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FIRST MID TERM TEST – 2024

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Standard X

Reg.No.:

MATHEMATICS

Time: 1.30 hrs. Part - I Marks: 50

I. Choose the correct answer: 4 x 1 = 4

1. The range of the relation R = {(x,x^2)/x is a prime number less than 13} is
   a) {2,3,5,7} b) {2,3,5,7,11}
   c) {4,9,25,49,121} d) {1,4,9,25,49,121}
2. The value of ($1^3 + 2^3 + 3^3 + \ldots\ldots + 15^3$) – (1 + 2 + 3 + ... + 15) is
   a) 14200 b) 14520 c) 14400 d) 14280
3. The solution of the system 3z = 9, –7y + 7z = 7, x + y – 3z = –6 is
   a) x = –1, y = 2, z = 3 b) x = 1, y = 2, z = 3
   c) x = 1, y = –2, z = 3 d) x = –1, y = –2, z = 3
4. In ΔLMN, ∠L = 60°, ∠M = 50°. If ΔLMN ~ ΔPQR, then the value ∠R is
   a) 40° b) 70° c) 30° d) 110°

Part - II

II. Answer any 5 questions. (Q.No.11 is compulsory) 5 x 2 = 10

5. A function f : [–5,9] → R is defined as follows :

$$f(x)=\begin{cases}6x+1 \; ; -5 \le x < 2\\ 5x^2-1; \; 2 \le x < 6\\ 3x-4 \; ; \; 6 \le x \le 9\end{cases}$$, find 2f(4) + f(8)

6. If $13824 = 2^a \times 3^b$, then find a and b.
7. Use Euclid's Division Algorithm to find the Highest Common Factor (HCF) of 396, 504, 636.
8. A boy of height 90 cm walking away from the base of a lamppost at a speed of 1.2 m / sec. If the lamppost is 3.6 m above the ground, find the length of his shadow cast after 4 seconds.
9. Simplify : $\frac{4x^2y}{2z^2} \times \frac{6xz^3}{20y^4}$
10. Find the LCM of each pair of the following polynomials $a^2 + 4a - 12$, $a^2 - 5a + 6$ whose GCD is a – 2
11. Represent at 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

Part - III

III. Answer any 4 questions. (Q.No.17 is compulsory) 4 x 5 = 20

12. A = {x∈W | x < 2}, B = {x∈N | 1 < x ≤ 4} and C = {3,5}, verify that A x (B ∪ C) = (A x B) ∪ (A x C)
13. Find the sum to n terms of the series 6 + 66 + 666 + ...
14. The ratio of 6^{th} and 8^{th} term of an A.P is 7.9. Find the ratio of 9^{th} term to 13^{th} term.

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15. Simplify : $\frac{1}{x^2-5x+6}+\frac{1}{x^2-3x+2}-\frac{1}{x^2-8x+15}$

16. Find the GCD of $6x^3-30x^2+60x-48$ and $3x^3-12x^2+21x-18$.

17. 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

18. i) Find the least positive value of x such that $67 + x \equiv 1 \pmod 4$
    ii) Solve: $5x \equiv 4 \pmod 6$

Part - IV

IV. Answer the following questions. **2 x 8 = 16**

19. a) 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 $\frac{7}{3}>1$)

(OR)

b) Construct a triangle similar to a given triangle ABC with its sides equal to $\frac{3}{5}$ of the corresponding sides of the triangle ABC. (scale factor $\frac{3}{5}<1$)

20. a) A two wheeler parking zone near bus stand charges as below :

Time (in hours) (x)	4	8	12	24
Amount ₹ (y)	60	120	180	360

Check if the amount charged are in direct variation or in inverse variation to the parking time. Graph the data. Also,
    i) Find the amount to be paid when parking time is 6 hr.
    ii) Find the parking duration when the amount paid is ₹150

(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

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