18 May 2023 17:23

18th May 2023

NUMBER THEORY

→ 90623 - 95123

2023

Common sense

$(1! + 2! + 3! + 4!) + \ldots + 2024!$

Last digit.

$1 + 2 + 6 + 24 + [120 + 720 + 5040 + \ldots]$

120
720
5040
0

33
0
0
0
0
3

0

Entertainment

Happy

Proud

Happy

Guilty

57000

10 +

Fact X

C.R.T

7

Sums

14 Pairs

28

2

14 (1) Dhamaal

In order to get a minimum match how many forsure Sums you need to pick?

1 →
2 →
3 →

$A_1 A_2$
$B_1 B_2$
$C_1 C_2$
$D_1 D_2$

$\left(\frac{\text{Total}}{2} + 1\right)$

14 + 1

$7^{8^5} = (7^8)^5$

No

Yes

$2^{3^2} > (2^3)^2$

$2^{2^2} = (2^2)^2$

2^9

$a^b = ab$

a^9

$3^3 \neq 3 \cdot 3$

$2^2 = 2 \cdot 2$

15% ↑ 55×1.15

20% ↑

70 20% ↓

70×1.2

$70 \times (1-0.20) = 70 \times 0.8$

50 35% ↑ 50×1.35

200 → 99% ↓ $(1-0.99)$

$200 \times (0.01)$

100 $100 \times (1-0.0001375)$

~~0.01375%~~ Rise

Fall

90623

95723

$100-0.5 = 99.5$

$100 \to 1$ newvalue ??

0.5 0.5% ↑

01% $100 \times (1-0.01)$

05% $(1-0.05)$

$100 \times (1-0.05)$ → 5%

$100 \times (1-0.005)$ → 0.5%

$100 \times (1-0.5)$ 50%

$100 \times (1+0.005)$

12% $(1-0.12)$

10% $(1-0.10)$

Netflix

Prime

PDF ..

Mathematics

1 When the natural numbers 1, 2, 3, …, 500 are written, then the digit 3 is used n times in this way. The value of n is :
(a) 100 (b) 200
(c) 300 (d) 280

2 In how many ways can 1146600 be written as the product of two factors?
(a) 100 (b) 108
(c) 216 (d) 273

3 How many natural numbers upto 990 are divisible by 5 & 9 both, but not by 7?
(a) 18 (b) 19
(c) 22 (d) none of a, b, c

4 The number of solution of $|x| + |y| \le 0$, for $(x, y) \in R$, is :
(a) 0 (b) 1
(c) 2 (d) infinitely many

5 The remainder when 2^{39} is divided by 39 is :
(a) 0 (b) 2
(c) 8 (d) 1

6 The unit digit of the following expression
$(1!)^{99} + (2!)^{98} + (3!)^{97} + (4!)^{96} + \ldots (99!)^1$ is :
(a) 1 (b) 3
(c) 7 (d) 6

7 The sum of all four digit numbers which are divisible by 7 is :
(a) 7071071 (b) 7^7
(c) 7107073 (d) 10019996

8 When the numerator of a positive fraction is increased by 2 and the denominator of the same fraction is multiplied by 2, the new fraction can be reduced to $\frac{1}{2}$ to its lowest term. The sum of the numerator and denominator of the original fraction can be :
(a) 13
(b) 45
(c) 16
(d) any even integer greater than 3

9 In the given expression $pq = p - q + 9$; q is a fraction and p is any positive integer. The value of p that is inadmissible is :
(a) 5 (b) 4
(c) 8 (d) 2

9 In the given expression $pq = p - q + 9$; q is a fraction and p is any positive integer. The value of p that is inadmissible is :

(a) 5 (b) 4

(c) 8 (d) 2

10 The digits of a three digit number are in G.P. When the digits of this number are reversed and this resultant number is subtracted from the original number the difference comes out to be 792. The actual number is :

(a) 842 (b) 961

(c) 421 (d) 931

11 How many even integers n; $13 \le n \le 313$ are of the form $3k + 4$, where k is any natural number?

(a) 101 (b) 51

(c) 50 (d) none of these

12 In the above question the number of values of n which are odd :

(a) 10 (b) 51

(c) 32 (d) none of a, b, c

13 If a and b are two odd distinct prime numbers and if $a > b$ then $a^2 - b^2$ can never be divided by :

(a) 13 (b) 11

(c) 17 (d) all of these

14 If $P = (101)^{100}$ and $Q = (100)^{101}$, then the correct relation is

(a) $P > Q$ (b) $P < Q$

(c) $P = Q$ (d) $P = \frac{11}{10} Q$

15 If $k^2 - 25$ is an odd integer then which one of the following values gives the even number?

(i) $k^{(2k-1)}$ (ii) $(3k - 3)(2k - 2)$

(iii) $(k + 5)(k - 5)$

(a) None (b) exactly one

(c) all three (d) exactly two

16 $(a + 1)(b - 1) = 625$; $(a \ne b) \in I^+$, then the value of $(a + b)$ is :

(a) $a + b \ge 25$ (b) $a + b \ge 50$

(c) $a + b = 24$ (d) $a + b = 26$

17 If $p + \frac{1}{p} = q$, then for $p > 0$:

(a) $q = 0$ (b) $-2 < q < 2$

(c) $q \geq 2$ (d) none of a, b, c

18 If $a^b = b^a$; $(a \neq b) > 1$, then the value of $(a + b)$ is :

(a) 5 (b) 6

(c) 7 (d) does not exist

19 If $m^n - n^m = (m + n)$; $(m, n) \in$ prime numbers, then what can be said about m and n :

(a) m, n are only even integers

(b) m, n are only odd integers

(c) m is even and n is odd

(d) none of the above

20 There is a unique 3 digit number which is cube of a natural number. If we shift the position of the digits of this number, the new number also becomes the cube of another number. The original number is :

(a) 343 (b) 729

(c) 125 (d) does not exist

21 For $n > 2$ such that $n \in I^+$, the given expression $n^4 - n^2$ is divisible is

(a) 4 (b) 8

(c) 12 (d) all of these

22 If a, b represents two distinct positive integers such that $(aa)^b = abba$ is a valid relation. Then the value of $(a^b \cdot b^a + b^a \cdot a^b)$ is :

(a) 4 (b) 6

(c) 13 (d) none of these

23 At our training institute we have p-1, p-2, p-3 and p-4 processors in the ratio of $\frac{1}{6}, \frac{1}{5}, \frac{1}{3}$ and $\frac{1}{2}$, respectively. Minimum number of processors in our institute is :

(a) 16 (b) 30
(c) 32 (d) 36

24 $(392)^n - (392)^{n-1}$ is not divisible by :

(a) 56 (b) 23 (c) 13 (d) 7

25 Mr. Chaalu while travelling by Ferry Queen has travelled the distance one kilometre more than the fare he paid per km. Initially, he had total amount of ₹ 350 in his wallet. Now he is only left with the minimum sum of (if all the distance travelled by him is in integers) :

(a) ₹ 26 (b) ₹ 8
(c) ₹ 19 (d) can't be determined

26 A person starts typing the numbers from 1 to 1999. He press the keys total 'n' number of times. The value of n is

(a) 6889 (b) 1000
(c) 2888 (d) none of these

27 The remainder when $(20)^{23}$ is divided by 17 is :

(a) 11 (b) 3
(c) 6 (d) can't be determined

28 Let p be a prime number such that $3 < p < 50$, then $p^2 - 1$ is :

(a) always divisible by 8 (b) always divisible by 24
(c) always divisible by 12 (d) all of a, b, c

29 If p be a prime number, then $p^2 + 1$ can not have its unit digit equal to

(a) 3 (b) 9
(c) 7 (d) all of these

30 The number of numbers from 1 to 200 which are divisible by neither 3 nor 7 is :

(a) 115 (b) 106
(c) 103 (d) less than 100

31 p is a prime number and $(p^2 + 3)$ is also a prime number. Find the number of values of p satisfying the given criterias.

