

REGISTER NUMBER :

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**GOVERNMENT HIGHER SECONDARY SCHOOL – THAZHUTHALI**  
**MODEL QUARTERLY EXAMINATION 2 – SEPTEMBER 2022**  
**X STD – MATHEMATICS**

Time Allowed : 3 hours

Maximum Marks : 100

**PART – I**

Note : (i). Answer all the questions.

14 × 1 = 14

(ii). Choose the most appropriate answer form the given four alternatives and write the option code and the corresponding answer.

- If the ordered pairs  $(a + 2, 4)$  and  $(5, 2a + b)$  are equal then  $(a, b)$  is  
 (A).  $(2, -2)$                       (B).  $(5, 1)$                       (C).  $(2, 3)$                       (D).  $(3, -2)$
- If  $f(x) = 2x^2$  and  $g(x) = \frac{1}{3x}$ , then  $f \circ g$  is  
 (A).  $\frac{3}{2x^2}$                       (B).  $\frac{2}{3x^2}$                       (C).  $\frac{2}{9x^2}$                       (D).  $\frac{1}{6x^2}$
- Euclid's divisions lemma states that for positive integers  $a$  and  $b$ , there exists unique integers  $q$  and  $r$  such that  $a = bq + r$ , where  $r$  must satisfy  
 (A).  $1 < r < b$                       (B).  $0 < r < b$                       (C).  $0 \leq r < b$                       (D).  $0 < r \leq b$
- If 6 times of 6<sup>th</sup> term of an A.P is equal to 7 times the 7<sup>th</sup> term, then the 13<sup>th</sup> term of the A.P is  
 (A). 0                      (B). 6                      (C). 7                      (D). 13
- If  $1 + 2 + 3 + \dots + 10 = 55$ , then  $1^3 + 2^3 + 3^3 + \dots + 10^3 = \dots$   
 (A).  $55^2$                       (B).  $10^2$                       (C).  $55^3$                       (D).  $10^3$
- If  $(x - 6)$  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
- The solution of  $(2x - 1)^2 = 9$  is equal to  
 (A). -1                      (B). 2                      (C). -1, 2                      (D). None of these
- GCD of  $6x^2y$ ,  $9x^2yz$ ,  $12x^2y^2z$  is .....  
 (A).  $36xy^2z^2$                       (B).  $36x^2y^2z$                       (C).  $36x^2y^2z^2$                       (D).  $3x^2y$
- If in triangle ABC and EDF,  $\frac{AB}{DE} = \frac{BC}{FD}$ , then they will be similar, when  
 (A).  $\angle B = \angle E$                       (B).  $\angle A = \angle D$                       (C).  $\angle B = \angle D$                       (D).  $\angle A = \angle F$

10. In a  $\Delta ABC$ , AD is the bisector of  $\angle BAC$ . If  $AB = 8$  cm,  $BD = 6$  cm and  $DC = 3$  cm. The length of the side AC is
- (A). 6 cm                      (B). 4 cm                      (C). 3 cm                      (D). 8 cm
11. The slope of the line joining  $(12, 3)$ ,  $(4, a)$  is  $\frac{1}{8}$ . The value of 'a' is
- (A). 1                      (B). 4                      (C). -5                      (D). 2
12. The equation of a line passing through the origin and perpendicular to the line  $7x - 3y + 4 = 0$
- (A).  $7x - 3y + 4 = 0$       (B).  $3x - 7y + 4 = 0$       (C).  $3x + 7y = 0$       (D).  $7x - 3y = 0$
13. The points  $A(1, -2)$ ,  $B(3, 4)$ ,  $C(4, 7)$  form a.....
- (A). Right angle triangle      (B). Isosceles triangle      (C). Equilateral triangle      (D). Collinear
14. If  $5x = \sec\theta$  and  $\frac{5}{x} = \tan\theta$ , then  $x^2 - \frac{1}{x^2}$  is equal to
- (A). 25                      (B).  $\frac{1}{25}$                       (C). 5                      (D). 1

## PART – II

**Note : Answer any 10 questions. Question No.28 is compulsory.**

**$10 \times 2 = 20$**

15. Let  $A = \{1, 2, 3, 4, \dots, 45\}$  and R be the relation defined as "is a square of" on A. Write R as a subset of  $A \times A$ . Also, find the domain and range of R.
16. Represent the function  $f = \{(1, 2), (2, 2), (3, 2), (4, 3), (5, 4)\}$  through
- (i). an arrow diagram                      (ii). a table
17. Find the greatest number that will divide 445 and 572 leaving remainders 4 and 5 respectively.
18. Today is Tuesday. My uncle will come after 45 days. In which day my uncle will be coming?
19. How many numbers of two digits are divisible by 7.
20. Find the LCM of the each pair of the following polynomials  $a^2 + 4a - 12$ ,  $a^2 - 5a + 6$  whose GCD is  $a - 2$ .
21. Solve :  $x^2 + 2x - 2 = 0$  by formula method.
22. A vertical stick of length 6 m casts a shadow 400 cm long on the ground and at the same time a tower casts shadow 28 m long. Using similarity, find the height of the tower.
23. Check whether AD is bisector of  $\angle A$  of  $\Delta ABC$  of the following
- $AB = 4$  cm,  $AC = 6$  cm,  $BD = 1.6$  cm and  $CD = 2.4$  cm.

