Tsi10M

Tenkasi District

Common Half Yearly Examination - 2024

Standard 10 **MATHEMATICS**

Part - A

I.	Choose	the	correct	answer.

Marks: 100

1) $A = \{a, b, p\}, B = \{2, 3\}, C = \{p, q, r, s\} \text{ then } n \lceil (A \cup C) \times B \rceil \text{ is}$

a) 8

Time: 3.00 Hours

- b) 20
- d) 16

2) Let $f(x) = \sqrt{1 + x^2}$ then

- a) f(xy)=f(x)f(y)
- b) $f(xy) \ge f(x)f(y)$
- c) $f(xy) \le f(x)f(y)$
- d) None of these

3) An A.P consists of 31 terms. If its 16th terms is m, then the sum of all the term

- a) 16m
- b) 62m
- c) 31 m
- d) $\frac{31}{2}$ m

4) In an A.P., the first term is 1 and the common difference is 4. How many term of A.P must be taken for there sum of be equal to 120?

- a) 6
- b) 7
- d) 9

5) $\frac{3y-3}{y} + \frac{7y-7}{3y^2}$ is

- a) $\frac{9y}{7}$

- c) $\frac{21y^2 42y + 21}{3y^3}$ d) $\frac{7(y^2 2y + 1)}{y^2}$

6) Graph of a linear equation is a

- a) straight line
- b) cricle
- c) parabola
- d) hyperbola

7) How many tangents can be drawn to the circle from an exterior point?

- a) one
- b) two
- c) infinite
- d) zero

8) The equation of a line passing through the origin and perpendicular to the 7x - 3y + 4 = 0 is

- a) 7x-3y+4=0
- b) 3x-7y+4=0
- c) 3x+7y=0
- d) 7x-3y=0

9) (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

10) If $5x = \sec \theta$ and $\frac{3}{y} = \tan \theta$, then $x^2 - \frac{1}{y^2}$ is equal to

- a) 25

11) $(1 + \tan \theta + \sec \theta)(1 + \cot \theta - \csc \theta)$ is equal to

- a) 0
- b) 1

12) The height of a right circular cone whose raduis is 5cm and slant height is 13cm will be

- a) 12cm
- b) 10cm
- c) 13cm
- d) 5cm

13) The range of the data 8, 8, 8, 8 is

- a) 0
- b) 1
- c) 8

14) If the standard deviation of x,y,z is P then the standard deviation of 3x+5, 3y+5, 3z+5 is

- a) 3p + 5
- b) 3p
- c) p+5
- d) 9p + 15

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Part - B

II. Answer any 10 questions.(Q.No. 28 is compulsory)

10x2=20

- 15) If $B \times A = \{(-2, 3), (-2, 4), (0, 3), (0, 4), (3, 3), (3, 4)\}$ find A and B
- 16) If $A = \{-2, -1, 0, 1, 2\}$ and $f: A \rightarrow B$ is an onto function defined by $f(x) = x^2 + x + 1$ then find B
- 17) 'a' and 'b' are two positive integers such that $a^b \times b^a = 800$. Find 'a' and 'b'.
- 18) If 3 + k, 18 k, 5k + 1 are in A.P then find k.

19) Solve :
$$\frac{x}{x-1} + \frac{x-1}{x} = 2\frac{1}{2}$$

20) If
$$A = \begin{bmatrix} 5 & 2 & 2 \\ -\sqrt{17} & 0.7 & \frac{5}{2} \\ 8 & 3 & 1 \end{bmatrix}$$
 then verify $(A^T)^T = A$

- 21) If radii of two concentric circles are 4cm and 5cm then find the length of the cord of one circle which is tangent to the other circle.
- 22) Find the intercepts made by the line 4x-9y+36=0 on the coordinate axes
- 23) Show that the straight lines x 2y + 3 = 0 and 6x + 3y + 8 = 0 are perpendicular

24) Prove that
$$\sqrt{\frac{1+\cos\theta}{1-\cos\theta}} = \csc\theta + \cot\theta$$

- 25) The curved surface area of a right circular cylinder of height 14cm is 88 cm². Find the diameter of the cylinder
- 26) Find the volume of a cylinder whose height is 2m and whose base area is 250m².
- 27) The probability that atleast one of A and B occur is 0.6. If A and B occur simultaneously with probability 0.2, then find $P(\overline{A}) + P(\overline{B})$
- 28) The range of a set of data is 13.67 and the largest value is 70.08. Find the smallest value

Part - C

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

10x5=50

- 29) a) Let $A = \{1, 2, 3, 4\}$ and $B = \{2, 5, 8, 11, 14\}$ be two sets. Let $f: A \rightarrow B$ be a function given by f(x) = 3x 1. Represent this function.
 - i) by arrow diagram
- ii) in a table form
- iii) as a set of ordered pairs
- iv) in a graphical form
- 30) If f(x) = 2x + 3, g(x) = 1 2x and h(x) = 3x. Prove that fo(goh) = (fog)oh
- 31) Find the sum of all natural numbers between 300 and 600 which are divisible by 7
- 32) Find the sum to n terms of the series 3 + 33 + 333 + to n terms
- 33) Find the values of m and n if the following polynomial are perfect squares $36x^4-60x^3+61x^2-mx+n$

34) If
$$A = \begin{pmatrix} 1 & 2 & 1 \\ 2 & -1 & 1 \end{pmatrix}$$
 and $B = \begin{pmatrix} 2 & -1 \\ -1 & 4 \\ 0 & 2 \end{pmatrix}$ show that $(AB)^T = B^T A^T$

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- 35) State and prove Basic proportionality theorem
- 36) Find the equation of the perpendicular bisector of the line joining the points A(-4, 2) and B(6, -4)
- 37) A lift in a building of height 90 feet with transparent glass walls is decending from the top of the building. At the top of the building, the angle of depression to a fountain in the garden is 60°. Two minutes lates, the angle of depression reduces to 30°. If the fountain is $30\sqrt{3}$ feet from the entrance of the lift, find the speed of the lift which is descending.
- 38) The radius and height of a cyclinder are in the ratio 5 : 7 and its curved surface area is 5500 sq.cm. Find its radius and height.
- 39) Nathan an engineering student was asked to make a model shaped like a cylinder with two cones attached at its two ends. The diameter of the model is 3cm and its length is 12 cm. If each cone has a height of 2cm, find the volume of the model that Nathan made.
- 40) Find the coefficient of variation of 24, 26, 33, 37, 29, 31
- 41) Two dice are rolled. Find the probability that the sum of outcomes is
 - i) equal to 4
 - ii) greater than 10
 - iii) less than 13
- 42) Find the area of the quadrilateral formed by the points (8, 6), (5, 11), (-5, 12) and (-4, 3)

Part - D

IV. Answer all the questions.

2x8 = 16

43) Draw a circle of radius 5cm from a point, which is 10 cm away from its centre. Draw the two tangents to the circle, measure their length

(OR)

Construct a $\triangle PQR$ such that QR = 5cm, $\angle P = 30^{\circ}$ and the altitude from P to QR is of length 4.2cm

44) A company intially started with 40 workers to complete the work by 150 days. Later it decided to fastern up the work increasing the number of workers as shown below

Number of worker (x)	40	50	60	75
Number of days(y)	150	120	100	80

- i) Graph the above data and identity the type of veriation
- ii) From the Graph, Find the number of days required to complete the work if the company decides to opt for 120 workers?
- iii) If the work has to be completed by 30 days, how many workers are requried?

(OR)

Graph the quadratic equation $y = x^2 - 5x - 6$ and hence solve the quadratic equation $x^2 - 5x - 14 = 0$