(a) 3 (b) 2
(c) 1 (d) can' say

32 At a bangle shop, when the shopkeeper tries to displays all the bangles in the form of a square, he is left with 38 bangles that cannot be accommodated in the square arrangement. If he wants to increase the size of the square by one unit, he need to by 25 more bangles to complete the square arrangement.
However, when the arranges the bangles he keep all the bangles adjacent to each other without any overlapping. What is the actual number of bangles in his shop?
(a) 1690 (b) 999
(c) 538 (d) can't be determined

33 If a and b are two integers which are multiples of 5, which of the following is not necessarily true ?
(a) a – b is divisible by 5 (b) a + b is divisible by 10
(c) $a^2 - b^2$ is divisible by 5 (d) none of the above

34 What are the values of the digits a and b, respectively, in the number a 5523879 b, if it is divisible by both a and b :
(a) (8, 6) (b) (7, 2) (c) (8, 1) (d) not unique

35 A six digit number abcabc such that a, b, c ∈ N, then which is the most correct statement :
(a) It is divisible by 91 (b) It can be divided by 143
(c) It is divisible by 6 (d) Only a and b are correct

36 Two numbers a and b are such that one is odd and the other is even. Which statement is necessarily true?
(a) a^{2b} is even
(b) (a + b) is even
(c) $a^b \times b^a$ is even
(d) $a^2 - b^2$ is even

37 A gardener plants his garden with 5550 trees and arranges them so that there is one plant more per row as there is the number of rows, then number of trees in a row is :
(a) 56 (b) 74 (c) 76 (d) 75

38 The value of 'a' when $3^a = 9^b$ and $4^{(a+b+2)b} = 16^{ab}$ is :
(a) 2 (b) 1 (c) 4 (d) none of these

39 The number of two digit prime numbers which remain prime even on inverting the position of its digits is :
(a) 4 (b) 5 (c) 9 (d) 10

40 Halfway through the journey from Delhi to Lahore Atal Bihari begins to look out of the window of the Samjhauta Express and continues looking out until the distance which is yet to be covered becomes half of the distance that he has already covered. At this point of time how much distance is he yet to cover?
(a) $\frac{2}{2}$ (b) $\frac{1}{4}$ (c) $\frac{1}{3}$ (d) $\frac{1}{6}$

41 At the end of 1996, I found that the height of my son was 90 cm. But, at the end of 2003, I found that the height of my son was 1/9th more than it was at the end of 2002. However, over the years I have observed that every year his height is increasing by equal amount and it is expected to increase at the same way. Can you find the height of my son at the end of 2008?
(a) 360 cm (b) 450 cm (c) 250 cm (d) 270 cm

42 Chris widener had a servant who was determined to be paid $ 250, a wrist watch and a ration for whole year? But after 9 months Widener migrated to India and he had just paid him $ 270 and the ration for the 9 months. What is the cost of the wrist watch?
(a) $ 20 (b) $ 120
(c) $ 110 (d) data insufficient

43 The sum of the squares of a two digit number is 10. If we add 18 to this number we get another number consisting of the same digits written in reverse order. The original number is :
(a) 10 (b) 46
(c) 13 (d) none of (a), (b), (c)

44 A two digit number ab is added to another number ba, which is obtained by reversing the digits then we get a three digit number. Thus a + b equals to :
(a) at least 18 (b) 2ab
(c) 2 (a + b) (d) $(a + b) \geq 10$

45 At Wharton School every student is awarded with the grades A, B or C only. 57.1428571428 ...% students obtained 'A' grade while 26.4444...% students obtained 'B' grade. If there are less than 3500 students then the maximum number of students obtained the 'C' grade while no one is declared fail.
(a) 517 (b) 533
(c) 428 (d) can't be determined

46 Which one of the following is wrong?
(a) The sum of two even numbers, each raised to an odd power is even
(b) The sum of two odd numbers, each raised to an odd power is even
(c) The remainder when dividing an even number by an odd number is even or zero
(d) The remainder when dividing an odd number by an even number is always odd

47 The sum of the expression 551 + 552 + 553 + ... + 560 is :
(a) 3450 (b) 5555 (c) 555 (d) 6060

48 Find x, if $x^2 + x = x^3 - x$:
(a) 1 (b) 2 (c) 3 (d) 4

49 In the above problem the number of values of x is :
(a) 1 (b) 2 (c) 3 (d) 4

50 How many 3s you have to write down while writing the numbers from 3301 to 3401?
(a) 220 (b) 218
(c) 198 (d) none of these

51 $(2^{19} + 1)$ is divisible by :
(a) 3 (b) 4 (c) 6 (d) 3 & 6 both

52 Which one of the following is a prime number : 3123, 219, 573, 467 ?
(a) 219 (b) 467 (c) 573 (d) 3123

53 Which is not a prime number?
(a) 97 (b) 1001 (c) 127 (d) 101

54 What is the least number which must be multiplied to 5400 to get a perfect square?
(a) 2 (b) 3 (c) 6 (d) 10

55 For every p, q positive integers at x = 0 or x = 1, the valid

52 Which one of the following is a prime number : 3123, 219, 573, 467 ?
(a) 219 (b) 467 (c) 573 (d) 3123

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(a) 97 (b) 1001 (c) 127 (d) 101

54 What is the least number which must be multiplied to 5400 to get a perfect square?
(a) 2 (b) 3 (c) 6 (d) 10

55 For every p, q positive integers at x = 0 or x = 1, the valid relation can be :
(a) $p^x q^{(1-x)} = qx + p(1-x)$
(b) $p^x q^{(1-x)} = px + q(1-x)$
(c) $p^x q^{(1-x)} = p^{(1-x)}qx$
(d) either (b) or (c)

56 How many times does the sum of 3780 and 2835 contains their difference?
(a) 4 (b) 5 (c) 6 (d) 7

57 The expression $(x + y)^{-1} . (x^{-1} + y^{-1})$ is equivalent to :
(a) 1 (b) $(xy)^{-1}$
(c) x^y (d) $xy^{-1} + x^{-1}y$

58 For any odd prime number p there exists a positive integer k where $1 < k < p$, such that the remainder of $\frac{k^2}{p}$ is 1. Then the number of positive integers k is :
(a) 0 (b) 1
(c) p – 1 (d) can't be determined

59 At Lucknow Public School $\frac{1}{9}$ students were absent in an exam and only $\frac{19}{24}$ of those who appeared for the exam passed it. Now we know that 500 students failed in the exam. Total number of students registered for the exam is :
(a) 2000 (b) 2400
(c) 2700 (d) 3000

60 If, $0 < m < n < 1$. Then the expression $km < kn$ is true if :
(a) $k < 0$ (b) $k > 0$
(c) $k = 1$ only (d) all of a, b, c

61 If $a = 0.1818181818 \ldots$ and $b = 0.3030030003 \ldots$ then $(a + b)$ is :
(a) a rational no. (b) a perfect number
(c) an irrational no. (d) both (b) and (c)

62 Half life of a substance is defined as the time period in which a substance becomes just half of it. If it is known that the half life of a substance "DECAY" is 1122 years, then after 4488 years, 80 gm of "DECAY" becomes.
(a) 4 gm (b) 20 gm
(c) 5 gm (d) none of these

63 In the examination of CBSE, a candidate must get $\frac{2}{5}$th marks to pass, out of total marks. Vinod appeared in the same exam and got 210 marks and still failed it by 40 marks. The maximum marks which a candidate can get is :
(a) 500 (b) 625
(c) 390 (d) can't be determined

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(c) 390 (d) can't be determined

64 Sunny gets $3\frac{1}{2}$ times as many marks in 'QA' as he gets in 'English'. If his total combined marks in both the papers is 90. His marks in 'QA' is :

(a) 50 (b) 60
(c) 70 (d) none of these

65 I know a two digit number, but when its digits swap their places we get another two digit number. But, when these two digit numbers are added, it amounts to 99. Further if I just consider the difference between these numbers, it comes out to be 45. What is the number which I know?

(a) 27 (b) 38
(c) 72 (d) data insufficient

66 Which of the following is/are correct?

(i) $a^{x+y} = ax + ay$ (ii) $(a^x)^y = ya^x$

(iii) $a\,(x.y) = ax.ay$ (iv) $\frac{a^x}{a^y} = a^{x-y}$

(a) (i) only
(b) (ii) & (iii) only
(c) (iv) only
(d) none of the above

67 In a Mock CAT at Lamamia Mobile App, a student was asked to multiply a two digit number with another two digit number. However, while doing the multiplication he reversed the digits (i.e., tens to unit and unit to tens) of each number, still his answer was correct. Such a pair of numbers is :

(a) 16, 32 (b) 28, 42
(c) 31, 23 (d) 12, 63

68 The relation $\frac{p}{(p+1)} > 1$ is valid when :

(a) $p \geq -1$ (b) $p > -1$
(c) $p < -1$ (d) $-1 < p < 0$

69 A number when divided by 14 leaves a remainder of 8, but when the same number is divided by 7, it will leave the remainder :

(a) 3 (b) 2
(c) 1 (d) can't be determined

70 The unit digit of $(316)^{3^{4n}} + 1$ is :

(a) 4 (b) 5 (c) 1 (d) 7

71 The sum of two numbers is 18. The greatest product of these two numbers can be :

(a) 17 (b) 81
(c) 80 (d) can't be determined

72 Largest four digit number which when divided by 15 leaves a remainder of 12 and if the same number is divided by 8 it leaves the remainder 5. Such a greatest possible number is :

(a) 9963 (b) 9957

(c) 9945 (d) 9999

73 In a mobileshop $\frac{7}{12}$ mobiles are imported and rest are manufactured in India. Further $\frac{1}{5}$th Indian mobiles are coloured while $\frac{5}{7}$th imported mobiles are black and white.

If there are total 150 coloured mobiles in his shop, then total number of mobile phones in his shop is :

(a) 500 (b) 600

(c) 800 (d) data insufficient

74 In a call centre at New Delhi, it is observed that it gets a call at an interval of every 10 minutes from California, at every 12 minutes from Texas, at the interval of 20 minutes from Washington DC and after every 25 minutes it gets the call from London. If in the early morning at 5 : 00 a.m. it has recieved the calls simultaneously from all the four destinations, then at what time will it receive the calls simultaneously from all the places on the same day?

(a) 10 : 00 a.m. (b) 3 : 00 a.m.

