10-STD **THIRD REVISION EXAMINATION 2024**

Time: 3.00 Hrs.

Mathematics

Maximum Marks - 100

PART- I (Marks - 14)

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 $f : A \to B$ is a bijective function and if $n(B) = 7$, then $n(A)$ is equal to

(A) 7   (B) 49   (C) 1   (D) 14

2. Let A to B a finite set. If $n(A) = m$, $n(B) = n$, then the total number of relations that exist from A to B is

(A) m^n (B) n^m (C) n (D) m

3. If the sequence $t_1, t_2, t_3, \ldots$ are in A.P. then the sequence $t_6, t_{12}, t_{18}, \ldots$ is

(A) a Geometric Progression

(B) an Arithmetic Progression

(C) neither an Arithmetic Progression nor a Geometric Progression

(D) a constant sequence

4. If 6 times of 6th term of an A.P is equal to 7 times of 7th term, then the 13th term of the A.P is

(A) 0   (B) 6   (C) 7   (D) 13

5. $\dfrac{x}{x^2 - 25} - \dfrac{8}{x^2 + 6x + 5}$ gives

(A) $\dfrac{x^2 - 7x + 40}{(x - 5)(x + 5)}$ (B) $\dfrac{x^2 + 7x + 40}{(x - 5)(x + 5)(x + 1)}$ (C) $\dfrac{x^2 - 7x + 40}{(x^2 - 25)(x + 1)}$ (D) $\dfrac{x^2 + 10}{(x^2 - 25)(x + 1)}$

6. Transpose of a column matrix is

(A) unit matrix   (B) diagonal matrix   (C) column matrix   (D) row matrix

7. A tangent is perpendicular to the radius at the

(A) centre   (B) point of contact   (C) infinity   (D) chord

8. The slope of the line which is perpendicular to a line joining the points $(0, 0)$ and $(-8, 8)$ is

(A) -1 (B) 1   (C) $\dfrac{1}{3}$ (D) -8

9. If (x, y) is any point on the line segment joining the points $(a, 0)$ and $(0, b)$ are collinear and $a, b \neq 0$ then

(A) $\dfrac{x}{a} + \dfrac{y}{b} = 1$ (B) $\dfrac{x}{a} - \dfrac{y}{b} = 1$ (C) $ax + by = 1$ (D) $ax - by = 1$

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10. If $(\sin\alpha - \cos ec\alpha)^2 + (\cos\alpha + \sec\alpha)^2 = k + \tan^2\alpha + \cot^2\alpha$ then the value of k is equal to

    (A) 9   (B) 7   (C) 5   (D) 3

11. If the radius of the base of a cone is tripled and the height is doubled then the volume is

    (A) made 6 times   (B) made 18 times   (C) made 12 times   (D) unchanged

12. If an iron rod is reduced one third of its radius and volume remains constant, then how many times the length of new iron rod increase with the previous one?

    (A) 1   (B) 3   (C) 6   (D) 9

13. The sum of all deviations of the data from its mean is

    (A) always positive   (B) always negative   (C) zero   (D) non-zero integer

14. The probability of getting a job in a person is $\dfrac{x}{3}$. If the probability of not getting a job in the person is $\dfrac{x}{2}$, then the value of x is

    (A) $\dfrac{6}{5}$ (B) $\dfrac{5}{6}$ (C) 5   (D) 6

PART – II (Marks - 20)

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

15. $A \times B = \{(3,2),(3,4),(5,2),(5,4)\}$ then, Find A and B

16. Let $f(x) = 2x + 5$. If $x \neq 0$ then find $\dfrac{f(x+2) - f(2)}{x}$

17. Kala says, "Today is my birthday" and she asks Vani, "When will you celebrate your birthday?" Vani replies, "Today is Monday and I celebrated my birthday 75 days ago". Find the day when Vani celebrated her birthday.

18. Find the sum of $1 + 3 + 5 +$ _____ to 40 terms

19. Determine the quadratic equations, whose sum and product of roots are $-\dfrac{3}{2}, -1$

20. If $A = \begin{pmatrix} 2 & -2\sqrt{2} \\ \sqrt{2} & 2 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & 2\sqrt{2} \\ -\sqrt{2} & 2 \end{pmatrix}$ then, show that $AB = BA$ w.r.to matrix multiplication

21. What length of ladder is needed to reach a height of 7 ft. along the wall when the base of the ladder is 4 ft. from the wall? Round off your answer to the next tenth place.

