

**SUN TUITION CENTER - VILLUPURAM****PUBLIC MODEL EXAM -2023**

Standard 10

Time Allowed : 3 Hours

Mathematics

Maximum Marks : 100

PART - I (Marks : 14)

Note : i) Answer all the questions

 $14 \times 1 = 14$ 

ii) Choose the most suitable answer from the given four alternatives and write the option code with the corresponding answer.

- 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) If  $A = 2^{65}$  and  $B = 2^{64} + 2^{63} + 2^{62} \dots + 2^0$  which of the following is true?  
a) B is  $2^{64}$  more than A b) A and B are equal  
c) B is larger than A by 1 d) A is larger than B by 1
- 3) Which of the following should be added to make  $x^4 + 64$  a perfect square  
a)  $4x^2$  b)  $16x^2$  c)  $8x^2$  d)  $-8x^2$
- 4) If  $\triangle ABC$  is an isosceles triangle with  $\angle C = 90^\circ$  and  $AC = 5$  cm, then AB is  
a) 2.5 cm b) 5 cm c) 10 cm d)  $5\sqrt{2}$  cm
- 5) When proving that a quadrilateral is a trapezium, it is necessary to show  
a) Two sides are parallel. b) Two parallel and two non-parallel sides.  
c) Opposite sides are parallel. d) All sides are of equal length.
- 6)  $(\sin \alpha + \operatorname{cosec} \alpha)^2 + (\cos \alpha + \sec \alpha)^2 = k + \tan^2 \alpha + \cot^2 \alpha$ , then the value of k is equal to  
a) 9 b) 7 c) 5 d) 3
- 7) The total surface area of a cylinder whose radius is  $\frac{1}{3}$  of its height is  
a)  $\frac{9\pi h^2}{8}$  sq. units b)  $24\pi h^2$  sq. units c)  $\frac{8\pi h^2}{9}$  sq. units d)  $\frac{56\pi h^2}{9}$  sq. units
- 8) Which of the following is not a measure of dispersion?  
a) Range b) Standard deviation c) Arithmetic mean d) Variance
- 9) Find the matrix x if  $2X + \begin{pmatrix} 1 & 3 \\ 5 & 7 \end{pmatrix} = \begin{pmatrix} 5 & 7 \\ 9 & 5 \end{pmatrix}$   
a)  $\begin{pmatrix} -2 & -2 \\ 2 & -1 \end{pmatrix}$  b)  $\begin{pmatrix} 2 & 2 \\ 2 & -1 \end{pmatrix}$  c)  $\begin{pmatrix} 1 & 2 \\ 2 & 2 \end{pmatrix}$  d)  $\begin{pmatrix} 2 & 1 \\ 2 & 2 \end{pmatrix}$
- 10) If  $f : A \rightarrow B$  is a bijective function and if  $n(B) = 7$ , then  $n(A)$  is equal to  
a) 7 b) 49 c) 1 d) 14
- 11) The number of points of intersection of the quadratic polynomial  $x^2 + 4x + 4$  with the X axis is  
a) 0 b) 1 c) 0 or 1 d) 2

- 12) The electric pole subtends an angle of  $30^\circ$  at a point on the same level as its foot. At a second point 'b' metres above the first, the depression of the foot of the pole is  $60^\circ$ . The height of the pole (in metres) is equal to
- a)  $\sqrt{3} b$                       b)  $\frac{b}{3}$                       c)  $\frac{b}{2}$                       d)  $\frac{b}{\sqrt{3}}$
- 13) The least number that is divisible by all the numbers from 1 to 10 (both inclusive) is
- a) 2025                      b) 5220                      c) 5025                      d) 2520
- 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)  $\frac{1}{5}$                       b)  $\frac{3}{10}$                       c)  $\frac{2}{3}$                       d)  $\frac{4}{5}$

**PART - II (Marks : 20)**

Answer any TEN questions. Question No. 28 is compulsory. Each questions carries 2 marks.  $10 \times 2 = 20$

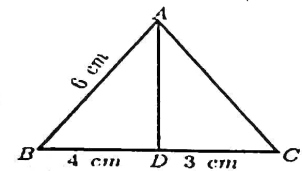
15) If  $f(x) = x^2 - 1$ ,  $g(x) = x - 2$  find a, if  $g \circ f(a) = 1$ .

16)  $a_n = \begin{cases} n(n+3); n \in N & \text{is odd} \\ n^2 + 1; n \in N & \text{is even} \end{cases}$

Find the eleventh and eighteenth terms.

17) Find the zeroes of the expression  $x^4 - 13x^2 + 42$

18) In the Fig. AD is the bisector of  $\angle A$ . If  $BD = 4$  cm,  $DC = 3$  cm and  $AB = 6$  cm, find AC.



19) The volumes of two cones of same base radius are  $3600 \text{ cm}^3$  and  $5040 \text{ cm}^3$ . Find the ratio of heights.