(c) 5 : 00 p.m. (d) both (a) and (b)

75 The H.C.F. and L.C.M. of 2^4, 8^2, 16^2, 20^3 are :

(a) 2^3; 32000 (b) 2^4; 32000

(c) 2^4; 25600 (d) 2^2; 3200

76 When we divide 15192327 by 99 the remainder will be :

(a) 98 (b) 84

(c) 30 (d) none of these

77 The number of numbers lying between 1 and 200 which are divisible by either of 2, 3 or 5 is :

(a) 146 (b) 145

(c) 158 (d) none of these

78 If xAy means x + y, x S y means x − y, xMy means x × y and xDy means x ÷ y. Then the value of 4D2S3M6A12 is :

(a) − 4 (b) 18

(c) $\frac{-47}{4}$ (d) none of these

79 The L.C.M. of two numbers is 1020 and their H.C.F. is 34, the possible pair of numbers is :

(a) 255, 34 (b) 102, 204

(c) 204, 170 (d) none of these

80 The sum of 100 terms of the series

$1 - 3 + 5 - 7 + 9 - 11 + 13 - 15 + \ldots$ is :

(a) 100 (b) 50

(c) 200 (d) none of these

81 The value of $\left(1-\frac{1}{2}\right)\left(1-\frac{1}{3}\right)\left(1-\frac{1}{4}\right)\left(1-\frac{1}{5}\right)\ldots\left(1-\frac{1}{n}\right)$ is :

(a) 1 (b) $\left(1-\frac{1}{n}\right)^n$

(c) $\frac{1}{n}$ (d) can't be determined

82 The minimum and maximum possible values of $\frac{x}{y}$, where $2 \le x \le 8$ and $16 \le y \le 32$, respectively, are :

(a) $\frac{1}{8}, \frac{1}{4}$ (b) $\frac{1}{16}, \frac{1}{2}$ (c) 2, 16 (d) not unique

83 A rectangular floor in my office has its area equal to 56 m^2. The minimum number of tiles required, if all the tiles are in square shape is :

(a) 15

(b) 9

(c) 14

(d) can't be determined

84 A string of length 221 metre is cut into two parts such that one part is $\frac{9}{4}$th as long as the rest of the string, then the difference between the larger piece and the shorter piece is

(a) 58 m (b) 53 m

(c) 85 m (d) none of these

85 Total number of prime numbers between 1 and 200 is :

(a) 34 (b) 46

(c) 56 (d) 71

86 What is the remainder of $\frac{6^{36}}{215}$?

(a) 0 (b) 1

(c) 2 (d) none of these

87 The remainder when $(12^{13} + 23^{13})$ is divided by 11 :

(a) 0 (b) 1

(c) 2 (d) none of these

88 The four digit smallest positive number which when divided by 4, 5, 6 or 7, it always leaves the remainder as 3 :

(a) 1000 (b) 1257

(c) 1263 (d) 1683

89 Which one of the following is correct?

(i) $13^{31} > 31^{13}$ (ii) $10^{100} < 100^{10}$

(iii) $2^{32} < 32^2$

(a) (i) and (ii) (b) (i) and (iii)

(c) (ii) and (iii) (d) (i) only

90 If $n_1, n_2, n_3, \ldots, n_k$ are such that out of these k elements $\frac{k}{2}$ elements are even and rest are odd numbers. Which is necessarily even?

(a) $(n_1 + 2n_2 + 3n_3 + 4n_4 + \ldots + k.n_k)$

(b) $n_1 . n_2 . n_3 \ldots n_{\left(\frac{k}{2}+1\right)}$

(c) $(n_1 + n_3 + n_5 + n_7 + \ldots + n_{k-1})$

(d) $n_2 + n_4 + n_6 + \ldots + n_k$

91 The H.C.F. of two numbers is 43 and their sum is 430. Total number of distinct pairs of two such numbers is :

(a) 5 (b) 2
(c) 6 (d) data insufficient

92 $2^{73} - 2^{72} - 2^{71}$ is same as :

(a) 2^{72} (b) 2^{71}
(c) 2^{70} (d) none of these

93 $N = 55^3 + 17^3 - 72^3$, then N is divisible by :

(a) 3 & 17 (b) 40 & 11
(c) 11 & 15 (d) all of these

94 abcde is a five digit number when multiplied by 13 it gives a number, which is purely formed by the digit 9. Then the value of a + b + c + d + e is :

(a) divisible by 8 (b) equal to 27
(c) divisible by 11 (d) all of these

95 The sum of 3 consecutive even numbers is always divisible by :

(a) 24 (b) 48
(c) 10 (d) none of these

96 The remainder obtained when $23^3 + 31^3$ is divided by 54

(a) 0 (b) 1
(c) 3 (d) can't be determined

97 The largest possible number by which the product of any five consecutive natural numbers can be divided :

(a) 120 (b) 160
(c) 100 (d) none of these

98 If $x^2 + y^2 = 25$ and $xy = 12$, then the value of $x^{-1} - y^{-1}$ is :

(a) $\frac{12}{5}$ (b) $\frac{7}{12}$
(c) $\frac{-7}{12}$ (d) both (b) and (c)

99 The remainder when $75^{75^{75}}$ is divided by 37 :

(a) 0 (b) 1
(c) 5 (d) 7

100 Let p be a prime number strictly greater than 3. Then $p^2 + 17$ will leave a remainder k, when divided by 12, the value of k is :

(a) 1 (b) 5
(c) 6 (d) none of these

1 In Mahabalipuram Temple there are some magical bells which toll 18 times in a day, simulateneously. But every bell tolls at a different interval of time, but not in fraction of minutes. The maximum number of bells in the temple can be :

(a) 18 (b) 10
(c) 24 (d) 6

2 Three numbers p, q, r are such that $p^q = q^r$, where $p, q, r > 1$ then the correct relation between q and r is :

(a) $\frac{q}{r} = 1$ (b) $q < r$
(c) $q > r$ (d) indeterminable

3 $p^q - q^r = (p+q)^{r-q}$, where $1 < q < r < p < 10$, then the value of $p + q + r$ is :

(a) 31 (b) 21
(c) 15 (d) 12

4 If $a^2 + b^2 + c^2 + d^2 = 1$, then the maximum value of $a.b.c.d$ is :

(a) 1 (b) 2
(c) $\frac{1}{16}$ (d) data insufficient

5 The value of n in the expression $n^2 - 2(n!) + n = 0$ for every $n \in N$ is :

(a) 6 (b) 1
(c) 3 (d) both (b) and (c) are true

6 If m, n, p are in A.P. and $m^n = p^m = n! + p; m, n, p \in N$, then the value of $m.n.p$ is, where $2 < m, n < p < 10$:

(a) 136 (b) 72
(c) 162 (d) none of these

7 The value of $(n!)^n$ if $n + (n-1) + (n-2) = n(n-1)(n-2)$, where $n^3 > 9$, a positive number :

(a) 27 (b) 216 (c) 256 (d) 331776

8 If $(n)^3 - (n)^2 - n = n$, then the number of values of n that satisfy the given relation is :

(a) 1 (b) 2
(c) 3 (d) can't be determined

9 If $k = (k_1, k_2, k_3, \ldots, k_n) \in I$ and
$k_1k_2k_3 + k_2k_3k_4 + k_3k_4k_5 + \ldots + k_{(n-2)}\,k_{(n-1)}\,k_n = 0$
Then minimum how many entities *i.e.* $k_i\,(i = 1, 2, 3 \ldots)$ must be zero? If there are total 12 terms in the above expression :

(a) 3 (b) 4
(c) 6 (d) ${}^nC_3$

10 The given relation $n^{(n-1)} + n^{(n+1)} = (n^2+1)^2 - (n^2+1)$ is valid for every $n \in N$ if n equals to :

(a) 3
(b) 5
(c) 1
(d) both (a) and (c)

11 The smallest possible number that can be expressed as the sum of cube of two natural numbers in two different combinations.

(a) 1000 (b) 1728
(c) 1729 (d) none of these

12 $8^6 - 5^6$ is individually divisible by :

(a) 91 (b) 49
(c) 129 (d) all of these

13 Total number of factors of a number is 24 and the sum of its 3 prime factors out of four is 25. The product of all 4 prime factors of this number is 1365. Then such a greatest possible number can be :

(a) 17745 (b) 28561
(c) 4095 (d) can't be determined

14 If p be any odd natural number greater than 3, then which digit will never appear as the last digit in the product of $(p^2 - 1)(p^2 + 1)$?

(a) 9 and 7 (b) 5 and 3
(c) 1 and 5 (d) all of these

Directions (for Q. Nos. 15 to 18) *The relation* $R(m, n)$ *can be defined for every positive integer* m, n *as* $R(m, n) = m \times (m+1) \times (m+2) \times (m+3) \times \ldots (m+n)$ *and the relation* $R(1, n)$ *is equal to* $n!$ *or can be written as* $R(n)$.

15 The value of $\frac{R(135)}{R(100, 35)}$ is :

(a) 99! (b) 100!
(c) 270 (d) none of these

16 The value of $R(17) . R(19, 62)$ is :

(a) $\frac{81!}{18}$ (b) $(81!) \times 18$
(c) 36! (d) $17 \times (19 + 62)$

17 The L.C.M. of $R(2, 995)$ and $R(996, 1)$ is :

(a) 1994
(b) 996!
(c) 997!
(d) can't be determined

18 The H.C.F. of $R(139, 2)$ and $R(141)$:

(a) 141 (b) 2743860
(c) 32,16,839 (d) 19599

19 A six digit number of the form $abcabc$ is written where $a, b, c \in I^+$, then which statement is true about this number ?

