SRI SAI MATRIC HR SEC SCHOOL
TIRUPUR
I-- Midterm Test
MATHS

Total Marks: 100 Marks　　　　　　　　　　　　　　　　Class: 10
Duration: 2 Hrs 30 Min

Sec--B

Answer any 10 questions.Q.No 15 is compulsory　　　　10 X 2 = 20

1. Let $A = \{x \in \mathbb{W} | x < 2\}$, $B = \{x \in \mathbb{N} | 1 \le x < 4\}$ and $C = \{3,5\}$. Then verify that
   A × (B ∩ C) = (A × B) ∩ (A × C)
2. Let A = {1,2,3,4} and B = {2,5,8,11,14} be two sets. Let f : A → B be a function given by f(x) = 3x - 1 . Represent the function as a set of ordered pairs
3. The function 't' which maps temperature in Celsius (C) into temperature in Fahrenheit (F) is defined by t(C) = F where $F = \frac{9}{5}C + 32$. $Find$ the temperature when the Celsius value is equal to the Farenheit value.
4. Find the largest number which divides 1230 and 1926 leaving remainder 12 in each case.
5. Find the next three terms of the sequence 5, 1,-3,...
6. Using horizontal line test (Fig.1.35(a), 1.35(b), 1.35(c)), determine which of the following functions are one - one.
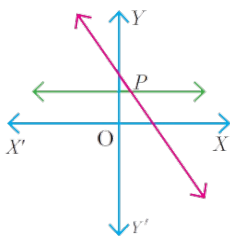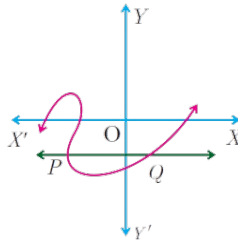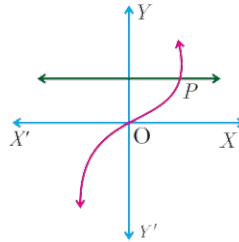

Fig. 1.35(a)　　　Fig. 1.35(b)　　　Fig. 1.35(c)

7. The value of a motor cycle depreciates at the rate of 15% per year. What will be the value of the motor cycle 3 year hence, which is now purchased for ₹ 45,000?
8. If l^{th}, m^{th} and n^{th} terms of an A.P. are x, y, z respectively, then show that
   x(m - n) + y(n - l) + z(l - m) = 0
9. A function f is defined by f(x) = 3 - 2x . Find x such that $f(x^2) = (f(x))^2$.
10. Find the middle term(s) of an A.P. 9, 15, 21, 27,...,183.
11. Find the remainder when 2^{81} is divided by 17.
12. Solve 3x - 2 ≡ 0(mod 11)
13. Let A = {1,2,3,4,...,45} and R be the relation defined as "is square of " on A. Write R as a subset of A × A . Also, find the domain and range of R.
14. The cartesian product A × A has 9 elements among which (-1,0) and (0,1) are found. Find the set A and the remaining elements of A × A.
15. a) . If nine times ninth term is equal to the fifteen times fifteenth term, show that six times twenty fourth term is zero.

(Or)

   b) Let A,B,C ⊆ ℕ and a function f: A → B be defined by f(x) = 2x + 1 and g: B → C be defined by g(x) = x^2. Find the range of f ∘ g and g ∘ f.

Sec--C

Answer any 9 questions.Q.No 30 is compulsory　　　　9 X 5 = 45

16. Find A × B , A × A and B × A
    (i) A = {2,-2,3} and B = {1,-4} (ii) A = B = {p,q} (iii) A = {m,n}; B = ϕ
17. If X = {-5,1,3,4} and Y = {a,b,c}, then which of the following relations are functions from X to Y ?
    (i) $\mathbb{R}_1$ = {(-5,a), (1,a), (3,b)}
    (ii) $\mathbb{R}_2$ = {(-5,b), (1,b), (3,a),(4,c)}
    (iii) $\mathbb{R}_3$ = {(-5,a), (1,a), (3,b),(4,c),(1,b)}
18. The sum of the squares of the first n natural numbers is 285, while the sum of their cubes is 2025. Find the value of n.
19. The sum of first n, 2n and 3n terms of an A.P. are S_1, S_2 and S_3 respectively. Prove that $S_3 = 3(S_2 - S_1)$.

