10-STD   **SECOND REVISION EXAM – 2024**

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Mathematics

Time : 3.00 Hrs   PART– I (Marks - 14)   Marks : 100

Note: i) Answer All the 14 questions

ii) Choose the most suitable answer from given the four alternatives and write the option code with the corresponding answers.   **14 x 1 = 14**

1. If $g = \{(1, 1), (2, 3), (3, 5), (4, 7)\}$ is a function given by $g(x) = \alpha x + \beta$ then the values of α and β are

   (A) $(-1, 2)$ (B) $(2, -1)$ (C) $(-1, -2)$ (D) $(1, 2)$

2. Given $f(x) = (-1)^x$ is a function from N to Z. Then the range of f is

   (A) $\{1\}$ (B) N   (C) $\{1, -1\}$ (D) Z

3. The value of $\left(1^3 + 2^3 + 3^3 + \ldots + 15^3\right) - \left(1 + 2 + 3 + \ldots + 15\right)$ is

   (A) 14400   (B) 14200   (C) 14280   (D) 14520

4. The value of $\sqrt{3\sqrt{3\sqrt{3\ldots}}}$ is

   (A) 3   (B) $\sqrt{3}$ (C) $\sqrt{27}$ (D) 9

5. Let $b = a + c$. Then the equations $ax^2 + bx + c = 0$, has equal roots, if

   (A) $a = c$ (B) $a = -c$ (C) $a = 2c$ (D) $a = -2c$

6. Which of the following can be calculated from the given matrices

   $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{pmatrix}$, $B = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$,   (i) A^2 (ii) B^2 (iii) AB (iv) BA

   (A) (i) and (ii) only   (B) (ii) and (iii) only   (C) (ii) and (iv) only   (D) all of these

7. If in $\triangle ABC$, $DE \parallel BC$. $AB = 3.6\,\text{cm}$, $AC = 2.4\,\text{cm}$ and $AD = 2.1\,\text{cm}$ then the length of AE is

   (A) 1.4 cm   (B) 1.8 cm   (C) 1.2 cm   (D) 1.05 cm

8. A straight line has equation $8y = 4x + 21$ Which of the following is true

   (A) The slope is 0.5 and the y intercept is 2.6

   (B) The slope is 5 and the y intercept is 1.6

   (C) The slope is 0.5 and the y intercept is 1.6

   (D) The slope is 5 and the y intercept is 2.6   10 Maths Page 1

9. The intercepts made by the line $4x - 9y + 36 = 0$ on the coordinate axes are

(A) $a = -9, b = -4$ (B) $a = 9, b = 4$ (C) $a = -9, b = 4$ (D) $a = -4, b = 9$

10. $(1 + \tan\theta + \sec\theta)(1 + \cot\theta - \operatorname{cosec}\theta)$ is equal to

(A) 0   (B) 1   (C) 2   (D) -1

11. In a hollow cylinder, the sum of the external and internal radii is 14 cm and the width is 4 cm. If its height is 20 cm, the volume of the material in it is

(A) 5600π cm³   (B) 11200π cm³   (C) 56π cm³   (D) 3600π cm³

12. 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

13. If the variance of a data is 12.25, then the S.D is

(A) 3.5   (B) 3   (C) 2.5   (D) 3.25

14. A purse contains 10 notes of ₹2000, 15 notes of ₹500, and 25 notes of ₹200. One note is drawn at random. What is the probability that the note is either a ₹500 note or ₹200 note?

(A) $\dfrac{1}{5}$ (B) $\dfrac{3}{10}$ (C) $\dfrac{2}{3}$ (D) $\dfrac{4}{5}$

PART – II (Marks - 20)

Note: Answer TEN questions. Question Number. 28 is compulsory.   10 x 2 = 20

15. If the order pairs $\left(x^2 - 3x, \ y^2 + 4y\right)$ and $(-2, 5)$ are equal, then find x and y

16. If the Highest Common Factor of 210 and 55 is expressible in the form $55x - 325$, find x.

17. Find the remainder when 2^{81} is divided by 17.

18. If α and β are the roots of the equation $x^2 + 7x + 10 = 0$, find the value of $\alpha^2 + \beta^2$

19. If a matrix has 30 elements, what are the possible orders it can have?

20. The perimeters of two similar triangles ABC and PQR are respectively 36cm and 24cm. If $PQ = 10cm$, find AB.

21. Find the equation of a straight line passing through $(5, -3)$ and $(7, -4)$

22. Show that the straight lines $x - 2y + 3 = 0$ and $6x + 3y + 8 = 0$ are perpendicular.

23. Show that $\left(\dfrac{1 - \tan A}{1 - \cot A}\right)^2 = \tan^2 A$

24. The radius of a sphere increases by 25%. Find the percentage increase in its surface area.

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25. The ratio of the volumes of two cones is 2 : 3. Find the ratio of their radii if the height of second cone is double the height of the first.