(a) it is always divisible by 7 and 11
(b) it is divisible by 143
(c) it is divisible by 1001
(d) all of (a), (b) and (c) are correct

20 How many natural numbers upto 1155 are divisible by either 5 or 7 but not by 11?

(a) 105 (b) 330
(c) 333 (d) none of these

21 The number of solution set (x, y) for the given equation $4x + 7y = 3$, such that $-99 \le x \le 99$ and $-100 \le y \le 100$, where $x, y \in I$:

(a) 14 (b) 29
(c) 15 (d) 30

22 When any two natural numbers N_1 and N_2, such that $N_2 = N_1 + 2$, are multiplied with each other, then which digit appears least time as a unit digit if $N_2 \le 1000$?

(a) 0 (b) 9
(c) 4 (d) both (a) and (c)

23 In the above problem (no. 22), if all such unit digits will be added the maximum sum can be :

(a) 4491 (b) 4500
(c) 3609 (d) 5400

24 A diamond expert cuts a huge cubical diamond into 960 identical diamond pieces in minimum number of 'n' cuts. If he wants to maximize the number of identical diamond pieces making same number of n cuts to it, so the maximum number of such diamond pieces are :

(a) 1000 (b) 1331
(c) 1200 (d) none of (a), (b), (c)

25 The sum of all the factors of 45000 which are exactly the multiples of 10 is :

(a) 152295 (b) 141960
(c) 600 (d) none of these

26 The unit digit of the expression

$$(1!)^{1!} + (2!)^{2!} + (3!)^{3!} + \ldots + (100!)^{100!} :$$

(a) 0 (b) 1 (c) 2 (d) 7

27 When $(1!)^{1!} + (2!)^{2!} + (3!)^{3!} + \ldots + (100!)^{100!}$ is divided by 5, the remainder obtained is :

(a) 2 (b) 0
(c) 4 (d) none of these

28 The digit at the tens place in the sum of the expression :

$(1!) + (2!)^2 + (3!)^3 + (4!)^4 + (5!)^5 + \ldots (111!)^{111}$ is :

(a) 0 (b) 1 (c) 8 (d) 9

29 A number is divided strictly into two unequal parts such that the difference of the squares of the two parts equals 50 times the difference between the two parts. The number is :

(a) 100
(b) 250
(c) 50
(d) can't be determined

30 A positive number p is such that $(p + 4)$ is divisible by 7. N being a smallest possible number larger than first prime number, which can make $(p + N^2)$ divisible by 7. The value of N is :

(a) 3 (b) 9
(c) 5 (d) 7

31 Anjali and Bhagwat fired 45 shots each. Total 66 bullets hit the target and the remaining bullets missed it. How many times does the Anjali hit the target if it is known that the number of hits per one miss shown by the Anjali is twice that of Bhagwat?

(a) 30 (b) 36 (c) 40 (d) 35

32 The remainder when n is divided by 3 is 1 and the remainder when $(n + 1)$ is divided by 2 is 1. The remainder when $(n - 1)$ is divided by 6 is :

(a) 2 (b) 3
(c) 5 (d) none of (a), (b), (c)

33 The expression $2222^{7777} + 7777^{2222}$ is divisible by :

(a) 99 (b) 101
(c) 13 (d) any two of these

34 The only library of a business school has total 91 books that are shared among all the students in such a way that every two students share a book on Organizational Behaviour, every three students share a book on Financial Management and every four students share a book on Operations Research. The number of students in the school is:

(a) 81 (b) 84
(c) 48 (d) can't be determined

35 After two successive raises the salary of an employee becomes equal to 15/8 times of his initial salary. In terms of percentage raise, his first raise was half of the second raise, then by what percentage his salary was raised for the second time?

(a) 82.5 %
(b) 60 %
(c) 50 %
(d) can't be determined

36 The number of digits in the product of $5^{72} \times 8^{27}$ is :

(a) 77 (b) 75
(c) 99 (d) none of (a), (b), (c)

37 A student of 5th standard started writing down the counting numbers as 1, 2, 3, 4, ... and then he added all those numbers and got the result 500. But when I checked the result I have found that he had missed a number. What is the missing number?

(a) 25 (b) 32 (c) 30 (d) 28

38 A stairway of 20 ft height is such that each step accounts for half a foot upward and one foot forward. What distance will an ant travel if it starts from ground level to reach the top of the stairway?

(a) 59 (b) 60
(c) 58 (d) none of these

39 Paltry and Sundry, the two bird hunters went to woods. Paltry fires 5 shots when Sundry fires 7 shots. But Paltry kills 2 out of 5 while Sundry kills 3 out of 7. When Sundry has missed 32 shots, then how many birds has Paltry killed?

(a) 25 (b) 24 (c) 16 (d) 12

40 A cigarette pack is $\frac{5}{6}$th full of its capacity, then 5 cigarettes were taken out and 2 another cigarettes were put inside the pack. Now it is $\frac{4}{5}$ full. How many cigarettes can this pack contain when it is full?

(a) 90 (b) 80
(c) 72 (d) can't be determined

41 Around a square table chairs are arranged in a sequence starting from one corner, numbered as 1, 2, 3, ... etc. The chair number 2 is opposite the chair number 14. How many chairs are there in all?

(a) 10 (b) 20
(c) 14 (d) can't be determined

42 The value of y for which the expression $p = \frac{1}{(|y-1|-3)}$ becomes undefined :

(a) {2, 8}
(b) {– 2, 4}
(c) {– 1, 3}
(d) {1, 2}

43 What is the sum of the following series?

$$\frac{1}{1\times 2}+\frac{1}{2\times 3}+\frac{1}{3\times 4}+\ldots+\frac{1}{100\times 101}$$

(a) $\frac{100}{101}$ (b) $\frac{1}{101}$
(c) $\frac{101}{100}$ (d) 101!

44 If Rupert has 4 more coins than Laxmi, Laxmi has 1 more coin than Bill and Bill has 1 more coin than Hawkins. Finally Hawkins has 4 more coins than Ajim. Then minimum number of coins that must be transfered if all of them wish to have an equal number of coins :

(a) 5 (b) 6
(c) 7 (d) none of these

45 If $f(x)=\frac{7}{x^7}+\frac{5}{x^5}+\frac{3}{x^3}+1+3x^3+5x^5+7x^7$. Now, if the value of $f(2)$ is 1081.58 then the value of $f\left(\frac{1}{2}\right)$ is :

(a) 540.79 (b) $\frac{1}{1081.58}$
(c) 1081.58 (d) 367.42

46 The last digit of the expression
$4 \times 9^2 \times 4^3 \times 9^4 \times 4^5 \times 9^6 \times \ldots \times 4^{99} \times 9^{100}$ is :

(a) 4 (b) 6
(c) 9 (d) 1

47 The last digit of the expression
$4 + 9^2 + 4^3 + 9^4 + 4^5 + 9^6 + \ldots + 4^{99} + 9^{100}$ is :

(a) 0 (b) 3
(c) 5 (d) none of these

48 p, q, r are the decimal numbers (*e.g.*, 5.8) and $\lfloor x \rfloor$ means the greatest integer less than or equal to x and $A = \lfloor p + q + r \rfloor$ and $B = \lfloor p \rfloor + \lfloor q \rfloor + \lfloor r \rfloor$, then the maximum value of $A - B$ is :

(a) 0 (b) 2
(c) 2.99 (d) none of these

49 If p, q, r be integers such that $p^2 = q^2 . r$ then :

(a) p is an even number (b) q is an even number
(c) r is an even number (d) r is a perfect square

50 The sum of n positive integers $k_1, k_2, k_3, \ldots, k_n$ is an even number, then number of odd integers involve in the expression is :

(a) odd (b) even
(c) $(n - 1)$ (d) none of these

51 If $1 + 2 + 3 + \ldots + k = N^2$ and N is less than 100 then the value of k can be, where $N \in$ Natural Numbers :

(a) 8 (b) 1 and 49
(c) 8 and 36 (d) both (a) and (b)

52 If a and b be two co-prime numbers, then $(a + b)$ and $(a - b)$:

(a) are always co-primes
(b) have atleast one common factor other than 1
(c) if $(a + b)$ or $(a - b)$ is not a prime number, then their HCF is 2
(d) none of the above

53 The G.M. of two positive numbers is 35 and the A.M. of the same number is $43\frac{3}{4}$, then the greater of these numbers is :

(a) 28 (b) 30
(c) 70 (d) 35

54 When a number is divided by 1, 2, 3, 4, 5, ..., $(n - 1)$, n individually it leaves 0, 1, 2, 3, 4, ..., $(n - 2)$, $(n - 1)$ respective remainders, then this number can be :

(i) $n!$
(ii) $(n! - 1)$
(iii) [(L.C.M. of 1, 2, 3, ..., n) $- 1$]

(a) both (i) and (ii) (b) both (ii) and (iii)
(c) only (iii) (d) only (ii)

55 Four consecutive even numbers are such that 3 times of the first number is equal to twice the third number. The sum of all the four numbers is :

(a) 20 (b) 40
(c) 44 (d) can't be determined

56 In the morning batch at Lamamia we have observed that when five-five students took seat on a bench, 4 students remained unseated. But when eleven students took seat per bench, 4 benches remained vaccant. The number of students in our morning batch were?

