

Class : 10th STD

Subject:

MATHEMATICS

Question : Type B



NEW BHARATH MATRIC HR SEC

SCHOOL THIRUVARUR

Date : 27-12-2019

Time : 2.30 Hrs

Roll No:

Maximum Marks: 489

**Instructions:**

(i) Check the question paper for fairness of printing. If there is any lack of fairness, inform the hall supervisor immediately.

(ii) Use Black or Blue ink to write and pencil to draw diagram

**PART - I****15 x 1 = 15****ANSWER ALL QUESTIONS**

- The value of  $(1^3 + 2^3 + 3^3 + \dots + 15^3) - (1 + 2 + 3 + \dots + 15)$  is  
a) 14400      b) 14200      c) 14280      d) 14520
- If the sequence  $t_1, t_2, t_3, \dots$  are in A.P, then the sequence  $t_6, t_{12}, t_{18}, \dots$  is  
a) a Geometric Progression      b) an Arithmetic Progression      c) neither an Arithmetic Progression nor a Geometric Progression      d) a constant sequence
- The next term of the sequence  $\frac{3}{16}, \frac{1}{8}, \frac{1}{12}, \frac{1}{18}, \dots$  is  
a)  $\frac{1}{24}$       b)  $\frac{1}{27}$       c)  $\frac{2}{3}$       d)  $\frac{1}{81}$
- 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
- In an A.P., the first term is 1 and the common difference is 4. How many terms of the A.P must be taken for their sum to be equal to 120?  
a) 6      b) 7      c) 8      d) 9
- An A.P consists of 31 terms. If its  $16^{th}$  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
- If 6 times of  $6^{th}$  term of an A.P is equal to 7 times the  $7^{th}$  term, then the  $13^{th}$  term of the A.P. is  
a) 0      b) 6      c) 7      d) 13
- 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
- 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
- $7^{4k} = \underline{\hspace{2cm}} \pmod{100}$   
a) 1      b) 2      c) 3      d) 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
- The sum of the exponents of the prime factors in the prime factorization of 1729 is  
a) 1      b) 2      c) 3      d) 4
- If the H.C.F 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
- 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
- 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)  $0 \leq r < b$

d)  $0 < r \leq b$

**PART - II**

**$72 \times 2 = 144$**

**ANSWER ALL QUESTIONS**

16. Find all positive integers which when divided by 3 leaves remainder 2.
17. A man has 532 flower pots. He wants to arrange them in rows such that each row contains 21 flower pots. Find the number of completed rows and how many flower pots are left over.
18. When the positive integers be a, b and c are divided by 13, the respective remainders are 9, 7 and 10. Show that  $a + b + c$  is divisible by 13.
19. A positive integer when divided by 88 gives the remainder 61. What will be the remainder when the same number is divided by 11?
20. Prove that two consecutive positive integers are always coprime.
21. If m, n are natural numbers, for what values of m, does  $2^n \times 5^m$  ends in 5 ?
22. What is the smallest number that when divided by three numbers such as 35, 56 and 91 leaves remainder 7 in each case?
23. Find the least number that is divisible by the first ten natural numbers.
24. Find the least positive value of x such that  $71 \equiv x \pmod{8}$
25. Find the least positive value of x such that  $78 + x \equiv 3 \pmod{5}$
26. Find the least positive value of x such that  $89 \equiv (x + 3) \pmod{4}$
27. Find the least positive value of x such that  $96 \equiv \frac{x}{7} \pmod{5}$
28. Find the least positive value of x such that  $5x \equiv 4 \pmod{6}$
29. If x is congruent to 13 modulo 17 then  $7x - 3$  is congruent to which number modulo 17?
30. Solve  $5x \equiv 4 \pmod{6}$
31. What is the time 100 hours after 7 a.m.?
32. What is the time 15 hours before 11 p.m.?
33. Prove that  $2^n + 6 \times 9^n$  is always divisible by 7 for any positive integer n.
34. Find the next three terms of the following sequence.  $\frac{1}{4}, \frac{2}{9}, \frac{3}{16}, \dots$
35. Find the next three terms of the following sequence.  $\frac{1}{4}, \frac{2}{9}, \frac{3}{16}, \dots$
36. Find the first four terms of the sequences whose  $n^{\text{th}}$  terms are given by  $a_n = n^3 - 2$
37. Find the first four terms of the sequences whose  $n^{\text{th}}$  terms are given by  $a_n = (-1)^{n+1}n(n+1)$
38. Find the first four terms of the sequences whose  $n^{\text{th}}$  terms are given by  $a_n = 2n^2 - 6$
39. Find the  $n^{\text{th}}$  term of the following sequences  $2, 5, 10, 17, \dots$
40. Find the  $n^{\text{th}}$  term of the following sequences  $0, \frac{1}{2}, \frac{2}{3}, \dots$
41. Find the  $n^{\text{th}}$  term of the following sequences  $3, 8, 13, 18, \dots$
42. Find the indicated terms of the sequences whose  $n^{\text{th}}$  terms are given by  $a_n = \frac{5n}{n+2}$ ;  $a_6$  and  $a_{13}$
43. Find the indicated terms of the sequences whose  $n^{\text{th}}$  terms are given by  $a_n = -(n^2 - 4)$ ;  $a_4$  and  $a_{11}$
44. Check whether the following sequences are in A.P.  $a - 3, a - 5, a - 7, \dots$
45. Check whether the following sequences are in A.P.  $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \dots$
46. Check whether the following sequence are in A.P.  $9, 13, 17, 21, 25, \dots$
47. Check whether the following sequence are in A.P.  $\frac{-1}{3}, 0, \frac{1}{3}, \frac{2}{3}, \dots$
48. Check whether the following sequence are in A.P.  $1, -1, 1, -1, 1, -1, \dots$
49. First term a and common difference d are given below. Find the corresponding A.P.  $a = 5, d = 6$
50. First term a and common difference d are given below. Find the corresponding A.P.  $a = 7, d = -5$
51. First term a and common difference d are given below. Find the corresponding A.P.  $a = \frac{3}{4}, d = \frac{1}{2}$

