisphere of radius r is

a) πr^2 b) $2\pi r^2$ c) $3\pi r^2$ d) $4\pi r^2$

**Direction: In the question number 19 and 20, a statement of Assertion (A) is followed by a statement of Reason (R).**
a) Both A and R are true and Reason (R) is correct explanation of A
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then $\angle POS = \angle ROQ = 105^0$
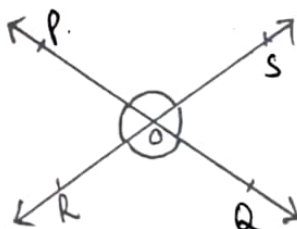
Reason (R) : If two lines intersect each other then vertically opposite angles are equal.

20. Assertion (A) : In a circle AB is diameter and P is any point in the interior of the circle then

$\angle APB = 90^0$

Reason (R): Angle in semicircle is always a right angle.

Section – B

21. Verify whether the following are zeroes of polynomial indicated against them

$p(x) = x^2 - 3x$; $x = 0$, $x = 3$

22. If a point C lies between two points A and B such that AC = BC then prove that $AC = \frac{1}{2}AB$

Explain by drawing the figure.

23. AD is an altitude of an isosceles triangle ABC in which AB = AC. Show that

a) AD bisects BC   b) AD bisects $\angle A$

24. Factorise $1 + 64x^3$

25. The lengths of sides of a triangle are in ratio $5:4:3$ and peremeter is 96 cm. Find area of the triangle.

Section – C

26. Simplify (i) $\left[5\left(8^{1/3} + 27^{1/3}\right)^3\right]^{1/4}$ (ii) Rationalise the denominator of $\frac{1}{\sqrt{7}-2}$

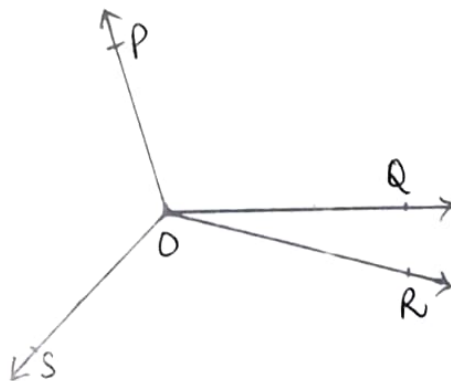27. Evaluate (i) 1001×999 (ii) 98^3 using identities.

28. Find co-ordinates of the point whose

a) abscissa is −1 and lies on x-axis.

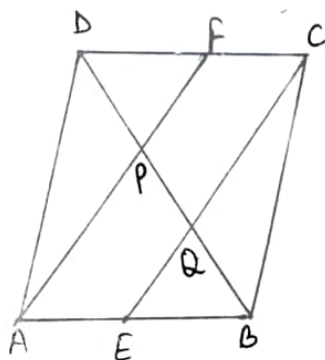b) abscissa is 4 and ordinate is −1

c) ordinate is −10 and lies on y-axis.

29. In the given OP, OQ, OR and OS

are four rays. Prove that

$\angle POQ + \angle QOR + \angle SOR + \angle POS = 360^0$

30. In a parallelogram ABCD, E and F are the midpoints of AB and CD respectively. Show that line segments AF and EC trisect the diagonal BD.

31. The diameter of the moon is approximately one fourth of the diameter of the earth. Find the ratio of their surface areas.

Section – D

32. A chord of a circle is equal to the radius of the circle. Find angle subtended by the chord at a point on the minor arc and also at a point on the major arc.

33. Simplify $\dfrac{4+\sqrt{5}}{4-\sqrt{5}} + \dfrac{4-\sqrt{5}}{4+\sqrt{5}}$

34. Twenty seven solid iron spheres each of radius r and surface area S are melted to form a sphere with surface area S'. Find

   a) Radius r' of the new sphere

   b) Ratio of S and S'

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Section – E

(Case study based questions are compulsory.)

36. Kuldeep was going to his home town during the summer vacation with his father, they were travelling on a straight road. After riding for sometime, they reach a crossroad, as shown in the figure. Using the above information answer the following questions.
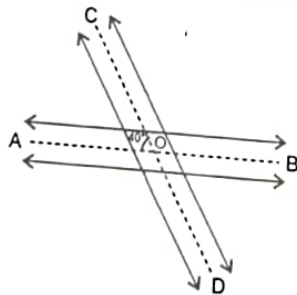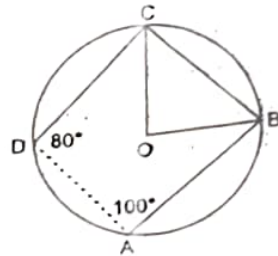

   (i) Find the measure of ∠BOC.
   (ii) Find the measure of ∠BOD.
   (iii) Find the measure of ∠AOD.

B-4

37. Vinisha studies in calss IX. Her maths teacher is quite innovative. To make the learning process more interesting, enjoyable and creative, she brings clay in the classroom to teach the topic Surface Area and Volume. With clay she formed a cone of base radius 7 cm and height 9 cm. She also formed a sphere of radius 10.5 cm.
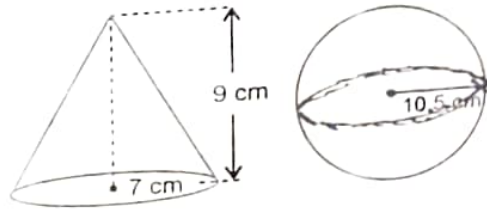
Based an the above information, answer the following questions :

(i) What is the slant height of the cone?

(ii) Find the volume of the cone formed.

(iii) What is the volume of the sphere formed?

38. There was a circular park in a colony in Delhi. For fencing purpose poles A, B, C and D were erected at the circumference of the park. Wires were tied from A to B, B to C and C to D. A nylon rope was tied from pole D to A temporarily. It was found that $\angle A = 100°$ and $\angle D = 80°$.

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Now answer the following questions :

1) Find the value of $\angle BCD$.

2) Quadrilateral ABCD is a _____ quadrilateral

3) Write the property of a cyclic quadrilateral.