(a) 55 (b) 48
(c) 26 (d) none of these

57 When $\left(\frac{m}{n}\right) = 25\left(\frac{n}{m}\right)$, then the value of $m : n$ is :

(a) 1/25 (b) 5
(c) 1/5 (d) 2.5

58 Which one of the following is the greatest one?

(a) 3^{3322} (b) 33^{322}
(c) 333^{22} (d) 22^{333}

59 The product of any two integers is 25, then the minimum possible sum is :

(a) 5 (b) 10
(c) 26 (d) none of these

60 If $4 \le p \le 5$ and $-10 \le q \le -9$, then the least value is given by the expression :

(a) $p.q$ (b) pq^6
(c) p^6q (d) $(pq)^5$

61 The remainder obtained when $1! + 2! + 3! + \ldots + 77!$ is divided by 7 is :

(a) 0 (b) 5
(c) 4 (d) can't be determined

62 If $(a, n) \in I^+$ and $(a, n) > 1$, then the remainder when $[(a+1)^{2n-1} - 1]$ is divided by $(a-1)$ is :

(a) 1 (b) $a-1$
(c) n (d) none of these

63 A typist starts to type the serial numbers of candidates in a list, upto 500. Minimum how many times does he needs to press the keys of numerals only?

(a) 1389 (b) less than 1000
(c) 1392 (d) can't say

64 If a, b, c, d, e, f are sequentially the terms of an A.P. belong to set $\{1, 2, 3, \ldots, 9\}$ where all the terms $a, b, c, \ldots$ are in increasing order, then the last digit of $a^b \times c^d \times e^f$ is :

(a) 5
(b) 2
(c) 7
(d) either of (a) and (b)

65 Total number of factors of a greatest possible number which when divides 1313 and 621, the respective remainders obtained are 17 and 9 :

(a) 9 (b) 10
(c) 11 (d) can't be determined

66 The set of values of x for which $|(x-5)x| > 0$ is :

(a) all real numbers (b) $R - \{0\}$
(c) $R - \{0, 5\}$ (d) $R - (0, 5)$

67 The sum of four prime numbers is 204. Each such number is a two digit number. The sum of first number P_1 and last number p_4 is same as the sum of second number p_2 and third number p_3. The average of all the four numbers is not a prime number, but the product of two prime numbers. Further, $p_3 - p_2 = 2(p_2 - p_1) = 2(p_4 - p_3)$, Out of the four prime numbers (p_1, p_2, p_3, p_4) one of them is:

(a) 23 (b) 89
(c) 71 (d) can't be determined

68 Jai Bhan wanted to sell his mobilephone consists of the handset and a simcard, but Praveen who intended to buy it, asked the price of simcard only? Jai Bhan told him that the price of the simcard is ₹ 4000 less than the price of the handset but if he wished to buy the complete set he had to pay ₹ 5000 only. The price of the handset was :

(a) 5500 (b) 2500
(c) 4500 (d) can't be determined

69 If $|x + y| = |x - y|$ then the number of ordered pairs of (x, y) which satisfy the given condition is :

(a) 1 (b) 4
(c) infinite (d) none of these

70 If $292k + 7 = 23l$, where $(k, l) \in I$, then the value of l is :

(a) 23 (b) 31
(c) does not exist (d) none of these

71 If $ab + 4 = cd$ and $ba + 40 = dc$, where ab, cd, ba and dc are the two digit prime numbers. Further b and d are the prime number digits and a, c are neither prime nor composite. The value of $\frac{(ab + ba)}{(cd + dc)}$ is :

(a) 1 (b) $\frac{1}{2}$
(c) 2 (d) can't be determined

72 A man sells chocolates which are in the boxes. Only either full box or half a box of chocolates can be purchased from him. A customer comes and buys half the number of boxes which the seller had plus half a box more. A second customer comes and purchases half the remaining number of boxes plus half a box. After this the seller is left with no chocolate boxes. How many chocolate boxes did the seller has, initially?

(a) 2 (b) 3 (c) 4 (d) 3.5

73 If $n^2 = 123454321$, then the value of n is :

(a) 1001 (b) not a natural number
(c) 111, 111 (d) none of these

74 $1^2 - 2^2 + 3^2 - 4^2 + \ldots - 198^2 + 199^2$:

(a) 19900 (b) 12321
(c) 19998 (d) none of these

75 The quotient when L.C.M. is divided by the H.C.F. of a G.P. with first term 'a' and common ratio 'r' is :

(a) r^{n-1} (b) r^n
(c) $a^{-1}r^{n-2}$ (d) $(r^n - 1)$

76 Once I met two persons of the same parents namely Ashmit and Amisha. Meanwhile Ashmit told me that he has twice the number of sisters as the number of brothers. Further Amisha told me that she has twice the number of brothers as the number of sisters. Actually it was very confusing for me, so can you find the number of brothers and sisters in their family?

(a) 4 (b) 5
(c) 6 (d) can't be determined

77 If $p < q$, then $p @ q = p \# q$, else $p @ q = q \# p$, where $a \# b = \frac{a}{b}$. Then the value of $(4 @ 5) @ (6 @ 5)$ is :

(a) $\frac{24}{25}$ (b) $\frac{2}{3}$
(c) 3/4 (d) none of these

78 A six digit number is such that every alternate digit is a prime digit and the three leftmost digits forms a G.P., while last three digits (*i.e.* hundreds, tens and unit) form an A.P. If it is expressed as *pqrstu*, where $p + q + r = u$, $q + r = t$, $p + r = s$, $\frac{r}{t} = \frac{2}{3}$ and $p \neq q \neq r \neq s \neq t \neq u$, then the sum of all the digits must be :

(a) 25 (b) 16
(c) 21 (d) can't be determined

79 Total number of digits in the product of $(4)^{1111} \times (5)^{2222}$ is :

(a) 3333 (b) 2223
(c) 2222 (d) can't be determined

80 If $p = N + 5$ when N is the product of any three consecutive positive integers. Then :

(a) p is prime (b) p is odd
(c) p is divisible by 6 (d) either of (b), (c)

81 If $\frac{p}{q}$ and $\frac{r}{s}$ are two rational numbers then the relation $\left|\frac{p}{q}\right| < \left|\frac{r}{s}\right|$ is :

(a) always true (b) always false
(c) never true (d) none of these

82 If $u^v + v^w + w^x = 0$ for every negative integer u, v, w, x, the value of $u \times v \times w \times x$ is necessarily be :

(a) 0 (b) less than zero
(c) even (d) odd

83 The unit digit of $2^{3^4} \times 3^{4^5} \times 4^{5^6} \times 5^{6^7} \times 6^{7^8} \times 7^{8^9}$ is :

(a) 0 (b) 5
(c) can't be determined (d) none of these

84 If $(a-7)(b-10)(c-12) = 1000$, the least possible value of $(a+b+c)$ equals :

(a) 59
(b) 29
(c) 14
(d) any integer less than 1000

85 If the number $23^{32} - 9$ is divided by 16, the remainder is :

(a) 8 (b) 0
(c) 6 (d) none of these

86 If $(x-5)(y+6)(z-8) = 1331$, the minimum value of $x+y+z$ is :

(a) 40 (b) 33
(c) 19 (d) not unique

87 If $x+y+z = 21$, the maximum value of $(x-6)(y+7)(z-4)$ is :

(a) 343 (b) 216
(c) 125 (d) not unique

88 The remainder R when $3^{37} + 4^{37}$ is divided by 7 is :

(a) 0 (b) 1
(c) $2 < R < 6$ (d) none of these

89 $7^{74} - 4^{74}$ is divisible by :

(a) 3 (b) 11
(c) 7 (d) both (a) and (b)

90 The factorial of a number n is exactly divisible by $(2^{11} \times 11^2)$ then the least possible value of n is :

(a) 22 (b) 25
(c) does not exist (d) none of these

91 The number of zeros at the end of the product of :
$2^3 \times 3^4 \times 4^5 \times 5^6 + 3^5 \times 5^7 \times 7^9 \times 8^{10} + 4^5 \times 5^6 \times 6^7 \times 7^8 - 10^2 \times 15^3 \times 20^4$ is :

(a) 5 (b) 6
(c) 28 (d) none of these

92 A nine digit number *abcdefghi* is such that a is divisible by 1, ab is divisible by 2, abc is divisible by 3 and $abcd$ is divisible by 4 and so on where none of $a, b, c, d, \ldots$ is same and every digit is a non-zero digit such a number is:

(a) 123456789 (b) 381654729
(c) 126453789 (d) 826435791

Directions (for Q. Nos. 93 to 95)

If Minimum (x, y, z) = *Minimum of* (xy, yz, zx)
Maximum (x, y, z) = *Maximum of* (x^y, y^z, z^x)
Labh (x, y, z) = *Average of* (x, y, z)
Hani (x, y, z) = *Modulus of* $(x - y - z)$ *i.e.*, $|x - y - z|$

93 The value of Minimum (1, 2, 3) + Maximum (1, 2, 3) is :
(a) 10 (b) 8
(c) 12 (d) 4

94 Labh [Hani (1, 2, 3), Hani (2, 3, 4), Hani (3, 4, 5)] is equal to :
(a) 4
(b) 5
(c) 6
(d) can't be determined

95 Minimum [Hani (1, 2, 3), Hani (2, 3, 4), Hani (3, 4, 5)] + Maximum [Labh (1, 2, 3), Labh (2, 3, 4), Labh (3, 4, 5)] is :
(a) 101 (b) 111
(c) 60 (d) none of these

