ANNUAL EXAMINATION
MATHEMATICS
AE-2024-25-09-(A)

Time : 3 hrs. **M. Marks : 80**

General Instructions :

Read the following instructions carefully and follow them :

(i) This question paper contains 38 questions. All questions are compulsory.

(ii) Question paper is divided into Five sections - Section A, B, C, D and E.

(iii) In **Section - A** question number **1 to 18** are multiple choice questions (MCQs) and question number **19 and 20** are Assertion - Reason based questions of 1 mark each.

(iv) In **Section - B** question number **21 to 25** are Very Short Answer (VSA) type questions of 2 marks each.

(v) In **Section - C** question number **26 to 31** are Short Answer (SA) type questions carrying 3 marks each.

(vi) In **Section - D** question number **32 to 35** are Long Answer (LA) type questions carrying 5 marks each.

(vii) In **Section - E** question number **36 to 38** are case based integrated units of assessment questions carrying 4 marks each. Internal choice is provided in 2 marks question in each case-study.

(viii) There is no overall choice. However, an internal choice has been provided in 2 questions in Section B, 2 questions in Section C, 2 questions in Section D and 3 questions in Section E.

(ix) Use of calculators is NOT allowed. Draw neat figures wherever required.

Take $\pi = \frac{22}{7}$ wherever requried if not stated.

SECTION - A

Section - A consists of 20 questions of 1 mark each.

1. The value of $64^{\frac{1}{3}} \times 8^{\frac{-1}{3}}$ is

(a) 8 (b) 4

(c) -8 (d) 2

2. Volume of a cone with base radius '2r' and height 'h' is

(a) $4\pi r^2 h$ (b) $\frac{2}{3}\pi r^2 h$

(c) $\frac{4}{3}\pi r^2 h$ (d) $\frac{1}{3}\pi r^2 h$

3. A quadrilateral having both diagonals always equal is

(a) Rhombus (b) Parallellogram

(c) Rectangle (d) Kite

4. Abscissa of all points is negative in

(a) IIIrd and IInd Quadrant (b) Only IInd Quadrant

(c) IVth and IIIrd Quadrant (d) Only IIIrd Quadrant

5. In a frequency distribution, the class marks of a class interval is 10 and width of the class is 8, then the lower limit of this class is