26. The standard deviation and the mean of 20 values are 21.2 and 36.6. Find the coefficient of variation.

27. A letter is chosen at random from the letters of the word "ENTERTAINMENT". Find the probability that the chosen letter is a vowel or T. (repetition of letters is allowed)

28. Let $A = \{-1, 1\}$ and $B = \{0, 2\}$. If the function $f : A \to B$ defined by $f(x) = ax + b$ is an onto function? Find a and b.

PART – III (Marks – 50)

Note: Answer TEN questions. Question Number. 42 is compulsory. $10 \times 5 = 50$

29. Let $A =$ The set of all natural numbers less than 8, $B =$ The set of all prime numbers less than 8, $C =$ The set of even prime number. Verify that $(A \cap B) \times C = (A \times C) \cap (B \times C)$

30. If $f(x) = x^2$, $g(x) = 3x$ and $h(x) = x - 2$ then, show that $(f \circ g) \circ h = f \circ (g \circ h)$.

31. A mother divides ₹207 into three parts such that the amount are in A.P. and gives it to her three children. The product of the two least amounts that the children had ₹4623. Find the amount received by each child.

32. How many terms of the series $1^3 + 2^3 + 3^3 + \dots$ should be taken to get the sum 14400?

33. Find the GCD of $6x^3 - 30x^2 + 60x - 48$ and $3x^3 - 12x^2 + 21x - 18$

34. If $A = \begin{pmatrix} 3 & 1 \\ -1 & 2 \end{pmatrix}$ then, show that $A^2 - 5A + 7I_2 = 0$

35. State and prove Angle Bisector Theorem

36. Find the value of k, if the area of a quadrilateral is 28 sq.units, whose vertices are $(-4, -2)$, $(-3, k)$, $(3, -2)$ and $(2, 3)$

37. Find the equations of the straight lines each passing through the point $(6, -2)$ and whose sum of the intercepts is 5.

38. From a window (h metres high above the ground) of a house in a street, the angles of elevation and depression of the top and the foot of another house on the opposite side of the street are θ_1 and θ_2 respectively. Show that the height of the opposite house is $h\left(1 + \dfrac{\cot \theta_2}{\cot \theta_1}\right)$

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39. A container open at the top is in the form of a frustum of a cone of height 16 cm with radii of its lower and upper ends are 8 cm and 20 cm respectively. Find the cost of milk which can completely fill a container at the rate of ₹40 per liter.

40. A capsule is in the shape of a cylinder with two hemispheres stuck to each of its ends. If the length of the entire capsule is 12 mm and the diameter of the capsule is 3 mm, how much medicine it can hold?

41. A box contains 10 white, 6 red and 10 black balls. A ball is drawn at random. Find the probability that the ball drawn is white or red.

42. If $A = \dfrac{x}{x+1}$, $B = \dfrac{1}{x+1}$ then, show that $\dfrac{(A+B)^2 + (A-B)^2}{(A+B)} = \dfrac{2(x^2+1)}{x(x+1)^3}$

PART - IV (Marks- 16)

Note: Answer both questions. $2 \times 8 = 16$

43. (A). Construct a triangle similar to a given triangle LMN with its sides equal to $\dfrac{4}{5}$ of the corresponding sides of the triangle LMN (scale factor $\frac{4}{5} < 1$).

OR

(B). Draw a triangle ABC of base $BC = 5.6\,cm$, $\angle A = 40^0$ and the bisector of $\angle A$ meets BC at D such that $CD = 4\,cm$.

44. (A). Draw the graph of $y = x^2 - 4$ and use to solve $x^2 - x - 12 = 0$.

OR

(B). Graph the following linear function $y = \dfrac{1}{2}x$. Identify the constant of variation and verify it with the graph. Also (i) find y when $x = 9$ (ii) find x when $y = 7.5$

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