22. If the straight lines $12y = -(p+3)x + 12$, $12x - 7y = 16$ are perpendicular then find 'p'.

23. Show that $\sqrt{\dfrac{1+\sin A}{1-\sin A}} + \sqrt{\dfrac{1-\sin A}{1+\sin A}} = 2\sec A$

24. There are 4 persons in a conical tent of slant height 19 cm. What should be the height of the conical tent, if each person occupies 22 cm^2.

25. What is the maximum volume of the cone if it was cut from the hemisphere of radius 21 cm.

26. A wall clock strikes the bell once at 1 o' clock, 2 times at 2 o' clock, 3 times at 3 o' clock and so on. How many times will it strike in a particular day. Find the standard deviation of the number of strikes the bell make a day.

27. Write the sample space for tossing three coins using tree diagram.

28. Find the equation of the perpendicular bisector of the line joining the points $A(1, 7)$ and $B(-3, -3)$.

PART – III (Marks - 50)

Note: Answer TEN questions. Question Number. 42 is compulsory.   10 x 5 = 50

29. If the function $f : R \to R$ is defined by $f(x) = \begin{cases} 2x+7, & x < -2 \\ x^2 - 2, & -2 \le x < 3 \\ 3x - 2, & x \ge 3 \end{cases}$, then find the values of

    (i) $f(4)$ (ii) $f(-2)$ (iii) $f(4) + 2f(1)$ (iv) $\dfrac{f(1) - 3f(4)}{f(-3)}$

30. The function 't' which maps temperature in Celsius (C) into temperature in Fahrenheit (F) is defined by $t(C) = F$ where $t(C) = \dfrac{9}{5}C + 32$. Find,

    (i) $t(0)$ (ii) $t(28)$ (iii) $t(-10)$

    (iv) the value of C when $t(C) = 212$

    (v) the temperature when the Celsius value is equal to the Fahrenheit value

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. If $9x^4 + 12x^3 + 28x^2 + ax + b$ is a perfect square, find the values of a and b.

33. If $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ and $I_2 = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ then, show that $A^2 - (a+d)A = (bc - ad)I_2$

34. State and Prove Thales theorem

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35. A quadrilateral has vertices at $A(-4, -2)$, $B(5, -1)$, $C(6,5)$ and $D(-7, 6)$. Show that the mid-points of its sides form a parallelogram.

36. Find the equation of a straight line through the point of intersection of the lines $8x + 3y = 18$, $4x + 5y = 0$ and bisecting the line segment joining the points $(5, -4)$ and $(-7, 6)$

37. Two ships are sailing in the sea on either sides of a lighthouse. The angle of elevation of the top of the lighthouse is observed from the ships are $30°$ and $45°$ respectively. If the lighthouse is 200 m high, find the distance between the two ships. $\left(\sqrt{3} = 1.732 \right)$

38. 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?

39. From a solid cylinder whose height is 2.4 cm and the diameter 1.4 cm, a cone of the same height and same diameter is carved out. Find the volume of the remaining solid to the nearest cm^3.

40. Find the variance of the first n natural numbers.

41. A die is numbered in such a way that its faces show the numbers $1, 2, 2, 3, 3, 6$. It is thrown two times and the total score in the two throws is noted. What is the probability that the total score is
    (i) even number   (ii) 6   (iii) atleast 6

42. Find the sum of all natural numbers between 100 and 1000 which are divisible by 11.

PART - IV (Marks-16)

Note: Answer both questions.   2 x 8 = 16

43. (A). Draw the two tangents from a point which is 10 cm away from the centre of a circle of radius 5 cm. Also, measure the lengths of the tangents.

OR

(B). Construct a triangle ABC such that $AB = 5.5\,cm$, $\angle C = 25^0$ and the altitude from C to AB is 4 cm.

44. (A). Graph the quadratic equations $x^2 + x - 12 = 0$ and state their nature of solutions.

OR

(B). Graph the following linear function $y = \frac{1}{2}x$. 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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