Section – II

Directions for questions 56 and 57: Answer the questions based on the following information.
Each of the letters of the alphanumetic addition EAT + THAT = APPLE are distictly different. The addtion is done in the decimal system.

56. What is the sum of the digits of APPLE?
a. 9 b. 10 c. 11 d. 12

57. What is the value of L?
a. 3 b. 4 c. 5 d. 6

58. If in a set of three natural numbers X, Y, Z; X is the H.C.F. of all the three numbers then
a. One of the other two numbers Y, Z is also the L.C.M.(X,Y,Z).
b. Among Y, Z one of them would be the H.C.F. of Y, Z.
c. L.C.M. (X, Y, Z) = L.C.M.(Y, Z)
d. X.Y.Z = H.C.F.(X, Y, Z) × L.C.M.(X, Y, Z)

59. Which of the following will have a zero remainder when divided by the product of $(17-11)(17^2+11^2)(17^3+11^3)(17^4+11^4)$?
a. 17^5-11^5 b. 17^4-11^4 c. 17^6-11^6 d. $17^{24}-11^{24}$

Directions for questions 60 to 62: Answer the questions based on the following information.
Let X = {1, 2, 3, 4, ..., 100}.
Sets S_1 and S_2 are subsets of X such that each of them has atleast one element and $S_1 \cap S_2 = \phi$; where ϕ is the null set.
$Max(S_1) = MX_1$; $Min(S_1) = MN_1$
$Max(S_2) = MX_2$; $Min(S_2) = MN_2$

60. What is the maximum possible value of $MX_1 - MN_2$?
a. 100 b. 50 c. 49 d. 99

61. Let $S_1 \cup S_2 = X$ and S_1, S_2 have the same number of elements. If elements of S_1 and S_2 are chosen randomly it was found that by exchanging two elements of S_1 with two elements of S_2, every element of S_1 was greater than that of S_2. Find the number of sets S_1 that can be formed.
a. ${}^{100}C_2$ b. ${}^{50}C_2$ c. ${}^{50}C_{48} \times {}^{50}C_2$ d. None of these

62. If $|MX_1 - MX_2|$ and $|MN_1 - MN_2|$ are at their minimum possible values then which of the following is true?
a. $|MX_1 - MX_2| > |MN_1 - MN_2|$
b. $|MX_1 - MX_2| = |MN_1 - MN_2|$
c. $|MX_1 - MX_2| < |MN_1 - MN_2|$
d. None of these

63. If n is an integer greater than 3, then which is the maximum value amongst all these fractions?

a. $\frac{1}{n^2 - n - 6}$ b. $\frac{1}{n^2 - n}$

c. $\frac{n}{n^4 - n^2}$ d. $\frac{1}{n^2 - 4}$

64. What is the value of n for which $(n^{17} - n)(4^{2n} - 1)$ is divisible by 289?

a. 7 b. 51

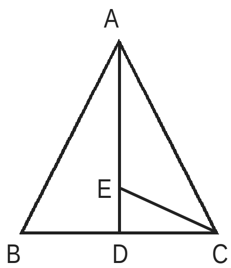
c. 17 d. 34

65. Prashant thought of a 4-digit number. He multiplied it by 12. He added 39 ot it. He subtracted 36 dozens from that number and he multiplied the resultant number with 24. The number that he got was 25x2536. He cannot see digit x because the calculator was malfunctioning. What is digit x from among the choices given?

a. 2 b. 4

c. 6 d. 8

66.



In the given ΔABC, if AB = AC = 10 cm, DE : EA = 1 : 3 and BD = DC = 8 cm.
Then CE =

