Analytical Ability and Logical Reasoning

1. If all the 6's are replaced by 9's, then the algebraic sum of all the numbers from 1 to 100 (both inclusive), varies by
   (A) 333 (B) 300 (C) 279 (D) 330

2. A, B, C, D, E, F and G are members of a family consisting of four adults, three children, three male and four female. Out of the children F and G are girls. A and D are brothers and A is a doctor. E is an engineer married to one of the brothers and has two children. B is married to D and G is their child. Who is C?
   (A) E's daughter (B) A's son
   (C) G's brother (D) F's father

Questions from 3 to 6 are based on the following:

Eight friends J, K, L, M, N, O, P and Q live on eight different floors of a building but not necessarily in the same order. The lower most floor of the building is numbered one, the one above that is numbered two and so on until the top most floor is numbered eight.

- J lives on floor numbered six.
- Only one person lives between J and L.
- O lives on the floor immediately below L.
- Only one person lives between O and P.
- O lives above P.
- K lives on an even numbered floor but not on the floor numbered two.
- Two persons live between K and Q.
- Q does not live on the lower most floor.
- N lives on one of the floors above Q.

3. Who amongst the following lives on the floor number eight?
   (A) P (B) O (C) K (D) Cannot be determined

4. Three of the following four are alike in a certain way based on the given arrangement and thus form a group. Which of the following does not belong to the group?
   (A) PL (B) MQ (C) LN (D) OM

5. If P and L interchange their places, who will live between P and M?
   (A) O (B) L (C) J (D) No one

6. Which of the following is true about M?
   (A) K lives immediately above M. (B) Only two people live between M and Q.
   (C) M lives on an odd numbered floor. (D) M lives on the lower most floor.

7. A family has several children. Each boy in this family has as many sisters as brothers, but each girl has twice as many brothers as sisters. How many brothers and sisters are there?
   (A) 1 and 2 (B) 3 and 4 (C) 6 and 3 (D) 4 and 3

8. In a certain code language '134' means 'good and tasty', '478' means 'see good pictures' and '729' means 'pictures are faint'. Which of the following numerical symbols stand for 'see'?
   (A) 2 (B) 7 (C) 8 (D) 1

9. If the English word 'EXAMINATION' is coded as 56149512965, then the word 'GOVERNMENT' can be coded as
   (A) 7655955552 (B) 7645954452
   (C) 7645954552 (D) 7644956552

Questions 10 to 12 are based on the following:

A team must be selected from the ten probable players A, B, C, D, E, F, G, H, I and J. Of these, A, C, E and J are forwards, B, G and H are point guards and D, F and I are defenders.

- The team must have at least one forward, one point guard and one defender.
- If the team includes J, it must also include F.
- The team must include E or B, but not both.
- If the team includes G, it must also include F.
- The team must include exactly one among C, G and I.
- C and F cannot be members of the same team.
- D and H cannot be members of the same team.
- The team must include both A and D or neither of them.
- There is no restriction on the number of members in the team.

10. What would be the size of the largest possible team?
(A) 7 (B) 6 (C) 5 (D) 4

11. Which of the following cannot be included in a team of size 6?
(A) A (B) H (C) J (D) E

12. What could be the maximum size of the team that includes G?
(A) 4 (B) 5 (C) 6 (D) More than 6

13. 405 sweets were distributed equally among a group of children such that the number of sweets received by each child is one-fifth of the number of children. The number of children in the group is
(A) 45 (B) 9 (C) 21 (D) 15

14. The number of common terms in the two sequences 17, 21, 25, ..., 817 and 16, 21, 26, ..., 851 is
(A) 28 (B) 39 (C) 40 (D) 87

15. *Fact 1:* Most stuffed toys are stuffed with beans.
Fact 2: There are stuffed bears and stuffed tigers.
Fact 3: Some chairs are stuffed with beans.

If the above statements are fact, which of the following statements must also be fact?
1. Only children's chairs are stuffed with beans.
2. All stuffed tigers are stuffed with beans.
3. Stuffed monkeys are not stuffed with beans.

(A) 1 is a fact (B) Only 2 is a fact
(C) Both 2 and 3 are facts (D) None of the statements 1, 2, 3 are true

16. A Group of 630 children are seated in n rows for a group photo session. Each row contains three less children than the row in front of it. Which one of the following number of rows is not possible?
(A) 3 (B) 4 (C) 5 (D) 6

Questions 17 to 19 are based on the following:

- There are six houses P, Q, R, S, T and U, three on either side of a road.
- The houses are of different colours—red, blue, green, orange, yellow and white.
- All the houses are of different heights.
- T, the tallest house is exactly opposite to the red coloured house.
- The shortest house is exactly opposite to the green coloured house.
- U, the orange coloured house is located between P and S.
- R, the yellow coloured house is exactly opposite to P.
- Q, the green coloured house is exactly opposite to U.
- P, the white coloured house is taller than R, but shorter than S and Q.

17. Which is the second largest house?
(A) Q (B) R (C) S (D) Cannot be determined

18. Which is the second shortest house?
(A) P (B) R (C) S (D) Cannot be determined

19. What is the colour of the tallest house?
(A) Red (B) Blue (C) Green (D) Yellow

20. Raman was born on March 5, 1970 Lakshman was born 25 days before Raman. The year when they took birth, the Republic Day fell on Monday. What is the day of birth of Lakshman?
(A) Sunday (B) Monday
(C) Wednesday (D) Saturday

Questions 21 and 22 are based on the following:

A boy is asked to put in a basket one mango when ordered 'One', one orange when ordered 'Two', one apple when ordered 'Three' and is asked to take out from the basket one mango and an orange when ordered 'Four'. A sequence of orders is given as 12332142314223314113234.