52. Find the first term and common difference of the Arithmetic Progressions whose  $n^{th}$  terms are given below  $t_n = -3 + 2n$
53. Find the first term and common difference of the Arithmetic Progressions whose  $n^{th}$  terms are given below  $t_n = 4 - 7n$
54. Find the sum of the following 3, 7, 11, . . . . upto 40 terms.
55. Find the sum of the following 102, 97, 92, . . . up to 27 terms.
56. Find the sum of the following  $6 + 13 + 20 + \dots + 97$ .
57. When the positive integers a, b and c are divided by 13 the respective remainders are 9, 7 and 10. Find the remainder when  $a+2b+c$  is divided by 13?
58. Show that 107 is of the form  $4q+3$  for any integer q?
59. Find the sum to infinity of  $9 + 3 + 1 + \dots$
60. Find the sum to infinity of  $21 + 14 + \frac{28}{3} + \dots$
61. Find the 12th term from the last term of the A.P. -2, -4, -6, . . . -100?
62. Which of the following sequences are in G.P? 3, 9, 27, 81, . . .
63. Which of the following sequences are in G.P? 4, 44, 444, 4444, . . .
64. Which of the following sequences are in G.P? 0.5, 0.005, 0.0005, . . .
65. Which of the following sequences are in G.P?  $\frac{1}{3}, \frac{1}{6}, \frac{1}{12}, \dots$
66. Find the sum of the Geometric series  $3 + 6 + 12 + \dots + 1536$ .
67. Which of the following sequences are in G.P?  $1, -5, 25, -125, \dots$
68. Find the rational form of the number  $0.\overline{123}$ .
69. Which of the following sequences are in G.P? 120, 60, 30, 18, . . .
70. Which of the following sequences are in G.P?  $16, 4, 1, \frac{1}{4}, \dots$
71. Write the first three terms of the G.P. whose first term and the common ratio are given below.  
 $a = 6, r = 3$
72. Write the first three terms of the G.P. whose first term and the common ratio are given below.  
 $a = \sqrt{2}, r = \sqrt{2}$ .
73. Write the first three terms of the G.P. whose first term and the common ratio are given below.  
 $a = 1000, r = \frac{2}{5}$
74. In a G.P. 729, 243, 81, . . . find  $t_7$ .
75. Find the  $10^{th}$  term of a G.P. whose  $8^{th}$  term is 768 and the common ratio is 2.
76. Which of the following list of numbers form an AP? IF they form an AP, write the next two terms: (i)  
4, 10, 16, 22, . . .  
(i) 4, 10, 16, 22, . . .
77. Which of the following list of numbers form an AP? IF they form an AP, write the next two terms:  
(ii) 1, -1, -3, -5, . . .
78. Which of the following list of numbers form an AP? If they form an AP, write the next two terms:  
(iii) -2, 2, -2, 2, -2, . . .
79. Find the sum of the following series  $1 + 2 + 3 + \dots + 60$
80. Find the sum of the following series  $3 + 6 + 9 + \dots + 96$
81. Find the sum of the following series  $51 + 52 + 53 + \dots + 92$
82. Find the sum of the following series  $1 + 4 + 9 + 16 + \dots + 225$
83. Find the sum of the following series  $6^2 + 7^2 + 8^2 + \dots + 21^2$
84. Find the sum of the following series  $10^3 + 11^3 + 12^3 + \dots + 20^3$
85. Find the sum of the following series  $1 + 3 + 5 + \dots + 71$
86. If  $1 + 2 + 3 + \dots + k = 325$ , then find  $1^3 + 2^3 + 3^3 + \dots + k^3$ .
87. If  $1^3 + 2^3 + 3^3 + \dots + k^3 = 44100$  then find  $1 + 2 + 3 + \dots + k$ .