96 When $(55)_{10}$ is represented in base 25 then the expression is :
(a) $(25)_{25}$ (b) $(35)_{25}$
(c) $(55)_{25}$ (d) none of these

97 For $(P, Q) > 0$ the number 340 PQQ 0 is divisible by both 3 and 8 then the total possible values of (P, Q) is :
(a) 2 (b) 3
(c) 6 (d) none of these

98 While typing the numbers from 600 to 799, a typist typed 8 whenever he was supposed to type 6. So the total number of times he has typed 8 is:
(a) 300 (b) 230
(c) 180 (d) none of these

99 If p and q are two distinct integers such that $p^2 - pq = 0$, then we can deduce that :
(a) $p = q$
(b) q is only negative integer
(c) $p = 0$
(d) either (a) or (c)

100 In a survey it was found that YTC sells the cigarettes of ₹ 15990 per day. If the cost of a pack is not less than ₹ 100, then what can be the price of each pack which it sells per day ?
(a) 150 (b) 420 (c) 78 (d) 205

1 Sania wanted to cut a cubical cake into 120 identical pieces applying minimum number of 'n' cuts. Later on she realised that she had to cut this cake into maximum number of identical pieces *i.e.*, 125 pieces. Now she applies the number of cuts is :

(a) n (b) $n + 5$

(c) $n + 1$ (d) can't be determined

Directions (for Q. Nos. 2 to 4)

If $s_1 = (1)$;
$s_2 = (2), (3)$;
$s_3 = (4), (5), (6)$;
$s_4 = (7), (8), (9), (10)$;
$s_5 = (11), (12), (13), (14), (15) \ldots$ *etc.*

where $s_1, s_2, s_3, \ldots$ *etc. are the first, second and third terms ... of the given sequence.*

2 The last digit and tens digit of the sum of all the elements of the first 21 terms of this sequence respectively are :

(a) 7, 0
(b) 6, 9
(c) 9, 6
(d) none of (a), (b), (c)

3 The number of zeros at the end of the product of the elements of s_{19}.

(a) 4 (b) 5

(c) 1 (d) none of these

4 The largest power of 10 that can exactly divide the product of all the elements of s_{19} and s_{20} is :

(a) 10 (b) 9

(c) 19 (d) can't be determined

5 A set '*S*' contains first 50 elements of the form $2n$; $n \in N$. Further a subset '*P*' of set '*S*' is formed such that the product of any 3 elements of '*P*' is not divisible by 16. Then maximum number of elements that '*P*' can have is :

(a) 12 (b) 13

(c) 25 (d) none of (a), (b), (c)

6 A cuboid of dimensions 51, 85 and 102 cm is first painted by red colour then it is cut into minimum possible identical cubes. Now the total surface area of all those faces of cubes which are not red is :

(a) 119646 cm^2 (b) 52020 cm^2

(c) 18514 cm^2 (d) 36414 cm^2

7 A number 'p' is such that it is divisible by 7 but not by 2. Another number 'q' is divisible by 6 but not by 5, then the following expression which necessarily be an integer is :

(a) $\frac{7p + 6q}{42}$ (b) $\frac{5p + 6q}{71}$

(c) $\frac{6p + 7q}{42}$ (d) none of these

8 If $p^q - q^r = (p + q)^{r-q}$; $p > r > q \in$ Prime numbers less than 11 then $p + q$ is equal to :

(a) $r(r - q)$ (b) $r(q - p)$

(c) $r(p + q)$ (d) pq

9 To visit the Republic Day Parade on 26th January, 2005 the people from every nook and corner including intellectuals, artists, farmers and mathematicians thronged in New Delhi. There were 100 seats in front row numbered 1, 2, 3, ..., 100. But the smart mathematician chose not to sit on those seats which are the multiples of any number greater than unity. How many mathematicians could sit on these front row chairs?

(a) 25 (b) 26

(c) 33 (d) none of these

Directions (for Q. Nos. 10 to 12) *In South-Asia the New Desh follows a septarian calender in which every month starts with Monday and a week has 7 days. There are only four months, the first 3 months consists of 98 days each and the last month has 70 days only.*

10 Which day falls on the 88th day of the first month?

(a) Sunday (b) Monday

(c) Thursday (d) Saturday

11 Which date cannot fall on the Thursday of the first month?

(a) 46 (b) 18

(c) 81 (d) 64

12 Which day occurs maximum number of times in a year?

(a) Monday (b) Saturday

(c) Sunday (d) none of these

13 The last two digits in the expansion of $(1989)^{91}$ are :

(a) 9, 1 (b) 8, 1

(c) 6, 9 (d) 8, 9

14 Earlier when I have created my e-mail-ID, the password was consisting of first 4 prime numbers. Recently when I tried to check my emails I got dumbfounded since I could not remember my password exactly. So when I have written 2735, my computer indicated me that no digit is correctly placed. Again I tried 5273, I got the same response. So once again I have written only 3 as the left most digit for my password it again indicated me that it was wrong. Finally I have taken one more attempt and got the account open. The code of my password is :

(a) 2537 (b) 7352

(c) 7325 (d) none of these

15 The remainder when $(888!)^{9999}$ is divided by 77 is :

(a) 1 (b) 2
(c) 3 (d) none of these

16 We publish a monthly magazine of 84 pages. Once I found that in a magazine 4 pages were missing. One out of them was page number 29. It is known that the page number of the last page of the magazine is 84, (including the coverpages). The numbers printed on the missing pages were :

(a) 29, 52, 53 (b) 30, 55, 56
(c) 28, 52, 53 (d) can't be determined

17 There are six locks exactly with one key for each lock. All the keys are mixed with each other. The maximum number of attempts needed to get the correct combination is :

(a) 21 (b) 15
(c) 6 (d) can't be determined

18 If n is an integer, how many values of n will give an integral value of $51n^2 + 17n + 6$?

(a) 4 (b) 3
(c) 2 (d) none of these

19 Sania always beats Plexur in tennis, but loses to Venus. Lindse usually beats Plexur and sometimes Sania, but cannot win against Venus. The worst player can be :

(a) Venus (b) Plexur
(c) Sania (d) can't say

20 Winner and Loser, the two brothers are playing a game in a recreational room at Amausi Airport, Lucknow. In this game each one in turn has to pick up a number m such that $1 \le m \le n$; $m, n \in I^+$. The game stops as soon as the sum of all the numbers picked so far attains the value of $2n + 1$ or exceeds and thus the player who picked last number was loser. With which number winner starts if he were to pick up first to defeat necessarily the loser is?

(a) $(n + 1)$ (b) n (c) $(n - 1)$ (d) $2n$

21 The sum of the last 10 digits of the sum of the expression :

$$(1^1 \times 2^2 \times 3^3 \times 4^4 \times 5^5) + (1^6 \times 2^7 \times 3^8 \times 4^9 \times 5^{10}) + (1^{11} \times 2^{12} \times 3^{13} \times 4^{14} \times 5^{15}) + \ldots + (1^{96} \times 2^{97} \times 3^{98} \times 4^{99} \times 5^{100})$$ is :

(a) 16 (b) 18
(c) 20 (d) none of these

22 One day very early morning Ravishankar went to temple to offer some flowers as a part of *Puja*. He purchased some flowers but the seller offered him that if he would give him all his ₹ 2, he could get all the remaining 6 flowers and thus could gain 60 paise per dozen. If each time the transaction is possible only in rupees then how many flowers did Ravishankar purchase initially?

(a) 6 (b) 3
(c) 4 (d) 12

23 Maximum number of squares possible that can be constructed using 31 pencils of equal length on the table :
(a) 30 (b) 20
(c) 15 (d) 29

Directions (for Q. Nos. 24 and 25) *Kavita, a student of IIMA, told me that she did everyday 3 more passages of English than that of previous day and thus she completed all the passages in 10 days. Later on she told me that the number of passages she did on the last but one day were four times that she did on the second day.*

24 Number of passages she has done on the last day :
(a) 30 (b) 41
(c) 32 (d) none of these

25 Total number of passages that she has completed in those 10 days :
(a) 84
(b) 180
(c) 175
(d) can't be determined

26 Recently, a small village in Tamilnadu where only male shephereds reside with four sheep each, was devastated by Tsunami waves. Therefore 8 persons and 47 sheep were found to be dead and the people, who luckily survived, left the village with one sheep each. Since 21 sheep were too injured to move so have been left on their own luck in the village. The number of sheep which were earlier in the village is :
(a) 84 (b) 120
(c) can't be determined (d) none of these

27 The number of 3-digit numbers which consist of the digits in A.P., strictly in increasing order using the non-zero digits of the decimal system is :
(a) 14 (b) 16
(c) 15 (d) none of these

28 The sum of :
$(2^2 + 4^2 + 6^2 + \ldots + 100^2) - (1^2 + 3^2 + 5^2 + \ldots + 99^2)$ is :
(a) 5555 (b) 5050 (c) 888 (d) 222

29 If an integer p is such that $(8p + 1)$ is prime, where $p > 2$, then $(8p - 1)$ is :
(a) divisible by 7 (b) divisible by 3
(c) a prime number (d) none of these

