Padasalai's Centum Special Model Question Paper -2025

STD:10   **MATHEMATICS**

MARKS :100
TIME 3 HRS

CHOOSE THE CORRECT ANSWER :   14X1=14

1. $A = \{a,b, p\}$, $B = \{2, 3\}$, $C = \{p,q,r,s\}$ then $n[(A \cup C) \times B]$ is
   (A) 8   (B) 20   (C) 12   (D) 16

2. Let $n(A) = m$ and $n(B) = n$ then the total number of relations that can be defined from A to B is
   (A) m^n (B) n^m (C) $2^{mn} - 1$ (D) 2^{mn}

3. Using Euclid's division lemma, if the cube of any positive integer is divided by 9 then the possible remainders are
   (A) 0, 1, 8   (B) 1, 4, 8   (C) 0, 1, 3   (D) 1, 3, 5

4. The next term of the sequence $\frac{3}{16}, \frac{1}{8}, \frac{1}{12}, \frac{1}{18}, \dots is$
   (A) $\frac{1}{24}$ (B) $\frac{1}{27}$ (C) $\frac{2}{3}$ (D) $\frac{1}{81}$

5. I f $(x$ -6) is the HCF of $x^2 - 2x - 24$ and $x^2 - kx - 6$ then the value of k is
   (A) 3   (B) 5   (C) 6   (D) 8

6.. If A is a 2x3 matrix and B is a 3x4 matrix, how many rows does AB have
   (A) 3   (B) 4   (C) 2   (D) 5

7. Two poles of heights 6 m and 11 m stand vertically on a plane ground. If the distance between their feet is 12 m, what is the distance between their tops?
   (A) 13 m   (B) 14 m   (C) 15 m   (D) 12.8 m

8. How many tangents can be drawn to the circle from an exterior point?
   (A) one   (B) two   (C) infinite   (D) zero

9. If slope of the line PQ is $\frac{1}{\sqrt{3}}$ then slope of the perpendicular bisector of PQ is
   (A) $\sqrt{3}$ (B) $-\sqrt{3}$ (C) $\frac{1}{\sqrt{3}}$ (D) 0

10. (2, 1) is the point of intersection of two lines.
    (A) $x - y - 3 = 0$; $3x - y - 7 = 0$ (B) $x + y = 3$; $3x + y = 7$
    (C) $3x + y = 3$; $x + y = 7$ (D) $x + 3y - 3 = 0$; $x - y - 7 = 0$

11. If the ratio of the height of a tower and the length of its shadow is $\sqrt{3} : 1$, then the angle of elevation of the sun has measure
    (A) 45°   (B) 30°   (C) 90°   (D) 60°

12. 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

13. The ratio of the volumes of a cylinder, a cone and a sphere, if each has the same diameter and same height is
    (A) 1:2:3   (B) 2:1:3   (C) 1:3:2   (D) 3:1:2

14. The range of the data , 7, 7, 7. . . 7 is
    (A) 0   (B) 1   (C) 8   (D) 3

SECTION–B

II. Answer any 10 questions. Question No.28 is compulsory   10x2=20

15. Let $A = \{1, 2, 3\}$ and $B = \{ x/ x$ is a prime number less than 10$\}$. Find $A \times B$ and $B \times A$

16. If $f(x) = 3x - 2$, $g(x) = 2x + k$ and if f o $g = g$ o f, then find thevalue of k.

17. $13824 = 2^a \times 3^b$, then find a and b.

18. Which term of an A.P. 16, 11, 6, 1, … is $- 54$?

19. Find the exclude $\dfrac{x^2-16}{x^2+8x+16}$

20. If the difference between a number and its reciprocal is $\dfrac{24}{5}$, find the number.

21. Construct a 3×3 matrix whose elements are $a_{ij} = i^2 j^2$

22. Find the diameter of a sphere whose surface area is $154\ m^2$.

23. 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.

24. If the area of the triangle formed by the vertices $A(-1, 2)$, $B(k, -2)$ and

    $C(7, 4)$ (taken in order) is 22 sq. units, find the value of k.

25. Find the value of 'a', if the line through $(-2, 3)$ and $(8, 5)$ is

    perpendicular to $y = ax + 2$.

26. A tower stands vertically on the ground. From a point on the ground,which is 48 m away from the foot of the tower, the angle of elevation of the top of the tower is $30°$. Find the height of the tower.

27.Find the range and coefficient of range of the following data:

    25, 67, 48, 53, 18, 39, 44

28. What is the probability that a non leap year selected at random will contain 53 Sunday

SECTION –C

III. Answer any 10 questions. Question No.42 is compulsory   10x5=50

29. Let $A = \{ x \in W / x < 2 \}$, $B = \{ x \in N / 1 < x \leq 4 \}$ and $C = \{ 3, 5\}$
    Verify that. $A \times (B \cup C) = (A \times B) \cup (A \times C)$

30. If the function $f: R \rightarrow R$ is defined by $f(x) = \begin{cases} 2x + 7 & ; x < -2 \\ x^2 - 2 & ; -2 \leq x < 3 \\ 3x - 2 & ; x \geq 3 \end{cases}$

    Then find the values of (i) $f(4)$ (ii) $f(-2)$ (iii) $f(4) + 2f(1)$ (iv) $\frac{f(1) - 3f(4)}{f(-3)}$

31. In an A.P. sum of four consecutive terms is 28 and their sum of their squares is 276. Find the four numbers.

32. Find the sum to n terms of the series $5 + 55 + 555 + \ldots$

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

34. If the roots of the equation $(c^2 - ab)x^2 - 2(a^2 - bc)x + b^2 - ac = 0$ are real and equal, prove that either $a = 0$ (or) $a^3 + b^3 + c^3 = 3abc$.

35. If A $= \begin{pmatrix} 1 & 1 \\ -1 & 3 \end{pmatrix}$, B $= \begin{pmatrix} 1 & 2 \\ -4 & 2 \end{pmatrix}$, C $= \begin{pmatrix} -7 & 6 \\ 3 & 2 \end{pmatrix}$
    verify that A(B +C) = AB +AC.

36. state and prove angle bisector theorem

37. 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 $(2, 3)$.

38. Find the equation of a straight line through the point of intersection of the lines $8x + 3y = 18, 4x + 5y = 9$ and bisecting the line segment joining the points $(5, -4)$ and $(-7, 6)$

39. An aeroplane at an altitude of $1800m$ finds that two boats are sailing towards it in the same direction. The angles of depression of the boats as observed from the aeropalne are $60°$ and $30°$ respectively. Find the distance between the two boats. ($\sqrt{3} = 1.732$)

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

41. A solid iron cylinder has total surface area of $1848 \ sq. \ m$. Its curved surface area is five-sixth of its total surface area. Find the radius and height of the iron cylinder.

42. Two dice are rolled once. Find the probability of getting an even number on the second die or total of face sum 7.

SECTION – D

IV.Answer the following questions.   2x8=16

43. a)Construct a triangle $\triangle PQR$ such that $QR = 5$ cm, $\angle P = 30°$ and the altitude from P to QR is of length 4.2 cm.

OR

b)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.

44.a)A bus is travelling at a uniform speed of 50 km/hr. Draw the distance-time

graph and hence find

(i) the constant of variation

(ii) how far will it travel in 90 minutes?

(iii) the time required to cover a distance of 300 km from the graph.

OR

b)Draw the graph of $y = 2x^2$ and hence solve $2x^2 - x - 6 = 0$.

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