



22-09-2023

**Standard 10**  
**MATHEMATICS**

**Part - A**

Time: 3.00 Hours

Marks: 100

**Note :** i) Answer all the questions. **14x1=14**  
ii) Choose the most suitable answer from the four given alternatives and write the correct option.

- 1) If there are 1024 relations from a Set A = {1, 2, 3, 4, 5} to a Set B, then the number of elements in B is  
a) 3                                      b) 2                                      c) 4                                      d) 8
- 2) If f: A → B is a bijective function and if n(B) = 7, then n(A) is equal to  
a) 7                                      b) 49                                      c) 1                                      d) 14
- 3) Is composition of three functions associative?  
a) Sometimes true    b) Always true    c) Never true    d) Not defined
- 4) If the HCF of 65 and 117 is expressible in the form of 65m - 117, then the value of 'm' is  
a) 4                                      b) 2                                      c) 1                                      d) 3
- 5) The value of  $(1^3 + 2^3 + 3^3 + \dots + 15^3) - (1 + 2 + 3 + \dots + 15)$  is .....  
a) 14400                                      b) 14200                                      c) 14280                                      d) 14520
- 6) The sequence  $\sqrt{1}, \sqrt{55}, 5\sqrt{11}, 5\sqrt{55}, 25\sqrt{11}, \dots$  is  
a) A.P                                      b) G.P  
c) both A.P and G.P                                      d) neither A.P nor G.P
- 7)  $y^2 + \frac{1}{y^2}$  is not equal to .....  
a)  $\frac{y^4 + 1}{y^2}$                                       b)  $\left(y + \frac{1}{y}\right)^2$                                       c)  $\left(y - \frac{1}{y}\right)^2 + 2$                                       d)  $\left(y + \frac{1}{y}\right)^2 - 2$
- 8) 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)  $-8x^2$
- 9) The number of excluded values of  $\frac{x^3 + x^2 - 10x + 8}{x^4 + 8x^2 - 9}$  is .....  
a) 2                                      b) 1                                      c) 3                                      d) 4
- 10) If  $\triangle ABC$  is an isoscles triangle with  $\angle C = 90^\circ$  and AC = 5cm, then AB is  
a) 2.5 cm                                      b) 5cm                                      c) 10 cm                                      d)  $5\sqrt{2}$  cm
- 11) In  $\triangle ABC$ , DE || BC, AB = 3.6cm, AC = 2.4cm and AD = 2.1 cm then the length of AE is  
a) 1.4 cm                                      b) 1.8cm                                      c) 1.2cm                                      d) 1.05cm
- 12) If (5, 7) (3, P) and (6, 6) are collinear, then the value of 'P' is .....  
a) 3                                      b) 6                                      c) 9                                      d) 12
- 13) 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
- 14)  $\tan \theta \operatorname{Cosec}^2 \theta - \tan \theta$  is equal to  
a)  $\sec \theta$                                       b)  $\cot^2 \theta$                                       c)  $\sin \theta$                                       d)  $\cot \theta$

**Part - B**

**II. Do any 10 sums: (Q.No: 28 is compulsory)**

**10x2=20**

- 15) If A = {1, 3, 5} and B = {2, 3} then find n(A × B) and n(B × A).
- 16) Let f(x) = 2x + 5. If x ≠ 0 then find  $\frac{f(x+2) - f(2)}{x}$
- 17) Let f(x) = x<sup>2</sup> - 1. Find fof.
- 18) Find the least number that is divisible by the first ten natural numbers.
- 19) Find the indicated terms whose n<sup>th</sup> term is given by a<sub>n</sub> = -(n<sup>2</sup> - 4); a<sub>4</sub> and a<sub>11</sub>.
- 20) Find the sum  $3 + 1 + \frac{1}{3} + \dots \infty$
- 21) Find the excluded value in the expression  $\frac{y}{y^2 - 25}$
- 22) Determine the nature of roots of the quadratic equation  $9x^2 - 24x + 16 = 0$