30 The remainder when $3^0 + 3^1 + 3^2 + \ldots + 3^{200}$ is divided by 13 is :
(a) 0 (b) 12
(c) 3 (d) none of these

31 The remainder when $4^0 + 4^1 + 4^2 + 4^3 + \ldots + 4^{40}$ is divided by 17 is :
(a) 0 (b) 16
(c) 4 (d) none of these

32 In the problem number 31, if the divisor is 7 then the remainder is :
(a) 4 (b) 5 (c) 6 (d) 1

33 A monkey wanted to climb on the smooth vertical pole of height of 35 metre. In the first one minute he climbed up 5 metre in the next one minute he slipped down by 2 metre. Further he repeated the same process till he had reached on the top of the pole. Minimum how many times did he have to go upward to reach the apex of the pole?
(a) 35 (b) 12
(c) 11 (d) can't say

34 In the above question the minimum time required for this job is :
(a) 21 minute (b) 22 minute
(c) 24 minute (d) none of these

35 In the same problem, if the height of the pole is 36 metre then the time taken by monkey to reach at the top of the pole is :
(a) 22 min. 36 sec. (b) 22 min. 24 sec.
(c) 23 min. 12 sec. (d) none of these

36 The remainder when $1^3 + 2^3 + 3^3 + \ldots + 999^3 + 1000^3$ is divided by 13 is :
(a) 7 (b) 11
(c) 12 (d) none of these

37 If $22^3 + 23^3 + 24^3 + \ldots + 87^3 + 88^3$ is divided by 110 then the remainder wil be :
(a) 55 (b) 1 (c) 0 (d) 44

38 The sum of the n terms of a series is $n! + n^2$ then the 6th term is, if $n \in N$:
(a) 756 (b) 611
(c) data insufficient (d) none of these

39 A smallest possible number which is divisible by either 3, 5 or 7 when represented by only two digits either 0 or 1, then the minimum number of digits required to represent it :
(a) 6 (b) 5
(c) 7 (d) can't be determined

40 The sum of first n odd numbers (*i.e.*, $1 + 3 + 5 + 7 + \ldots + 2n - 1$) is divisible by 11111 then the value of n is :
(a) 12345 (b) 11111
(c) can't be determined (d) none of these

41 Anjuli bought some chocolates from Nestle's exclusive shop and she gave Amit one less than half of what she had bought initially. Then she gave 3 chocolates to Bablu and then half of the chocolates which she had gave to Charles. Thus finally she gave one chocolate to Deepak and the remaining one she ate herself. The number of chocolates she had purchased.
(a) 9 (b) 12 (c) 10 (d) 15

42 If $(a_1b_1c_1)^{100} + (a_2b_2c_2)^{100} + (a_3b_3c_3)^{100} + \ldots$ $(a_{100}b_{100}c_{100})^{100}$, where $a_ib_ic_i$ is a three digit positive number and in the expression all the 100 numbers are any consecutive 3 digit numbers. The last digit is :

(a) 0 (b) 1

(c) 3 (d) none of these

Directions (for Q. Nos. 43 to 45) *If [x] is read as the greatest integer less than or equal to x, {x} is the least integer greater than or equal to x. Further* $f(x, y) = [x] + \{y\}$

and $g(x, y) = [x] - \{y\}$

and $P(x, y) = f(x, y) + g(x, y)$

and $Q(x, y) = f(x, y) - g(x, y)$

43 If $x = 16$ and $y = 25$, the value of $P(x, y) + Q(x, y)$ is :

(a) 90 (b) 200

(c) can't be determined (d) none of these

44 If $x^2 = 16$ and $y^2 = 25$, $P(x, y)Q(x, y)$ is :

(a) 80 (b) – 80

(c) 72 (d) none of these

45 If $x, y \in I^+$ then $P(x, y) + Q(x, y)$ is always :

(a) an even number (b) an odd number

(c) can't say (d) none of these

46 Which of the following is/are true?

(i) $43^3 - 1$ is divisible by 11

(ii) $56^2 + 1$ is divisible by 19

(iii) $50^2 - 1$ is divisible by 17

(iv) $(729)^5 - 729$ is divisible by 5

(a) (i) and (ii)

(b) (iii) and (iv)

(c) (ii), (iii) and (iv)

(d) (ii) and (iii)

47 Capt. Manoj Pandey once decided to distribute 180 bullets among his 36 soldiers. But he gave n bullets to a soldier of nth row and there were same number of soldiers in each row. Thus he distributed all his 180 bullets among his soldiers. The number of soldiers in $(n - 1)$th row was :

(a) 3 (b) 8

(c) 9 (d) none of these

48 If $(n - 5)$ is divisible by 17 for every $n \in I^+$ then the greatest integer which will necessarily divide $(n + 12)(n + 29)$ is :

(a) 578

(b) 289

(c) such a number does not exist

(d) none of the above

49 A certain number 'n' can exactly divide $(3^{24} - 1)$, then this number can also divide the number :

(a) $(3^{16} + 1)$ (b) $(3^8 - 1)$

(c) $(3^{70} - 1)$ (d) $(3^{96} - 1)$

50 If a number 'n' can exactly divide $(5^{14} - 1)$ then 'n' can necessarily divide :

(a) $(5^{28} - 1)$ (b) $(5^{42} - 1)$

(c) $(5^{21} + 1)$ (d) both (a) and (b)

51 The nth term of a series of which all the terms are positive is defined as $T_n = n^2 + n$, then the sum of n terms of the series is :

(a) $\frac{n(n+1)(n+2)}{6}$ (b) $\frac{n^3 + 4n}{n}$

(c) $\frac{5n}{9}[n^2 + n]$ (d) $\frac{n(n+1)(n+2)}{3}$

52 The number of zeros at the end of the product of

$222^{111} \times 35^{53} + (7!)^{6!} \times (10!)^{5!} + 42^{42} \times 25^{25}$ is :

(a) 42 (b) 53

(c) 1055 (d) none of these

53 $\frac{12345}{12346} + \frac{12346}{12347} + \frac{12347}{12345}$ is equal to :

(a) 2.67 (b) 6.27

(c) 3 (d) 5

Directions (for Q. Nos. 54 to 56) *The set* $S_1 = \{1\}$, $S_2 = \{3,5\}$, $S_3 = \{7,9,11\}$, *etc. forms a sequence.*

54 Sum of all the elements of S_{10} is :

(a) 55 (b) 300

(c) 3375 (d) none of these

55 The 11th element of the set S_{21} is :

(a) 21 (b) 121

(c) 221 (d) 441

56 The sum of the first and last element of the set S_{51} is :

(a) 5202 (b) 5151

(c) 5152 (d) 5102

57 During my studies once I brought a book from library which was written in early days, when there were only 9 digits *i.e.*, the digit 0 did not exist. There was a sum in that book as follows :

$$k = 13 + 17 + 31 + 2$$

Then the value of k if $9 + 1 = 11$, $19 + 4 = 24$ etc.

(a) 70 (b) 71

(c) 63 (d) 64

58 According to that book, the sum of $4 + 16 - 5 + 12$ is

(a) 27 (b) 26

(c) 29 (d) none of these

59 The value of x for which the unit digits of $(2357)^{\log_{10} x}$ and $(5723)^x$ are same for $x > 1$.

(a) 10 (b) 100

(c) 1000 (d) none of these

60 The value of x for which the unit digits of the following two expressions $(1 + 2 + 3 + 4 + 7)^{x^2 + x}$ and $(11 \times 11 \times 13)^x$ are same for $x > 0$:

(a) 1 (b) 2

(c) 3 (d) none of these

61 When any odd number greater than unity multiplied by even times by itself then dividing this product by 8, we get the remainder as :

(a) 1 (b) 7

(c) not unique (d) none of these

62 Stephen's birthday, this year falls on 2nd April, Wednesday. But coincidently his marriage anniversary is 2 days before the 23rd of the same month. On which day he will celebrate his marriage anniversary?

(a) Monday

(b) Wednesday

(c) Friday

(d) can't be determined

63 In the above problem if there are only 6 days in a week *i.e.*, there is no Sunday and the week starts with Monday and ends with Saturday then his marriage anniversary will fall on :

(a) Wednesday

(b) Thursday

(c) Friday

(d) data insufficient

64 An N.G.O. (non-government organisation) STRANGE working for the relief of Tsunami Victims in Srilanka consisting of 7 members S, T, R, A, N, G, E of the same family.