## PART - IV

66 x 5 = 330

## ANSWER ALL QUESTION

- 88 . Prove that the product of two consecutive positive integers is divisible by 2.
- 89 . Prove that square of any integer leaves the remainder either 0 or 1 when divided by 4.
- 90 . Use Euclid's Division Algorithm to find the Highest Common Factor (H.C.F) of 340 and 412
- 91 . Use Euclid's Division Algorithm to find the Highest Common Factor (H.C.F) of 867 and 255
- 92 . Use Euclid's Division Algorithm to find the Highest Common Factor (H.C.F) of 10224 and 9648
- 93 . Use Euclid's Division Algorithm to find the Highest Common Factor (H.C.F) of 84, 90 and 120
- 94 . Find the largest number which divides 1230 and 1926 leaving remainder 12 in each case.
- 95 . If d is the Highest Common Factor of 32 and 60, find x and y satisfying  $d = 32x + 60y$ .
- 96 . For what values of natural number n,  $4^n$  can end with the digit 6?
- 97 . Find the H.C.F. of 252525 and 363636.
- 98 . If  $13824 = 2^a \times 3^b$  then find a and b.
- 99 . If  $P_1^{x_1} \times P_2^{x_2} \times P_3^{x_3} \times P_4^{x_4} = 113400$  where  $P_1, P_2, P_3, P_4$  are primes in ascending order and  $x_1, x_2, x_3, x_4$  are integers, find the value of  $P_1, P_2, P_3, P_4$  and  $x_1, x_2, x_3, x_4$ .
- 100 . Find the L.C.M. and H.C.F. of 408 and 170 by applying the fundamental theorem of arithmetic.
- 101 . Find the greatest number consisting of 6 digits which is exactly divisible by 24, 15, 36?
- 102 . Solve  $3x - 2 \equiv 0 \pmod{11}$
- 103 . Find the remainder when  $2^{81}$  is divided by 17.
- 104 . The duration of flight travel from Chennai to London through British Airlines is approximately 11 hours. The airplane begins its journey on Sunday at 23 : 30 hours. If the time at Chennai is four and half hours ahead to that of London's time, find the time at London, when will flight lands at London Airport.
- 105 . Find the next three terms of the following sequence. 8, 24, 72, ....
- 106 . Find the next three terms of the following sequence. 5, 1, -3, ....
- 107 . Find  $a_8$  and  $a_{15}$  whose  $n^{th}$  term is  $a_n = \begin{cases} \frac{n^2-1}{n+3}; & n \text{ is even, } n \in N \\ \frac{n^2}{2n+1}; & n \text{ is odd, } n \in N \end{cases}$
- 108 . If  $a_1 = 1, a_2 = 1$  and  $a_n = 2a_{n-1} + a_{n-2}, n \geq 3, n \in N$ , then find the six terms of the sequence.
- 109 . Find the  $19^{th}$  term of an A.P. -11, -15, -19, ....
- 110 . Which term of an A.P. 16, 11, 6, 1, .... is -54?
- 111 . Find the middle term(s) of an A.P. 9, 15, 21, 27, ....., 183 .
- 112 . If nine times ninth term is equal to the fifteen times fifteenth term, show that six times twenty fourth term is zero.
- 113 . If  $3 + k, 18 - k, 5k + 1$  are in A.P. then find k.
- 114 . Find x, y and z, given that the numbers x, 10, y, 24, z are in A.P.
- 115 . In a theatre, there are 20 seats in the front row and 30 rows were allotted. Each successive row contains two additional seats than its front row. How many seats are there in the last row?
- 116 . The sum of three consecutive terms that are in A.P. is 27 and their product is 288. Find the three terms.
- 117 . 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.
- 118 . In a winter season let us take the temperature of Ooty from Monday to Friday to be in A.P. The sum of temperatures from Monday to Wednesday is  $0^\circ C$  and the sum of the temperatures from Wednesday to Friday is  $18^\circ C$ . Find the temperature on each of the five days.
- 119 . Priya earned Rs.15, 000 in the first month. Thereafter her salary increased by Rs.1500 per year. Her expenses are Rs.13, 000 during the first year and the expenses increases by Rs.900 per year. How long will it take for her to save Rs.20, 000 per month.