20) The standard deviation and mean of a data are 6.5 and 12.5 respectively. Find the coefficient of variation.

21) What is the probability that a leap year selected at random will contain 53 Saturdays.

22) A Relation R is given by the set  $\{(x, y) / y = x + 3, X \in \{0, 1, 2, 3, 4, 5\}\}$ . Determine its domain and range.

23) If  $1 + 2 + 3 + \dots + n = 666$  then find n.

24) If a matrix has 18 elements, what are the possible orders it can have? What if it has 6 elements?

25) Find the LCM and HCF of 408 and 170 by applying the fundamental theorem of arithmetic.

- 26) Find the intercepts made by the line  $3x - 2y - 6 = 0$  on the coordinate axes.
- 27) Prove that  $\frac{\sin A}{1 + \cos A} = \frac{1 - \cos A}{\sin A}$
- 28) Let  $A = \{1, 2, 3\}$  and  $B = \{x \mid x \text{ is a prime number less than } 10\}$ . Find  $A \times B$  and  $B \times A$ .

**PART - III (Marks : 50)**

Answer any TEN questions. Question No. 42 is compulsory . Each questions carries 5 marks.  $10 \times 5 = 50$

- 29) Represent the function  $f = \{ (1, 2), (2, 2), (3, 2), (4, 3), (5, 4) \}$  through  
i) an arrow diagram    ii) a table form    iii) a graph
- 30) If the function  $f$  is defined by  $f(x) = \begin{cases} x + 2 & ; \quad x > 1 \\ 2 & ; \quad -1 \leq x \leq 1 \\ x - 1 & ; \quad -3 < x < -1 \end{cases}$   
find the values of i)  $f(3)$     ii)  $f(0)$     iii)  $f(-1.5)$     iv)  $f(2) + f(-2)$
- 31) Find the sum to  $n$  terms of the series  $5 + 55 + 555 + \dots$
- 32) If  $9x^4 - 12x^3 + 28x^2 + ax + b$  is a perfect square, find the values of  $a$  and  $b$ .
- 33) Show that in a triangle, the medians are concurrent.
- 34) Find the value of  $k$ , if the area of a quadrilateral is 28 sq. units, whose vertices are taken in the order  $(-4, -2), (-3, k), (3, -2)$  and  $(2, 3)$ .
- 35) As observed from the top of a 60 m high lighthouse from the sea level, the angles of depression of two ships are  $28^\circ$  and  $45^\circ$ . If one ship is exactly behind the other on the same side of the lighthouse, find the distance between the two ships. ( $\tan 28^\circ = 0.5317$ )
- 36) 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 litre.
- 37) A card is drawn from a pack of 52 cards. Find the probability of getting a king or a heart or a red card.
- 38) The data in the adjacent table depicts the length of a person forehand and their corresponding height. Based on this data, a student finds a relationship between the height ( $y$ ) and the forehand length( $x$ ) as  $y = ax + b$ , where  $a, b$  are constants.  
i) Check if this relation is a function.  
ii) Find  $a$  and  $b$ .    iii) Find the height of a person whose forehand length is 40 cm.    iv) Find the length of forehand of a person if the height is 53.3 inches.
- | Length ' $x$ ' of forehand (in cm) | Height ' $y$ ' (in inches) |
|------------------------------------|----------------------------|
| 35                                 | 56                         |
| 45                                 | 65                         |
| 50                                 | 69.5                       |
| 55                                 | 74                         |

- 39) In an A.P., sum of four consecutive terms is 28 and the sum of their squares is 276. Find the four numbers.
- 40) If  $A = \begin{pmatrix} 3 & 1 \\ -1 & 2 \end{pmatrix}$  show that  $A^2 - 5A + 7I_2 = 0$ .
- 41) Find the equation of a straight line passing through the point  $P(-5, 2)$  and parallel to the line joining the points  $Q(3, -2)$  and  $R(-5, 4)$
- 42) Find the mean and variance of the first  $n$  natural numbers.

**PART - IV (Marks : 16)**

Answer both questions . Each questions carries 8 marks.

$2 \times 8 = 16$

- 43) a) Draw a 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 from the centre .

(OR)

- b) Construct a triangle similar to a given triangle PQR with its sides equal to  $\frac{7}{3}$  of the corresponding sides of the triangle PQR (scale factor  $\frac{7}{3} > 1$ ).

- 44) a) Draw the graph of  $y = x^2 + 4x + 3$  and hence find the roots of  $x^2 + x + 1 = 0$

(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  $y = 7.5$

\*\*\*\*\*

**\*\*\*\*\* ALL THE BEST \*\*\*\*\***

*Life is a Good Circle,*  
*you Choose The Best Radius....*

**ALL SUBJECT QUESTION BANK ARE AVAILABLE**

**CONTACT- 9629216361**