20. If the function $f : \mathbb{R} \to \mathbb{R}$ is defined by $f(x) = \begin{cases} 2x + 7, & x < -2 \\ x^2 - 2, & -2 \le x < 3 \\ 3x - 2, & x \ge 3 \end{cases}$ then find the values of

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

21. If a, b, c are three consecutive terms of an A.P. and x, y, z are three consecutive terms of a G.P. then prove that $x^{b-c} \times y^{c-a} \times z^{a-b} = 1$.

22. Find x if gff(x) = fgg(x), given f(x) = 3x + 1 and g(x) = x + 3.

23. Consider the functions f(x), g(x), h(x) as given below. Show that (f ∘ g) ∘ h = f ∘ (g ∘ h) in each case. f(x) = x - 4, g(x) = x^2 and h(x) = 3x - 5

24. Rekha has 15 square colour papers of sizes 10 cm, 11 cm, 12 cm,..., 24 cm. How much area can be decorated with these colour papers?

25. In an A.P., sum of four consecutive terms is 28 and their sum of their squares is 276. Find the four numbers.

26. Find the sum of all natural numbers between 300 and 600 which are divisible by 7.

27. If (m + 1)th term of an A.P. is twice the (n + 1)th term, then prove that (3m + 1)th term is twice the (m + n + 1)th term.

28. Find the sum to n terms of the series 5 + 55 + 555 + ...

29. The 13th term of an A.P. is 3 and the sum of first 13 terms is 234. Find the common difference and the sum of first 21 terms.

30. a) If $S_n = (x + y) + (x^2 + xy + y^2) + (x^3 + x^2 y + xy^2 + y^3) + \dots$ n terms then prove that

$(x - y)S_n = \left[\frac{x^2(x^n - 1)}{x - 1} - \frac{y^2(y^n - 1)}{y - 1} \right]$

(Or)

b) The functions f and g are defined by f(x) = 6x + 8; $g(x) = \frac{x - 2}{3}$
(i) Calculate the value of $gg(\frac{1}{2})$
(ii) Write an expression for gf(x) in its simplest form.

Sec--D

Answer any 1 questions in detail   1 X 10 = 10

31. Discuss the nature of solutions of x^2 - 9x + 20 = 0.

32. Discuss the nature of solutions of x^2 - 9 = 0.

Sec--E

Answer any 1 questions in detail   1 X 10 = 10

33. Draw a circle of radius 3 cm. Take a point P on this circle and draw a tangent at P.

34. Draw the two tangents from a point which is 5 cm away from the centre of a circle of diameter 6 cm. Also, measure the lengths of the tangents.

Sec-A

Choose the correct answer   15 X 1 = 15

35. 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

36. If {(a,8),6,b)} represents an identity function, then the value of a and b are respectively
a) (8,6)   b) (8,8)   c) (6,8)   d) (6,6)

37. Let $f(x) = \sqrt{1 + x^2}$ then
a) f(xy) = f(x).f(y)   b) f(xy) ≥ f(x).f(y)
c) f(xy) ≤ f(x).f(y)   d) None of these

38. Euclid's division lemma states that for positive integers a and b, there exist unique integers q and r such that a = bq + r, where r must satisfy.
a) 1 < r < b   b) 0 < r < b   c) 0 ≤ r < b   d) 0 < r ≤ b

39. The least number that is divisible by all the numbers from 1 to 10 (both inclusive) is
a) 2025   b) 5220   c) 5025   d) 2520

40. Given $F_1 = 1$, $F_2 = 3$ and $F_n = F_{n-1} + F_{n-2}$ then F_5 is
a) 3   b) 5   c) 8   d) 11

41. An A.P. consists of 31 terms. If its 16th term is m, then the sum of all the terms of this A.P. is
a) 16 m   b) 62 m
c) 31 m   d) $\frac{31}{2} m$

42. The value of $(1^3 + 2^3 + 3^3 + \dots + 15^3)$ - (1 + 2 + 3 + ... + 15) is
a) 14400   b) 14200   c) 14280   d) 14520