24. Find the area of the triangle whose vertices are  $(-3, 5)$ ,  $(5, 6)$  and  $(5, -2)$ .
25. The line  $r$  passes through the points  $(-2, 2)$  and  $(5, 8)$  and the line  $s$  passes through the points  $(-8, 7)$  and  $(-2, 0)$ . Is the line  $r$  perpendicular to  $s$ ?
26. The hill in the form of a right triangle has its foot at  $(19, 3)$ . The inclination of the hill to the ground is  $45^\circ$ . Find the equation of the hill joining the foot and top.
27. Prove that  $\frac{\sin A}{1 + \cos A} = \frac{1 - \cos A}{\sin A}$
28. Find the value of  $k$  for which the equation  $9x^2 + 3kx + 4 = 0$  has real and equal roots.

### PART – III

**Note : Answer any 10 questions. Question No.42 is compulsory.**

**10 × 5 = 50**

29. Given  $A = \{1, 2, 3\}$ ,  $B = \{2, 3, 5\}$ ,  $C = \{3, 4\}$  and  $D = \{1, 3, 5\}$ , check if  $(A \cap C) \times (B \cap D) = (A \times B) \cap (C \times D)$  is true?

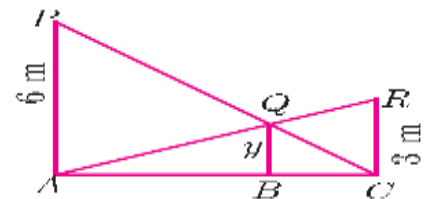
30. If the function  $f: R \rightarrow R$  is defined by  $f(x) = \begin{cases} 2x + 7 & \text{if } x < -2 \\ x^2 - 2 & \text{if } -2 \leq x < 3 \\ 3x - 2 & \text{if } x \geq 3 \end{cases}$  then the values of

(i).  $f(4)$                       (ii).  $f(-2)$                       (iii).  $f(4) + 2f(1)$                       (iv).  $\frac{f(1) - 3f(4)}{f(-3)}$

31. The sum of 3 consecutive terms that are in A.P is 27 and their product is 288. Find the 3 terms.
32. A man repays a loan of Rs.65,000 by paying Rs.400 in the first month and then increasing the payment by Rs.300 every month. How long will it take for him to clear the loan?
33. Find the sum to  $n$  terms of the series :  $5 + 55 + 555 + \dots$
34. Solve the following system of linear equations in three variables ,
- $$3x - 2y + z = 2 \quad , \quad 2x + 3y - z = 5 \quad , \quad x + y + z = 6 .$$
35. If  $9x^4 + 12x^3 + 28x^2 + ax + b$  is a perfect square, find the values of  $a$  and  $b$  .

36. State and prove Basic Proportionality Theorem.

37. Two vertical poles of heights 6m and 3m are erected above a horizontal ground AC. Find the value of  $y$ .



38. 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  $(2, 3)$ .

39. Without using Pythagoras theorem, show that the points  $(1, -4)$ ,  $(2, -3)$  and  $(4, -7)$  form a right angled triangle.
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  $\frac{\cos\theta}{1 + \sin\theta} = \frac{1}{a}$ , then prove that  $\frac{a^2 - 1}{a^2 + 1} = \sin\theta$ .
42. If the equation  $(1 + m^2)x^2 + 2mcx + (c^2 - a^2) = 0$  has equal roots, then prove that  $c^2 = a^2(1 + m^2)$ .

### PART – IV

**Note : Answer the following questions.**

**2 × 8 = 16**

43. (a). Construct a triangle similar to a given triangle LMN with its sides equal to  $\frac{7}{3}$  of the corresponding sides of the triangle LMN. (Scale factor  $\frac{7}{3} > 1$ ).

(OR)

- (b). Construct a  $\Delta PQR$  in which  $PQ = 8\text{cm}$ ,  $\angle R = 60^\circ$  and the median  $RG$  from  $R$  to  $PQ$  is  $5.8\text{cm}$ .

Find the length of the altitude from  $R$  to  $PQ$ .

44. (a). A company initially started with 40 workers to complete the work by 150 days. Later, it decided to fasten up the work increasing the number of workers as shown below.

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

- (i).. Graph the above data and identify the type of variation.
- (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 200 days, how many workers are required?

(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  $y = 7.5$ .