a. $\sqrt{68}$ cm b. $\frac{\sqrt{265}}{2}$ cm

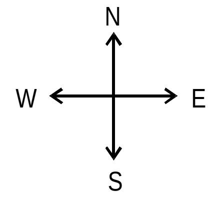
c. $\sqrt{40}$ cm d. Data insufficient

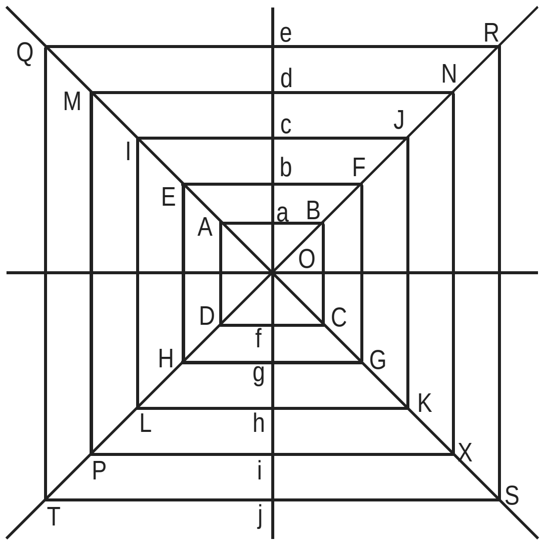
67. ABCD is a rectangular field. There is a hole dug into the field which is 3 m from A, 4 m from B and 2 m from D. How far is it from C?

a. 3 m b. $\sqrt{11}$ m

c. 5 m d. Data insufficient

Directions for questions 68 and 69: Answer the questions based on the following information.



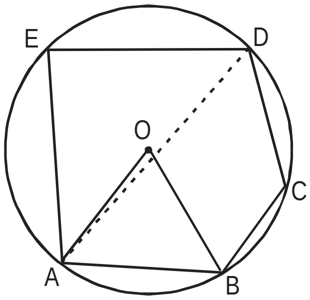


The above figure is a spider net with O as its centre. ABCD, EFGH, IJKL, ... are all square shaped with O as their centre. Strings like QMIEAOCGKXS which run across are the main strings. All the main strings pass through O. The distances of points A, B, C, D is 2x distance from O, that of E, F, G, H is 4x form O, that of I, J, K, L is 8x form O and so on.
A mosquito is sitting at I. There are 3 spiders S_1, S_2, S_3 located at Q, N, R respectively.
They can move only on horizontal and vertical lines.

68. If both S_1, S_2 move towards the mosquito simultaneously, the ratio of time taken for them to reach the mosquito is
    a. 1 : 1   b. 2 : 1
    c. $2\sqrt{2} : 3$ d. Cannot be determined

69. If S_3 also heads towards the mosquito at the same time as S_1, S_2. What is the ratio of speeds if all of them reach the point simultaneously?
    a. 1 : 1 : 1   b. $2\sqrt{3} : \sqrt{5} : \sqrt{6}$
    c. 4 : 3 : 2   d. Cannot be determined

70.



"O is the centre of the circle". In the given figure AB = BC = CD, AE = ED and $\angle AOB = 70^\circ$.

Find $\angle EDA$.

a. 35° b. 32.5° c. 37.5° d. 45°

71. A, B, C set out to do a job. A works twice as fast as B and B works at one-third the rate of C. No two of them work on the job at the same time. The job is completed in three days. Each one of them has completed the same amount of work. A worked for

a. 1 day b. $\frac{9}{11}$ days c. $\frac{6}{7}$ days d. $\frac{1}{2}$ days

72. $\frac{1}{(n-1)!\,1!} + \frac{1}{(n-2)!\,2!} + \frac{1}{(n-3)!\,3!} - - - + \frac{1}{(n-1)!\,1!}$ will be equal to

a. $\frac{1}{n!}\left(2^n - 1\right)$ b. $\frac{1}{n!}\left(2^n - 2\right)$ c. $\frac{1}{n!}\,2^{n-1}$ d. None of these

73. A number is picked from the odd numbers formed by the products of numbers shown up when 5 dice are rolled. What is the probability that it ends with 5?

a. $1-\left(\frac{2}{3}\right)^5$ b. $\left(1-\frac{1}{3}\right)^5$ c. $1-\left(\frac{1}{6}\right)^5$ d. 0

74. There are 2n consecutive natural numbers. If n + 1 numbers are randomly selected, then what is the probability that their HCF is 1?