The eldest one '*S*' spoke to me "I have deployed equal number of brothers and sisters for medical relief and psychological counselling under the supervision of myself". Later on the youngest member *E* spoke to me as "we have been working for rehabilitation and food supply as twice the number of sisters as the number of brothers have been deployed there, but I did not actually do any thing due to a severe injury in my leg". Then we can conclude that :

(a) youngest person is a lady

(b) eldest person's wife is youngest

(c) the brother of *S* is youngest

(d) nothing can be said

65 When the sum of n digits of an n digit number is subtracted from the number itself, where the number must be atleast two digit number, then the correct statement is :

(a) the difference is a prime number

(b) the resultant value is a perfect square

(c) the resultant value is an odd number

(d) the resultant value is a multiple of 9

66 For every natural number x and y the value of $x - y$ when $y + \frac{7}{x} + \frac{y}{13} = 6\frac{3}{143}$, is :

(a) 5 (b) 6

(c) 2 (d) not unique

Directions (for Q. Nos. 67 and 68) *The $S = \{(1, 3, 5, 7, 9, \ldots, 99)$ (102, 104, 106, ..., 200)} i.e., in the first part there are odd integers less than 100 and in the second part there are even integers greater than 100, but upto 200.*

67 The highest power of 3 in the product of the element of the set is :

(a) 52 (b) 51

(c) 97 (d) can't be determined

68 The highest power of 5 that can exactly divide the product is :

(a) 25 (b) 24 (c) 30 (d) 26

69 The number of zeros at the end of the following expression :

$P = \{(2 \times 4 \times 6 \times 8 \times 10 \times \ldots 50) \times (55 \times 60 \times 65 \times 70 \times 75 \times \ldots 100)\}$

(a) less than 20 (b) 57

(c) 20 (d) 36

70 1, 2, 3, 4, 10, 11, 12, 13, 14, 20, 21, 22, 23, 24, ... are the consecutive numbers written in base 5. The twenty fifth number in the above sequence would be :

(a) 52 (b) 100

(c) 25 (d) none of these

71 Watch India Corporation made a wrist watch in which the minute hand makes one complete round of dial in 12 minutes and accordingly the hour hand too. When I have set this watch at 12 : 00 noon on 1st February this year. What time will be shown by this watch at 3 O'clock on the same day.

(a) 2 : 30 P.M.

(b) 6 : 15 A.M.

(c) 3 O'clock

(d) can't be determined

72 The sum of first n numbers of the form $(5k + 1)$, where $k \in I^+$ is :

(a) $\frac{n}{2}[5n^2 - 3]$ (b) $n(20 - 3n)$

(c) $\frac{n}{2}(5n + 7)$ (d) none of these

73 A series is given as : 1, 4, 9, 16, 25, 36, ...
Then the value of $T_{n+1} - T_n$ is, where T_n is the nth term of the series is :

(a) $n^2 - 1$ (b) $2n + 1$

(c) $n^2 + 1$ (d) none of these

74 The area of paper can be divided into 144 squares, but if the dimensions of each square were reduced by 2 cm each, then the number of squares so formed are 400. The area of the paper, initially, was :
(a) 544 cm² (b) 1444 cm²
(c) 3600 cm² (d) none of these

75 If $(ab)^2 = bcb$ and $(dd)^2 = ccff$, where a, f, d are strictly in increasing order of G.P. and b, c, d are in increasing order of A.P. Then the value of f will be, where ab and bcb etc. are the two digit and 3 digit numbers etc.
(a) 9 (b) 8
(c) can't be determined (d) none of these

76 If $A = 555!$ and $B = (278)^{555}$ then which one of the following relations is appropriate?
(a) $A > B$ (b) $A = B$
(c) $A < B$ (d) can't say

Directions (for Q. Nos. 77 to 81) *For any natural number n the sets $S_1, S_2, \ldots$ are defined as below :*
$S_1 = \{1\}$, $S_2 = \{2, 3\}$, $S_3 = \{4, 5, 6\}$
$S_4 = \{7, 8, 9, 10\}$, $S_5 = \{11, 12, 13, 14, 15\}$ ... *etc.*

77 The last element in the S_{24} is :
(a) 576 (b) 600
(c) 300 (d) 625

78 The middlemost element of the set S_{15} is :
(a) 196 (b) 169
(c) 131 (d) none of these

79 The sum of the elements of set S_{25} is :
(a) 7825 (b) 3125
(c) 3250 (d) none of these

80 In which set, there are maximum number of prime number elements among $S_1, S_2, S_3, \ldots, S_{13}$ is :
(a) S_{12} (b) S_{13}
(c) S_{12} and S_{13} (d) S_9, S_{12}, S_{13}

81 Of which set the sum of all the elements of the set is even
(a) S_{39} (b) S_{50}
(c) S_{72} (d) S_{94}

Directions (for Q. Nos. 82 to 85) *The sequence of sets $S_1, S_2, S_3, S_4, \ldots$ is defined as* $S_1 = \{1\}$, $S_2 = \{3, 5\}$, $S_3 = \{7, 9, 11\}$, $S_4 = \{13, 15, 17, 19\}$ ... *etc.*

82 The first element of the nth set S_n is :
(a) n (b) $n^2 - 1$
(c) $2n + 1$ (d) $n^2 - n + 1$

83 The last element of the set S_{100} is :
(a) 10099 (b) 9899
(c) 9900 (d) none of these

84 The middlemost element of an odd numbered set S_{125} is :
(a) 12500 (b) 15625
(c) 3125 (d) none of these

85 The sum of all the elements of S_{101} :
(a) 1531441 (b) 1189811
(c) 1030301 (d) none of these

86 The sum of the series :

$$S = \frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} + \frac{1}{4.5} + \ldots + \frac{1}{99.100} \text{ is :}$$

(a) $\frac{98}{99}$ (b) $\frac{99}{100}$
(c) $S > 1$ (d) none of these

87 A number P when divided by D it leaves the remainder 18 and if another number Q is divided by the same divisor D it leaves the remainder 11. Further if we divide $P + Q$ by D then we obtain the remainder 4. Then the common divisor D is :
(a) 22 (b) 15
(c) 25 (d) can't be determined

88 If the product of $1 \times 2 \times 3 \times 4 \times \ldots n$ contains 68 zeros in the end of the number. Then the maximum possible number of values of n is :
(a) 1 (b) 3 (c) 5 (d) 6

89 The remainder when $6^{6^{6^{6^{\cdots}}}}$ $\rightarrow$ times is divided by 10 is :
(a) 3 (b) 6
(c) 0 (d) can't be determined

90 $53^3 - 46^3 - 7^3$ is divisible by :
(a) 6 and 9
(b) 2 and 21
(c) 21 and 23
(d) both (b) and (c)

91 A number of decimal system when written in base n, $2 < n < 10$, we get a two digit number. Further if we reverse the digits of the obtained number in base 'n' we get a number which is twice of the original number in decimal system. The sum of original and resultant number both in decimal system for the largest possible value of n is :
(a) 45 (b) 63
(c) 77 (d) can't be determined

92 In the above question how many values of n are possible?
(a) 0 (b) 2 (c) 4 (d) 7

93 Pandavas won a hen in the war of the Mahabharat. They brought it on the Ist January, 2002. This hen gave birth to 7 new hens on the very first day. After it every new hen irrespective of its age everyday gave birth (only once in a lifetime) to 7 new hens. This process continued throughout the year, but no any hen had been died so far. On the 365th day all the Pandavas shared equally all the hens among all the five brothers. The remaining (if these can not be shared equally) hens were donated to Krishna. The number of hens which the Krishna had received is :
(a) 3 (b) 2
(c) can't be determined (d) none of these

94 Total number of natural numbers being the perfect square whose square root is equal to the sum of the digits of the perfect square is :

(a) 0 (b) 1
(c) 2 (d) 12

95 At our training Institute the number of boys is same as that of the girls. Last week, except $\frac{2}{3}$rd of the girls all the students went to picnic, where they bought some samosas but later on they found exactly one dozen samosas were not fresh so those 12 samosas had been thrown away. After it the samosas were divided equally between boys and girls. Further when boys dealtout the samosas equally among themselves 39 samosas left undistributed, but when the girls dealtout the same number of samosas equally among themselves 12 samosas were still left undistributed. The number of students at our training institute is :

(a) 60 (b) 156
(c) 162 (d) can't be determined

96 Darwin Miya has 6 kinds of fruits in large amount and has sufficient number of identical boxes to store the fruits. He can put at least 10 and atmost 15 fruits in any box and he put only one kind of fruits in a box. Further not more than 5 boxes can contain same number of fruits. Maximum number of fruits that he can put in the boxes is :

(a) 325
(b) 375
(c) 75
(d) can't be determined

97 In the above question if he is allowed to put the equal number of fruits in atmost 7 boxes and he has only 33 boxes and now he can put any kind of fruit with any other kind of fruits. At least how many boxes are there in which the number of fruits are same if he fills every box to its maximum capacity.

(a) 5
(b) 6
(c) 3
(d) can't be determined

98 If $n \in 1, 3, 5, 7, \ldots$ etc., then the value of $19^n - 23^n - 43^n + 47^n$ is necessarily divisible by :

(a) 264 (b) 246
(c) 76 (d) 129

99 The sum of the following series :

$$1.1^2\left(1-\frac{0}{1}\right)+2.2^2\left(1-\frac{1}{2}\right)+3.3^2\left(1-\frac{2}{3}\right)+4.4^2\left(1-\frac{3}{4}\right)+\ldots \text{ upto } n \text{ terms is :}$$

(a) $n.n^2\left(1-\frac{1}{n}\right)$ (b) $\frac{n(n+1)(2n+1)}{6}$
(c) $\frac{n(n+1)^2}{4}$ (d) none of these

100 The distance between the Sarvesh's house and Ravi's house is 900 km and the Sarvesh's house is at 100th milestone where as the Ravi's house is at 1000th milestone. There are total 901 milestones at a regular interval of 1 km each. When you go to Ravi's house from the Sarvesh's house which are on the same highway, you will find that if the last digit (*i.e.*, unit digit) of the 3 digit number on every milestone is same as the first (*i.e.*, hundreds digit) of the number on the next mile stone, then these milestones must be red and rest will be black. Total number of red milestones is :

(a) 179 (b) 90

(c) can't be determined (d) none of these