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- 23) If  $\triangle ABC$  is similar to  $\triangle DEF$  such that  $BC = 3\text{cm}$ ,  $EF = 4\text{cm}$  and area of triangle  $ABC = 54\text{cm}^2$ . Find the area of  $\triangle DEF$ .
- 24) In  $\triangle ABC$ , D and E are points on the sides AB and AC respectively such that  $DE \parallel BC$ . In it if  $\frac{AD}{DB} = \frac{3}{4}$  and  $AC = 15\text{cm}$  find AE.
- 25) Find the intercepts made by the line  $4x - 9y + 36 = 0$  on the coordinate axes.
- 26) Find the slope of a line joining the points  $(5, \sqrt{5})$  with the origin.
- 27) Prove that  $\sqrt{\frac{1 + \cos \theta}{1 - \cos \theta}} = \text{Cosec} \theta + \text{Cot} \theta$
- 28) If  $1^3 + 2^3 + 3^3 + \dots + K^3 = 44100$  then find  $1 + 2 + 3 + \dots + K$

## Part - C

## III. Answer any 10 questions. (Q.No: 42 is compulsory).

10x5=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) Let  $f: A \rightarrow B$  be a function defined by  $f(x) = \frac{x}{2} - 1$ , where  $A = \{2, 4, 6, 10, 12\}$   
 $B = \{0, 1, 2, 4, 5, 9\}$ . Represent f by  
i) Set of ordered pairs                      ii) a table  
iii) An arrow diagram                      iv) a graph
- 31) If  $f(x) = 2x + 3$ ,  $g(x) = 1 - 2x$  and  $h(x) = 3x$ . Prove that  $fo(goh) = (fog)oh$
- 32) The sum of three consecutive terms that are in AP is 27 and their product is 288. Find the three terms.
- 33) The sum of first n, 2n and 3n terms of an A.P are  $S_1$ ,  $S_2$  and  $S_3$  respectively. Prove that  $S_3 = 3(S_2 - S_1)$
- 34) Find the sum to n terms of the series  $7 + 77 + 777 + \dots$
- 35) Find the G.C.D of  $6x^3 - 30x^2 + 60x - 48$  and  $3x^3 - 12x^2 + 21x - 18$
- 36) Find the values of m and n if the polynomial  $36x^4 - 60x^3 + 61x^2 - mx + n$  is a perfect square.
- 37) State and demonstrate Basic proportionality theorem.
- 38) Find the area of the quadrilateral formed by the points (8, 6) (5, 11) (-5, 12) and (-4, 3)
- 39) If the points A(2, 2) B(-2, -3) C(1, -3) and D(x, y) form a parallelogram then find the value of x and y.
- 40) Find the equation of a straight line through the intersection of lines  $7x + 3y = 10$ ,  $5x - 4y = 1$  and Parallel to the line  $13x + 5y + 12 = 0$ .
- 41) If  $\frac{\cos \alpha}{\cos \beta} = m$  and  $\frac{\cos \alpha}{\sin \beta} = n$ , then Prove that  $(m^2 + n^2) \cos^2 \beta = n^2$ .
- 42) Solve :  $px^2 - (p + q)^2x + (p + q)^2 = 0$

## Part - D

## IV. Answer both the questions by choosing either of the alternatives. 2x8=16

- 43) a) Construct a triangle similar to a given triangle PQR with its sides equal to  $\frac{7}{4}$  of the corresponding sides of the triangle PQR (scale factor  $\frac{7}{4} > 1$ )

(OR)

- b) Construct a  $\triangle ABC$  such that  $AB = 5.5\text{cm}$ ,  $\angle C = 25^\circ$  and the altitude from C to AB is 4cm.
- 44) a) A bus is travelling at a uniform speed of 50 km/hr. Draw the distance - time graph and hence find  
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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) Vallam - 622829
- b) Draw the graph of  $xy = 24$ ,  $x, y > 0$ . Using the graph find,  
i) y when  $x = 3$  and ii) x when  $y = 6$  Tenkasi Di ST.