a. $\frac{n+1}{2n}$ b. $\frac{1}{n+1}$

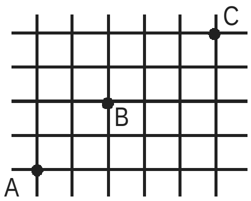
c. $\frac{1}{2n}$ d. $\frac{1}{(2n)^0}$

75. Find the number of integral solution to $|x| + |y| + |z| = 15$.

a. 902 b. 728

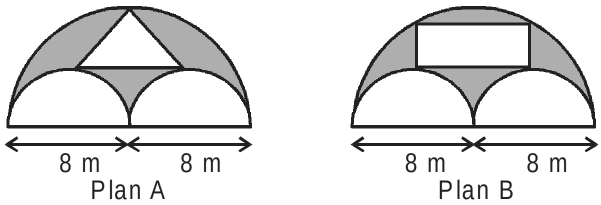
c. 734 d. 904

76. There are 5 parallel roads horizontally and 6 parallel roads vertically. In how many ways can a man go from point A to point C without passing point B?



a. 66 b. 60 c. 136 d. 140

77. There are two suggestions for landscape gardens Plan A and Plan B. In Plan A the base of the triangle is the common tangent of two small half circles and in Plan B one of the side of the rectangle is also the common tangent of two small half circles



The shaded region represents the area where the sand will be filled at the rate of Rs. 10 per m^2. Find the decrease in the sand cost if we move from Plan A to Plan B.

a. Rs. 25 b. Rs. 73.6 c. Rs. 72 d. Rs. 74

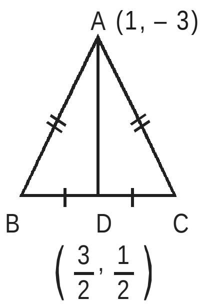
78. Consider the non decreasing sequence of positive integers
1, 2, 2, 3, 3, 3, 4, 4, 4, 4, 5, 5, 5, 5, 5 .... in which nth positive number appears n times. Find the remainder when the 2000th term is divided by 5.

a. 1 b. 2 c. 3 d. 4

79. There is a triangle whose sides are in G.P. (all sides distinct). Let the sides be x, xr, xr^2. Then the value of r cannot be

a. 1.6 b. 1.65 c. 0.7 d. 0.9

80. In the given triangle ABC, AB = AC and BD = DC. Then find the co-ordinates of B.



a. (–2, 1) b. (5, 0) c. (3, 1) d. Cannot be determined

81. If f(x) = $\frac{x^2+12x+12}{x^2+3x+3}$, then find max f(x).

a. 2 b. 4 c. 8 d. Cannot be determined

82. The value of y = $\frac{x^2}{x^4+1}$ lies in which of the following inequality?

a. $0 < y < \frac{1}{2}$ b. $0 \le y \le \frac{1}{2}$ c. $0 \le y \le \infty$ d. $-\frac{1}{2} \le y \le \frac{1}{2}$

83. Two friends A and B leave at 8 A.M everyday to meet each other at point P after two hours. On one day A walks at $\frac{5}{6}$ th of the usual speed white B starts one hour late, so he increases his speed by 25%. Now A takes $\frac{1}{2}$ hour more than usual to meet B and they meet half kilometer away from point P. Find out the speeds of A and B and total distance traveled by them.

a. 5 kmph, 5 kmph, 20 km b. 6 kmph, 4 kmph, 22 km
c. 6 kmph, 4 kmph, 20 kmph d. 4 kmph, 6 kmph, 20 kmph

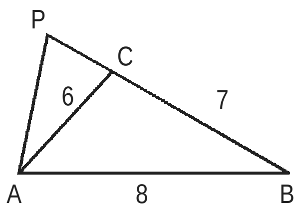
84. $1^1 \times 2^2 \times 3^6 \times 4^{12} \times 5^{20}$ ..... 25 terms. Find the highest power of 75 that can divide the given series.

a. 1900 b. 1850 c. 2526 d. None of these

85. If f(x) = kx + 5, g(x) = 5x + 2 and f(g(x)) = g(f(x)), then k is equal to

a. 5 b. 1 c. 11 d. 25

86. In ΔABC, AB = 8 cm, BC = 7 cm, CA = 6 cm and side BC is extended as shown in the figure to a point P so that ΔPAB is similar to ΔPCA. The length of PC is



a. 9 cm b. 10 cm c. 11 cm d. Data insufficient

87. A, B are two distinct points on a circle with centre C_1 and radius r_1. AB also is a chord of a different circle with centre C_2 and radius r_2.