(a) 14 (b) 6

(c) 8 (d) 18

6. Polynomial $x^{101}+1$ is divisible by

(a) $x+1$ (b) $x-101$

(c) $x+101$ (d) $x-1$

7. 200 cm^2 converted to m^2 is

(a) 0.002 m^2 (b) 0.02 m^2

(c) 0.2 m^2 (d) 0.0002 m^2

8. The class mark of the class $80-140$ is

(a) 100 (b) 110

(c) 120 (d) 115

9. If diagonals of a rhombus are 18 cm and 24 cm respectively then its side is equal to

(a) 17 cm (b) 16 cm

(c) 15 cm (d) 20 cm

10. ABCD is a cyclic quadrilateral such that $\angle ADB = 30^0$ and $\angle DCA = 80^0$ then $\angle DAB =$

(a) 70^0 (b) 125^0

(c) 100^0 (d) 110^0

11. The perimeter of an equilateral triangle is 60m, then the area of triangle is

(a) $10\sqrt{3}\,m^2$ (b) $15\sqrt{3}\,m^2$

(c) $20\sqrt{3}\,m^2$ (d) $100\sqrt{3}\,m^2$

12. The graph of the linear equation $5x-y=4$ cuts the y-axis at the point

(a) $(-4, 0)$ (b) $(0, -4)$

(c) $(0, 4)$ (d) $(2, 6)$

13. The surface area of a football is $100\pi\ cm^2$. The volume of air in football will be

(a) $\frac{200}{3}\pi\ cm^3$ (b) $\frac{350}{3}\pi\ cm^3$

(c) $\frac{500}{3}\pi\ cm^3$ (d) $\frac{400}{3}\pi\ cm^3$

14. In ΔABC, $\angle A+\angle B=75^0$ and $\angle B+\angle C=130^0$ then the measure of $\angle B$ is

(a) 40^0 (b) 25^0

(c) 105^0 (d) 60^0

15. Value of $(5\sqrt{2}-\sqrt{3})(5\sqrt{2}+\sqrt{3})$ is

(a) 53 (b) 47

(c) $25\sqrt{2}-9$ (d) $25\sqrt{2}-3$

16. If $x=-1$ and $y=-2$ is a solution of linear equation $ax-2y=-6$ then the value of 'a' is

(a) -2 (b) 2

(c) -10 (d) 10

17. If $\Delta ABC \cong \Delta PQR$, $\angle A=30^0$, $\angle B=80^0$ then the value of $\angle R$ will be

(a) 80^0 (b) 30^0

(c) 70^0 (d) 110^0

18. A solid metal sphere is cut through the centre in two equal parts. If the radius of the sphere is 14 cm, then the total surface area of each part is

(a) 1848 cm^2 (b) 462 cm^2

(c) 924 cm^2 (d) 231 cm^2

Direction : In the question number 19 and 20, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option :

(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

(b) Both Assertion (A) and Reason (R) are true and Reason (R) is not the correct explanation of Assertion (A).

(c) Assertion (A) is true but Reason (R) is false.

(d) Assertion (A) is false but Reason (R) is true.

19. Assertion (A) : If $(x-b)$ is a zero of the polynomial $p(x)=x^3-bx^2+2x+b-6$ then the value of b is 2.

Reason (R) : A real number 'a' is called a zero of polynomial $p(x)$ if $p(-a)=0$.

20. Assertion (A) : If two chords AB and CA of a circle are each at a distance 4 cm from the centre, then ΔABC is an isosceles triangle.

Reason (R) : Chords equidistant from the centre of a circle are equal in length.

SECTION - B

Section - B consists of 5 very short answer (VSA) type questions of 2 marks each.

21. Factorise : $7\sqrt{2}x^2 - 10x - 4\sqrt{2}$.

22. Plot the point P(5, –1) on the graph sheet. From point P draw PM and PN perpendicular to x-axis and y-axis respectively. Write the coordinates of point M and N.

23. Factorise $4x^2 + y^2 + 8z^2 - 4xy + 4\sqrt{2}yz - 8\sqrt{2}zx$. Mention the identity used.

OR

Evaluate $(104)^3$, using a suitable identity. Mention the identity used.

24. If $x = 2, y = 2$ is a solution of the equation $7x + py = 2$ then find the value of p.

25. Prove that a diagonal of a parallelogram divides it into two congruent triangles.

OR

If the diagonals of a parallelogram are equal, then show that its a rectangle.

SECTION - C

Section - C consists of 6 short answer (SA) type questions of 3 marks each.

26. Draw the graph of the equation $2x - 5y = 10$. Write the coordinates of the point at which the graph of the equation intersects the x-axis.

27. If $2x + 3 = 2y$ then find the value of $8x^3 + 27 - 8y^3$. Mention the identity used.

OR

Factorise : $2x^3 - x^2 - 13x - 6$

28. The sides of a triangular plot are in the ratio 3 : 5 : 7 and its perimeter is 600m. Find its area. Also, find the length of the altitude drawn on the shortest side from the opposite vertex.

29. If $x = 1 + \sqrt{2}$ find the value of $\left(x - \frac{1}{x}\right)^3$.

30. If two equal chords of a circle intersect within the circle, prove that the line joining the point of intersection to the centre makes equal angles with the chords.

31. A shot-putt is a metallic sphere of radius 4.9 cm. If the density of the metal is 7.8 g per cm^3, find the mass of the shot-putt.

OR

The radius of a spherical balloon increases from 7 cm to 14 cm as air is being pumped into it. Find the ratio of surface area of the balloon in the two cases.