120. How many consecutive odd integers beginning with 5 will sum to 480?
121. The sum of first  $n$  terms of a certain series is given as  $2n^2 - 3n$ . Show that the series is an A.P.
122. The  $104^{th}$  term and  $4^{th}$  term of an A.P are 125 and 0. Find the sum of first 35 terms.
123. Find the sum of all odd positive integers less than 450.
124. Find the sum of all natural numbers between 602 and 902 which are not divisible by 4.
125. Raghu wish to buy a laptop. He can buy it by paying Rs.40,000 cash or by giving it in 10 installments as Rs.4800 in the first month, Rs.4750 in the second month, Rs.4700 in the third month and so on. If he pays the money in this fashion, find  
(i) total amount paid in 10 installments.  
(ii) how much extra amount that he has to pay than the cost?
126. 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?
127. 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.  
(i) How many bricks are required for the top most step?  
(ii) How many bricks are required to build the stair case?
128. Find the sum  $\left[ \frac{a-b}{a+b} + \frac{3a-2b}{a+b} + \frac{5a-3b}{a+b} + \dots \text{to } 12 \text{ terms} \right]$
129. Find the sum of first  $n$  terms of the G.P.  $5, -3, \frac{9}{5}, \frac{27}{25}, \dots$
130. Prove that  $n^2 - n$  divisible by 2 for every positive integer  $n$ .
131. Find the sum of first  $n$  terms of the G.P. 256, 64, 16, .....
132. A milk man has 175 litres of cow's milk and 105 litres of buffalow's milk. He wishes to sell the milk by filling the two types of milk in cans of equal capacity. Calculate the following (i) Capacity of a can (ii) Number of cans of cow's milk (iii) Number of cans of buffalow's milk.
133. Find the sum of first six terms of the G.P. 5, 15, 45, .....
134. Find the first term of the G.P. Whose common ratio 5 and whose sum to first 6 terms is 46872.
135. 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?
136. If the first term of an infinite G. P is 8 and its sum to infinity is  $\frac{32}{3}$  then find the common ratio.
137. Two A.P's have the same common difference. The first term of one A.P is 2 and that of the other is 7. Show that the difference between their 10th terms is the same as the difference between their 21st terms, which is the same as the difference between any two corresponding terms?
138. If  $S_1, S_2, S_3, \dots, S_m$  are the sums of  $n$  terms of  $m$  A.P.s whose first terms are  $1, 2, 3, \dots, m$  and whose common differences are  $1, 3, 5, \dots, (2m-1)$  respectively, then show that  
$$S_1 + S_2 + S_3 + \dots + S_m = \frac{1}{2}mn(mn+1).$$
139. A man saved Rs. 16500 in ten years. In each year after the first he saved Rs. 100 more than he did in the preceding year. How much did he save in the first year?
140. find the sum of  $n$  terms of the series  $0.4 + 0.44 + 0.444 + \dots$   $n$  terms
141. Find the sum to  $n$  term of the series  $3 + 33 + 333 + \dots$  to  $n$  terms
142. Find the G.P in which the 2nd term is  $\sqrt{6}$  and the 6th term is  $9\sqrt{6}$ ?
143. Use Euclid's algorithm to find the HCF of 4052 and 12756?
144. Show that any positive odd integer is of the form  $4q+1$  or  $4q+3$ , where  $q$  is some integer?
145. Find the LCM and HCF of 6 and 20 by the prime factorisation method?
146. Prove that  $\sqrt{3}$  is irrational?
147. If  $S^n = (x+y) + (x^2 + xy + y^2) + (x^3 + x^2y + xy^2 + \dots + y^3) + \dots$   $n$  term then prove that  
(i)  $(x-y)$   
$$S_n = \left[ \frac{x^2(x^n-1)}{x-1} - \frac{y^2(y^n-1)}{y-1} \right]$$
148. In a flower bed, there are 23 rose plants in the first row, 21 in the second, 19 in the third, and so on. There are 5 rose plants in the last row. How many rows are there in the flower bed?

- 149 . Find the sum of first 24 terms of the list of numbers whose nth term is given by  $a_n = 3 + 2n$
- 150 . How many terms of the series  $1^3 + 2^3 + 3^3 + \dots$  should be taken to get the sum 14400 ?
- 151 . 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.
- 152 . Rekha has 15 square colour papers of size 10 cm, 11 cm, 12 cm, ..... 24 cm. How much area can be decorated with these colour papers?
- 153 . Find the sum of the series  $(2^3 - 1) + (4^3 - 3^3) + (6^3 - 15^3) + \dots$  to (i) n terms (ii) 8 terms.