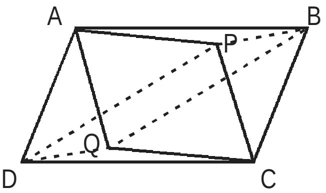
S denotes the statement: The arc AB divides the first circle into two parts of equal area.

a. S is true if $C_1C_2 > r_2$
b. If S is true then $C_1C_2 > r_2$
c. If S is true then it is possible that $C_1C_2 > r_2$.
d. If S is true then it is necessary that $C_1C_2 < r_2$.

88. The sides of a right-angle triangle have lengths which are integers in arithmetic progressions. In which of the following smallest side of a triangle does there exist such a triangle?

a. 2000 cm b. 2001 cm c. 2002 cm d. 2003 cm

89. Two parallelograms ABCD and APCQ have a common diagonal AC. Then PBQD is a



a. Rectangle b. Parallelogram c. Rhombus d. Straight line

Directions for questions 90 and 91: Answer the questions based on the following information.
A, B, C, D are four item who are being weighed one after the other in the same order. Each time when a item is weighed the average weights till then is recalculated. It is found the average weights so calculated were in A.P. with common difference of 2 kg.

90. The minimum weight of D if the weights of A, B, C and D are natural numbers is

a. 7 kg b. 9 kg c. 13 kg d. 28 kg

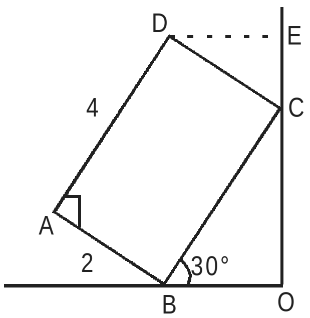
91. What is the average weight of A, B, C, D if the weight of A is 4kg?

a. 7 kg b. 10 kg c. 28 kg d. None of these

92. A, B are moving in a circular track in the same direction. They start simultaneously in a race which requires them to cover 10 rounds. Whenever A, B meet it was found that the ratio of the number of rounds covered by them till then is 3 : 1. The time taken by B to complete the race if they meet every 5 minutes is.

a. $\frac{50}{3}$ minutes b. 25 minutes c. 50 minutes d. 100 minutes

93.



A rectangular of slab of size 4 × 2 meters rests as shown in figure. What is the height of D above the ground?

a. 6 m b. 4 m c. $(4+\sqrt{3})$ m d. None of these

94. M = 2001! and N = 2002 × 2003 × 2004. The L.C.M. of M and N is

a. M b. 2002 × M
c. 2003 × M d. M × N

95. Which of the following does not divide $5^{4n} - 3^{2n}$ if H.C.F.(n, 4) = 2.

a. 317 b. 13 c. 11 d. 7

96. If a + b + c = 20 and $\left(\frac{1}{a}+\frac{1}{b}+\frac{1}{c}\right) = 30$, then the value of $\frac{a}{b}+\frac{b}{a}+\frac{a}{c}+\frac{c}{a}+\frac{b}{c}+\frac{c}{b}$ is

a. 597 b. 8 c. 350 d. 441

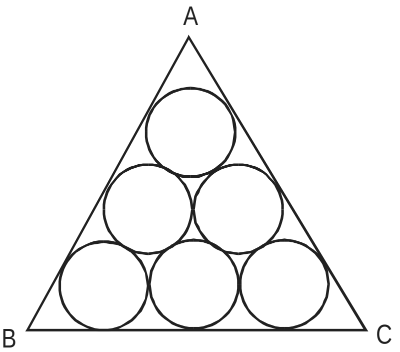
97. If the roots of the equation
$x^2 + (3k - 36)x + k^2 - 24k + 144 = 0$ are reciprocal of each other,then find the value of k.

a. k = 11 or k = 13
b. k = – 11 or k = – 13
c. k = 12
d. k = – 12

98. There is a 5 feet wide lane. Both walls of the lane are perpendicular to the ground. Two ladders, one 13 ft long and other 15 ft long, are propped up from opposite corners to the adjacent wall, forming an X shape. Each ladder is so placed that one end of the ladder touches the corner while the other end touches the top of the wall facing it. The two ladders are also touching each other at the intersection of the X shape. What is the distance from the point of intersection to the ground?

