SRI VINAYAGA TUITION CENTRE
ANAIMALAI-642104
UNIT TEST 2024 (CH-2)
MATHEMATICS

Total Marks: 100 Marks   Class: 10

Duration: 3 Hrs

PART A

CHOOSE THE CORRECT ANSWER   14 X 1 = 14

1. If the sequence $t_1, t_2, t_3,...$, are in A.P. then the sequence $t_6, t_{12}, t_{18},....$ is
   a) a Geometric Progression
   b) an Arithmetic Progression
   c) neither an Arithmetic Progression nor a Geometric Progression
   d) a constant sequence

2. The first term of an arithmetic progression is unity and the common difference is 4. Which of the following will be a term of this A.P.
   a) 4551
   b) 10091
   c) 7881
   d) 13531

3. Using Euclid's division lemma, if the cube of any positive integer is divided by 9 then the possible remainders are
   a) 0, 1, 8
   b) 1, 4, 8
   c) 0, 1, 3
   d) 1, 3, 5

4. 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

5. If $A = 2^{65}$ and $B = 2^{64} + 2^{63} + 2^{62} + ... + 2^0$ which of the following is true?
   a) B is 2^{64} more than A
   b) A and B are equal
   c) B is larger than A by 1
   d) A is larger than B by 1

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

7. 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

8. The next term of the sequence $\frac{3}{16}, \frac{1}{8}, \frac{1}{12}, \frac{1}{18}, \ldots$ is
   a) $\frac{1}{24}$
   b) $\frac{1}{27}$
   c) $\frac{2}{3}$
   d) $\frac{1}{81}$

9. If 6 times of 6th term of an A.P. is equal to 7 times the 7th term, then the 13th term of the A.P. is
   a) 0
   b) 6
   c) 7
   d) 13

10. 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) $\frac{31}{2}m$

11. $7^{4k} \equiv$ _____ (mod 100)
    a) 1
    b) 2
    c) 3
    d) 4

12. 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

13. The common ratio of the G.P. a^{m-n}, a^m, a^{m+n} is _____.
    a) a^m
    b) a^{-m}
    c) a^n
    d) a^{-n}

14. The sequence -3, - 3, -3, ... is _____.
    a) an A.P. only
    b) a G.P. only
    c) neither A.P. nor G.P.
    d) both A.P. and G.P.

PART B

Answer any 10 questions (Q.NO 28 COMPULSORY)   10 X 2 = 20

15. Check whether the sequences are in A.P. or not?
    $3\sqrt{2}, 5\sqrt{2}, 7\sqrt{2}, 9\sqrt{2}, ...$

16. Find the sum of $5^2 + 10^2 + 15^2 + ...105^2$

17. Find the sum of $3 + 6 + 9 + ... + 96$

18. First term a and common difference d are given below. Find the corresponding A.P.
    a = 5 , d = 6

19. Find the least positive value of x such that 67 + x ≡ 1 (mod 4)

20. 'a' and 'b' are two positive integers such that $a^b \times b^a = 800$. Find 'a' and 'b'.

21. A brick staircase has a total of 30 steps. The bottom step requires 100 bricks. Each successive step requires two bricks less than the previous step.
    How many bricks are required to build the stair case?

22. If the Highest Common Factor of 210 and 55 is expressible in the form 55x - 325 , find x.

23. Find the sum of 1 + 3 + 5 + ...+ 55

24. In an A.P. the sum of first n terms is $\frac{5n^2}{2} + \frac{3n}{2}$. Find the 17th term.

25. Find the least positive value of x such that 71 ≡ x (mod 8)

26. Find the sum of 51 + 52 + 53 + ... + 92

27. Find the first term and common difference of the Arithmetic Progressions whose nth terms are given t_n = -3 + 2n

28. Compute x, such that $10^4 \equiv x$(mod 19)

PART C

Answer any 10 questions (Q.NO 42 COMPULSORY)   10 X 5 = 50

29. Find the HCF of 252525 and 363636.

30. Find the sum $\left[\frac{a-b}{a+b} + \frac{3a-2b}{a+b} + \frac{5a-3b}{a+b} + ... + to \ 12 \ terms \right]$.

31. Find the next three terms of the sequence 8, 24, 72,...

32. The product of three consecutive terms of a Geometric Progression is 343 and their sum is $\frac{91}{3}$. Find the three terms.

33. Find the sum of first n terms of the G.P.
    (i) 256,64,16,....

34. Fundamental Theorem of Arithmetic

35. Check whether the following sequences are in A.P. or not?
    (i) x + 2, 2x + 3, 3x + 4,....(ii) 2,4,8,16,... $(iii) \ 3\sqrt{2}, 5\sqrt{2}, 7\sqrt{2}, 9\sqrt{2}, ...$

36. A man repays a loan of   65,000 by paying   400 in the first month and then increasing the payment by   300 every month. How long will it take for him to clear the loan?

37. Find the next three terms of the sequences
    $(i) \ \frac{1}{2}, \frac{1}{6}, \frac{1}{14}, ...$ (ii) 5, 2,-1, -4,.... (iii) 1, 0.1, 0.01,...

38. Find the number of terms in the G.P. 4,8,16,.....,8192?

39. How many terms of the series $1^3 + 2^3 + 3^3 + ...$ should be taken to get the sum 14400?

40. Priya earned   15,000 in the first month. Thereafter her salary increased by   1500 per year. Her expenses are   13,000 during the first year and the expenses increases by   900 per year. How long will it take for her to save   20,000 per month.

41. 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.

42. Find the sum of the first n terms of the series 0.4 + 0.94 + 0.994 +.....

PART D

ANSWER THE FOLLOWING QUESTIONS   2 X 8 = 16

43. A) Draw a triangle ABC of base BC = 5.6 cm, ∠A = 40° and the bisector of ∠A meets BC at D such that CD = 4 cm.

(Or)

B) Construct a triangle Δ PQR such that QR = 5 cm, ∠P = 30° and the altitude from P to QR is of length 4.2 cm.

44. A) Construct a Δ PQR in which PQ = 8 cm, ∠R = 60° and the median RG from R to PQ is 5.8 cm. Find the length of the altitude from R to PQ.

(Or)

B) Construct a Δ PQR such that QR = 6.5 cm, ∠p = 60° and the altitude from P to QR is of length 4.5 cm.

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