இடைநிலை – இராண்டாம்

HALF YEARLY EXAMINATION - 2025

10 – STD **MATHEMATICS**

Time : 3.00 Hrs. **Marks : 100**

PART - I

I) Answer all the questions. **14 X 1 = 14**

1. If the ordered pairs (a+2, 4) and (5,2a+b) are equal then (a, b) is----------
   (A) (2,-2) (B) (5, 1) (C) (2,3) (D) (3,-2)
2. $f(x)=(x+1)^3-(x-1)$ represent a function which is ---------
   (A) linear (B) cubic (C) reciprocal (D) quadratic
3. Sum of infinite term of a G.P is 12 and the first term is 8 what is the fourth term of the G.P ?. (A) 8/27 (B) 4/27 (C) 8/20 (D) 1/3
4. The first term of an arithmetic progression is unity and the common difference is 4 .Which of the following will be a term of this A.P?.
   (A) 4551 (B) 10091 (C) 7881 (D) 13531
5. Graph of a linear equation is ----------
   (A) straight line (B) circle (C) parabola (D) hyperbola
6. If P and Q are matrices then which of the following is true ?.
   A) $PQ \neq QP$ B) $(P^t)^t \neq P$ C) $P+Q \neq Q+P$ D) all are true.
7. The perimeter of two similar triangles ΔABC and ΔPQR are 36 cm and 24 cm respectively. If PQ = 10cm, then the length of AB is------
   (A) 6 2/3 cm (B) $10\sqrt{6}/3$ cm (C) 66 2/3 cm (D) 15 cm
8. A tangent is perpendicular to the radius at the----------
   (A) centre (B) point of contact (C) infinity (D) chord
9. The slope of the line joining (12,3), (4,a) is 1/8.Then the value of 'a ' is --------
   (A) 1 (B) 4 (C) -5 (D) 2
10. If $5x=\sec\theta$ and $\frac{5}{y}=\tan\theta$ then $x^2- 1/y^2$ is equal to----------
    (A) 25 (B) 1/25 (C) 5 (D) 1

11. A cone of height 9 cm with diameter of its base 18 cm is carved out from a wooden solid sphere of radius 9 cm. The percentage of wood wasted is --------

(A) 45% (B) 56% (C) 67% (D) 75%

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. The range of the data 8, 8, 8, 8, 8,... 8 is ---------

(A) 0 (B) 1 (C) 8 (D) 3

14. The probability of getting a job for a person is x/3 . If the probability of not getting the job is 2/3 then the value of ' x' is-------

(A) 2 (B) 1 (C) 3 (D) 1.5

PART II

(i) Answer any ten question only.
(ii) Question number 28 is compulsory. **10 x 2 = 20**

15. If B X A ={(-2,3), (-2, 4),(0, 3), (0, 4),(3, 3),(3, 4)} then find A and B .

16. If f(x) = 3x -2, g(x) = 2x + k and if f. g = g. f then find the value of "k".

17. If 13824 = 2^a X 3^b then find a and b.

18. Find the sum of first 8 terms of the G.P . 1, -3, 9, -27...

19. Determine the quadratic equations, whose sum and product of roots are -3/2,-1.

20. Find the excluded values of (X^3-27) / X^2 + X -2.

21. If radii of two concentric circles are 4 cm and 5 cm then find the length of the chord of one circle. Which is tangent to other circle.

22. Find the equation of a line passing through the points (-3, 4) and having slope -5/7.

23. If the straight line 12y = - (p + 3) x + 12, 12 x - 7y = 16 bare perpendicular then find "p".

24. Find 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 a tower of height $10\sqrt{3}$ m.

25. Find the volume of iron used to make hollow cylinder of height 9 cm and whose internal and external radii are 21 cm and 28 cm respectively.

26. Find the standard deviation of first 21 natural numbers.

27. In a box there are 20 non defective and some defective bulbs. If the probability that a bulb selected random from the box found to be defective is 3/8 then, find the number of defective bulbs.

28. When karuna divided surface area of a sphere by the sphere's volume, he got the answer as 1/3 . What is the radius of the sphere.

PART-III

(i) Answer any ten question only.

(ii) Question number 42 is compulsory. 10 X 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 A X (B - C) = A X B – A X C.

30. The function "t" which maps temperature in Celsius © in to temperature in Furan heat (F) is defined by t (C) = F Where $F = \frac{9}{5} C + 32$. 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. Find the sum of all natural numbers between 300 and 600 which are divisible by 7.

32. Find the sum of the series 3 + 33 + 333 + ... to n terms.

33. If the polynomial $x^4 - 8x^3 + mx^2 + nx + 16$ is a perfect square, find the value of m and n.

34. State and prove angle bisector theorem.

35. Show that the given points form a parallelogram .
A (2.5, 3.5), B (10, -4), C (2.5, -2.5) and D (-5, 5).

36. Find the equation of perpendicular bisector of the line joining the points A (-4, 2) and B(6, -4).

37. If $\frac{\cos\theta}{1+\sin\theta} = \frac{1}{a}$ then prove that $\frac{a^2-1}{a^2+1} = \sin\theta$.

38. If the radii of the circular ends of a frustum which is 45 cm heigh are 28 cm and 7 cm. Find the volume of the frustum.

39. A toy is in the shape of a cylinder surmounded by a hemisphere. The height of the toy is 25 cm. Find the total surface area of the toy if its common diameter is 12 cm.

40. Find the coefficient of variation of 24, 26, 33, 37, 29, 31.

41. Two dice are rolled once. Find the probability of getting an even number on the first die or a total of face sum 8.

42. If $A = \begin{pmatrix} p & 0 \\ 0 & 2 \end{pmatrix}$ $B = \begin{pmatrix} 0 & -q \\ 1 & 0 \end{pmatrix}$ $C = \begin{pmatrix} 2 & -2 \\ 2 & 2 \end{pmatrix}$ and if $BA = C^2$ find p and q.

PART – IV

Answer all the questions. **2 x 8 = 16**

43. Construct a triangle ΔPQR such that QR=6.5 cm , ∠R=60° and the altitude from P to QR is of length 4.5 cm. **(OR)**

Draw the tangent to the circle from the point P having radius 3.6 cm and centre at O. point P is at a distance 7.2 cm away from the centre.

44. A school announces that for a certain competitions, the cash price will be distributed for all the participants equally as show below

No. of participants (x)	2	4	6	8	10
Amount for each participantint in Rs (y)	180	90	60	45	36

i) Find the constant of variation.

ii) Graph the above data and hence find how much will each participant get if the number of participants are 12. **(OR)**

Draw the graph of $y = x^2 + x - 2$ and hence use it to solve $x^2 + x - 2 = 0$.