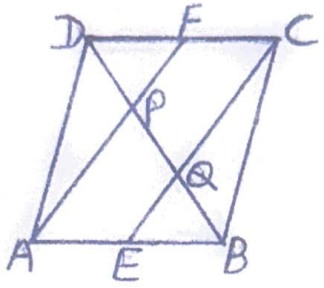
SECTION - D

Section - D consists of 4 long answer (LA) type questions of 5 marks each.

32. Represent the following data by means of a histogram.

Age of children in a park (in years)	1-4	4-6	6-8	8-11	11-16	16-18
No. of children	6	12	9	9	10	5

33. ABCD is a ||gm. E and F are mid point of sides AB and CD respectively. AF and CE intersect BD in P and Q respectively. Show that the line segment AF and EC trisect the diagonal BD.



OR

ABCD is a rectangle and P, Q, R and S are mid points of the sides AB, BC, CD and DA respectively. Show that the quadrilateral PQRS is a rhombus.

34. If $x = \frac{\sqrt{2}+1}{\sqrt{2}-1}$ and $y = \frac{\sqrt{2}-1}{\sqrt{2}+1}$, find the value of $x^2 + y^2 + xy$.

OR

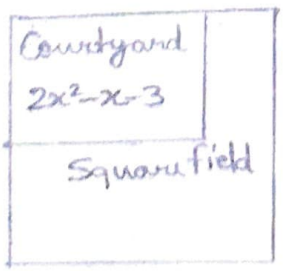
If $x = 7 + 4\sqrt{3}$ then find the value of $\sqrt{x} + \frac{1}{\sqrt{x}}$.

35. Rohan has a piece of canvas whose area is 551 m^2. He uses it to have a conical tent made, with a base radius of 7m. Assuming that all the stitching margins and the wastage incurred while cutting amounts to approximately 1m^2, find the volume of the tent that can be made with it.

SECTION - E

Section - E consist of three case study based questions of 4 marks each.

36. Arvind owns a square field having area $9x^2 - 24x + 16$. He has a small courtyard which is rectangular shaped having area $2x^2 - x - 3$.



Based on the above information, answer the following questions :

(i) What is the degree of the expression representing area of the square field? Write a trinomial of degree 21. (1)

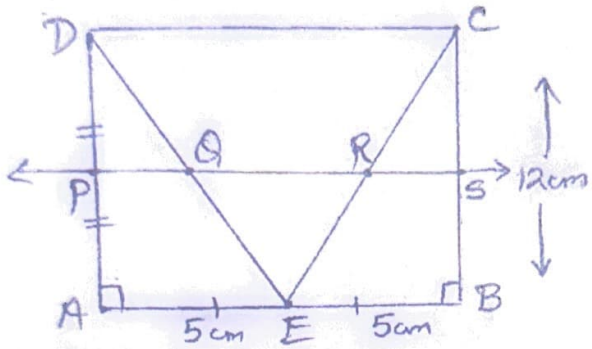
(ii) What are the possible dimensions of the rectangular courtyard? (1)

(iii) What is the side of the square field? Mention the identity used?

OR

(iii) Let p(x) represents the area of courtyard, then find the value of p(4). (2)

37. A man ordered some tiles for his drawing room. The rectangular tile ABCD had some symmetrical design with some measurement given as per the following figure :



Based on the above information, answer the following questions :

(i) Show that $\Delta DAE \cong \Delta CBE$. (1)

(ii) Find the area of ΔDAE and rectangle ABCD. (1)

(iii) In the given figure, if P is the mid-point of DA and PS||AB, then show that Q is the mid point of DE.

OR

(iii) In the given figure if P is the mid point of DA and PS||AB then show that R is the mid-point of EC. (2)

38. A Mathematics teacher brings clay in the classroom to teach the chapter Surface Area and Volumes in class IX. The teacher uses the clay and forms a cone of radius 8 cm and height 4 cm and then she moulds that cone into a spherical ball.

Based on the above information, answer the following questions :

(i) Find the volume of cone formed, in terms of π. (1)

(ii) Find the slant height of the cone. (1)

(iii) Find the radius of the spherical ball formed.

OR

(iii) Find the surface area of the spherical ball $(\pi = 3.14)$. (2)