a. 6.5 feet b. $\frac{5}{\sqrt{2}}$ feet c. 7 feet d. None of these

99. The diagram shows size equal circles inscribed in an equilateral triangle ΔABC. The circles touch externally among themselves and also touch the sides of a triangle. If the radius of a circle is R, find the area of triangle.



a. $R^2(6+\pi\sqrt{3})$ sq. units
b. $9R^2$ sq. units
c. $R^2(12+7\sqrt{3})$ sq. units
d. $R^2(9+6\sqrt{3})$ sq. units

100. On Monday A, B and C meet in a library.
A says “I visit the library every day”.
B says “I visit the library every third day”.
C says “I visit the library every fourth day”.
The librarian overheard the conversation and told them that the library is closed on Wednesdays. A, B and C decided that if one of their library days falls on Wednesday they would visit the library on Thursday and count from there. If the Monday on which they meet is the first day of the week, then they meet again in

a. 2nd week
b. 4th week
c. 5th week
d. 3rd week

101. A man had three daughters, who celebrated their birthday on the same day, but were born in 1977, 1978 and 1979 respectively. On one such birthday, if the product of their ages was divided by their respective ages in turn, the sum of quotients, would have been 74. The age of the oldest daughter is
a. 6 years b. 8 years c. 7 years d. None of these

102. If $x^3 – k^2x^2 + (6k + 5)x – 5k = 0$ has two roots 3 and 5. Find the value of the third root.
a. 3 b. $\frac{-14}{9}$ c. 1 d. – 1

103. There is an alloy (A) of silver and copper. A certain weight of this alloy is mixed with 15 kg of pure silver and melted. The new alloy (B) contains 90% of silver. If the alloy (A) is mixed with 10kg of a 90% silver alloy, the new alloy (C) is found to contain 84% silver. Find the percentage of silver in (A).
a. 80% b. 90% c. 75% d. 84%

104. A big cube is cut into 64 equal cubes. If 6 litres of paint was used to paint the big cube, how many more litres will you need for the smaller cubes to be painted on all sides?
a. 24 Litres b. 23 Litres c. 30 Litres d. 18 Litres

105. Vinod is a very shrewd shop owner. He adjusted his electronic weighing scale in a typical way. Error percentage of his scale is directly proportional to the displayed weight of the commodity. But he gives a discount of 10% in every transaction. His weighting scale shows 5 kg for 4 kg. What is the actual profit % when the displayed weight is 10 kg? If he sells the commodity at its cost price.
a. 35% b. 30% c. –5% d. 50%

106. My digital clock is peculiar. It counts 10 seconds of a normal clock as 1 minute and 60 such minutes of itself as 1 hour. It has also a display which shows the day. It was at par with normal clock at 12 noon on Monday. At 3 p.m of the same day (actual time), I just read the time display of my weird clock. I read
a. 6 p.m, Monday b. 6 p.m, Tuesday c. 6 a.m., Tuesday d. 4 a.m., Tuesday

107. $f(x) = x^2 + 4x + 4$ and $g(x) = x^2 + 4x + 3$, then
Find x such that $f(g(x)) = g(f(x))$.
a. $x = – 1$ b. $x = – 2$ c. $x = – 3$ d. Not possible

108. Two pipes A and B each can fill a tank in 20 mins and 30 mins respectively. A carries milk and B carries water. At 12 noon they simultaneously started filling water and milk together but unfortunately a leak in the form of a circular hole occured at 12:06 p.m. The size of the leak is such that it can evacuate the tank within 20 minutes. At 12:12 the area of the circle doubled. What will be the ratio of milk and water at 12:18, if milkman with impatience suddenly fills up the rest of the tank by water at 12:18?
a. 9 : 16 b. 11 : 17 c. Data insufficient d. None of these

109. How many factors of 1296 will have total number of factors exactly equal to 3?
a. 1 b. 2 c. 3 d. 4

110. If $(52a)_b = (169)_{11}$ and a and b differ by two, find (a + b).
a. 6 b. 8 c. 10 d. 14