TVL10M

Tirunelveli District
Common Quarterly Examination - September 2025

Standard 10
MATHEMATICS

Time Allowed: 3.00 Hours | Maximum Marks: 100

Part-I

Answer all the questions: **14×1=14**

1) Let n(A) = m and n(B) = n, then the total number of non-empty relations that can be defined from A to B is
   a) m^n b) n^m c) $2^{mn} - 1$ d) 2^{mn}

2) If $f(x) = 2x^2$ and $g(x) = \frac{1}{3x}$, then f o g is
   a) $\frac{3}{2x^2}$ b) $\frac{2}{3x^2}$ c) $\frac{2}{9x^2}$ d) $\frac{1}{6x^2}$

3) If g = {(1,1), (2,3), (3,5), (4,7)} is a function given by $g(x) = \alpha x + \beta$ then the values of α and β are
   a) (−1,2) b) (2,−1) c) (−1,−2) d) (1,2)

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 n^{th} term of an AP is 2n−1. The sum of the first 'n' terms of that AP is
   a) n^2 b) 2n−1 c) n+2 d) n(n+2)

6) $y^2 + \frac{1}{y^2}$ is not equal to
   a) $\frac{y^4+1}{y^2}$ b) $\left(y+\frac{1}{y}\right)^2$ c) $\left(y-\frac{1}{y}\right)^2$ d) $\left(y+\frac{1}{y}\right)^2 - 2$

7) Graph of a linear equation is a _____.
   a) straight line b) circle c) parabola d) huperbola

8) If ΔABC is an isosceles triangle with $\angle C = 90°$ and AC = 5 cm, then AB is
   a) 2.5 cm b) 5 cm c) 10 cm d) $5\sqrt{2}$ cm

9) If in ΔABC, DE || BC, AB = 3.6 cm, AC = 2.4 cm and AD = 2.1 cm, then the length of AE is
   a) 1.4 cm b) 1.8 cm c) 1.2 cm d) 1.05 cm

10) The point of intersection of 3x − y = 4 and x + y = 8 is
   a) (5,3) b) (2,4) c) (3,5) d) (4,4)

11) (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

12) The area of a triangle formed by the points (2,−3), (3,2) and (−2,5) is
   a) 11 b) 12 c) 14 d) 13

13) $\tan\theta \cdot \operatorname{cosec}^2\theta - \tan\theta$ is equal to
   a) $\sec\theta$ b) $\cot^2\theta$ c) $\sin\theta$ d) $\cot\theta$

14) If $\sin\theta + \cos\theta = a$ and $\sec\theta + \operatorname{cosec}\theta = b$, then the value of $b(a^2 - 1)$ is equal to
   a) 2a b) 3a c) 0 d) 2ab

Part-II

Answer any 10 questions only. Question no.28 is compulsory: **10×2=20**

15) If B×A = {(−2,3), (−2,4), (0,3), (0,4) (3,3), (3,4)} find A and B.
16) A plane is flying at a speed of 500 km per hour. Express the distance 'd' travelled by the plane as function of time t in hours.
17) 'a' and 'b' a are two positive integers such that $a^b \times b^a = 800$ find 'a' and 'b'.
18) Find the sum of 8 terms of the GP 1, −3, 9, −27,....
19) Find the L.C.M of $x^4 - 1$, $x^2 - 2x + 1$.
20) Solve $2x^2 - 3x - 3$ by formula method.
21) If α, β are the roots of the equation, $3x^2 + 7x - 2 = 0$, find the values of $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$.

22) If ΔABC is similar to ΔDEF such that BC = 3 cm, EF = 4 cm, and the area of ΔABC = 54 cm^2. Find the area of ΔDEF.

23) In ΔABC, D and E are points on the sides AB and AC respectively such that DE || BC, if $\frac{AD}{DB} = \frac{3}{4}$ and AC = 15 cm, find AE.

24) Find the slope of a line joining the points (14,10) and (14,−6).

25) If the straight lines $12y = -(p+3)x + 12$, $12x - 7y = 16$ are perpendicular, then find 'p'.

26) Prove that $\frac{\cos\theta}{1+\sin\theta} = \sec\theta - \tan\theta$.

27) Prove that $\cot^2\theta - \frac{1}{\sin^2\theta} = -1$.

28) A cat is located at the point (−6,−4) in xy plane. A bottle of milk is kept at (5,11). The cat wish to consume the milk travelling through shortest possible distance. Find the equation of the path it needs to take its milk.

Part-III

Answer any TEN questions. Question No.42 is compulsory: **10×5=50**

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

30) If $f(x) = 2x + 3$, $g(x) = 1 - 2x$ and $h(x) = 3x$. Prove that $f \circ (g \circ h) = (f \circ g) \circ h$.

31) 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).

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

33) Find the sum of $15^2 + 16^2 + 17^2 + ... + 28^2$.

34) Solve the following system of linear equations in three variables.
$x + y + z = 5$; $2x - y + z = 9$; $x - 2y + 3z = 16$

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

36) 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) $a^3 + b^3 + c^3 = 3abc$.

37) State and prove basic proportionality theorem.

38) Find the area of the quadrilateral whose vertices are at (−9,−2), (−8,−4), (2,2) and (1,−3).

39) A (−3,0), B (10,−2) and C (12,3) are the vertices of ΔABC. Find the equation of the altitude through A and B.

40) Prove that $\left[\frac{\cos^3 A - \sin^3 A}{\cos A - \sin A}\right] - \left[\frac{\cos^3 A + \sin^3 A}{\cos A + \sin A}\right] = 2 \sin A \cos A$.

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

42) Find the equation of a line passing through the point of intersection of the lines $4x + 7y - 3 = 0$ and $2x - 3y + 1 = 0$ that has equal intercepts on the axes.

Part-IV

Answer all the questions: **2×8=16**

43) a) Constructa triangle similar to a given triangle PQR with its sides equal to $\frac{2}{3}$ of the corresponding sides of the triangle PQR. (Scale factor $\frac{2}{3} < 1$) **(OR)**

b) Construct a ΔABC such that AB = 5.5 cm, $\angle C = 25^\circ$ and the altitude from C to AB is 4 cm.

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

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

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. **(OR)**