21. How many total fruits will be in the basket at the end of the above order sequence?
(A) 9 (B) 8 (C) 11 (D) 10

22. How many total oranges were in the basket at the end of the above sequence?
(A) 1 (B) 4 (C) 3 (D) 2

23. The day after the day after tomorrow is four days after Monday. What day is it today?
(A) Monday (B) Tuesday
(C) Wednesday (D) Thursday

24. A clock is set right at 5 a.m. The clock looses 16 minutes in 24 hours. What will be the correct time when the clock indicates 10 p.m. on the 3rd day?
(A) 11 p.m. (B) 10:45 p.m. (C) 11:15 p.m. (D) 12 p.m.

Questions 25 to 27 are based on the following:

- Eleven students, A, B, C, D, E, F, G, H, I, J and K are sitting in the first row of the class facing the teacher.
- D who is to the immediate left of F is second to the right of C.
- A is second to the right of E, who is at one of the ends.
- J is the immediate neighbour of A and B and third to the left of G.
- H is to the immediate left of D and third to the right of I.

25. Who is sitting in the middle of the row?
(A) B (B) C (C) G (D) I

26. If E and D, C and B, A and H and K and F interchange their positions, which of the following pairs of students are sitting at the ends?
(A) D and E (B) E and F (C) D and K (D) K and F

27. Which of the following groups of friends is sitting to the right of G?
(A) CHDE (B) CHDF (C) IBJA (D) None of these

28. What is the missing number in the series 4, 7, 11, 18, 29, 47, _____, 123, 199?
(A) 76 (B) 77 (C) 86 (D) 87

29. How many pairs of letters are there in the word NECESSARY which have as many letters between them in the word as there are between them in the alphabet and in the same order?
(A) One (B) Two (C) Three (D) Four

30. Unscramble the letters in the following words and find the odd one.

(A) ONGEAR (B) NOONI (C) ALPEP (D) AUVAG

31. A bus starts from its depot filled to seating capacity. It stops at a point A where 1/6th of the passengers alight and 10 board the bus. At point B, 1/5th of the passengers alight and 3 board the bus. At point C which is the last stop, all the 55 passengers alight. The capacity of the bus is

(A) 96 (B) 99 (C) 66 (D) 90

32. Kha-kha is an obscure island which is inhabited by two types of people: the "Yes" type and the "No" type. Native of type 'Yes' ask only questions the right answer to which is 'Yes' while those of type 'No' ask only questions the right answer to which is 'No'. For example the 'Yes' type will ask questions like "Is 2 plus 2 equal to 4?" While the "No" type will ask questions like "Is 2 plus 2 equal to 5?". The following question is based on your visit to the island Kha-kha.

Kevin and Kumar are brothers from the island. Kumar asks you. Is at least one of us is of type 'No'? You can conclude that

(A) Kevin is 'No', Kumar is 'Yes'. (B) Both are 'Yes'.
(C) Kevin is 'Yes', Kumar is 'No'. (D) Both are 'No'.

Questions 33 to 35 are based on the following:

- A, B, C, D, E and F are six members in a family in which there are two married couples.
- D is brother of F.
- Both D and F are lighter than B.
- B is mother of D and lighter than E.
- C a lady, is neither heaviest nor lightest in the family.
- E is lighter than C.
- The grandfather in the family is the heaviest.

33. Which of the following is a pair of married couples?

(A) AB (B) BC (C) AD (D) BE

34. Who among the following will be in the second place if all the members in the family are arranged in a descending order of their weights?

(A) C (B) A (C) D (D) Data inadequate

35. How is C related to D?

(A) Grandmother (B) Cousin
(C) Sister (D) Mother

Questions 36 to 39 are based on the following:

- A group of six friends are sitting around a hexgonal table, each one at one corner of the hexagon.
- Ram is sitting opposite to Ramesh.
- Jyoti is sitting next to Seema.
- Neeta is sitting opposite to Seema but not next to Ram.
- Amrit has a person sitting between Ramesh and himself.

36. Who is sitting between Amrit and Ramesh?

(A) Neeta (B) Jyoti (C) Seema (D) Ram

37. Who is sitting opposite to Jyoti?

(A) Ramesh (B) Neeta (C) Amrit (D) Seema

38. If Seema and Jyoti mutually interchange their positions, then who will be sitting opposite to Neeta?
(A) Jyoti (B) Ram (C) Seema (D) Ramesh

39. If Neeta sits to the right of Amrit, then who is sitting to the left of Amrit?
(A) Ramesh (B) Neeta (C) Jyoti (D) Ram

40. P, Q, R and S are four logical statements such that if P is true, then Q is true; if Q is true, then R is true; and if S is true, then at least one of Q and R is false. Then it follows that
(A) if S is false, then both Q and R are true.
(B) if at least one of Q and R is true, then S is false.
(C) if P is true, then S is false.
(D) if Q is true, then S is true.

Computer Awareness

41. The number of terms in the product-of-sums canonical form of $[\overline{(x_1 + x_2)\,(\overline{x_3\, x_4})}]$ is
(A) 7 (B) 8 (C) 9 (D) 10

42. Find the odd man out:
(A) HTTP (B) FCFS (C) HTML (D) TCP/IP

43. Consider a hard disk with 16 recording surfaces (0 – 15) having 16384 cylinders (0 – 16383) and each cylinder contains 64 sectors (0 – 63). Data storage capacity in each sector is 512 bytes. Data are organized cylinder-wise and the addressing format is < cylinder no., surface no., sector no. >. A file of size 42797 KB is stored in the disk and the starting disk location of the file is < 1200, 9, 40 >. What is the cylinder number of the last sector of the file, if it is stored in a contiguous manner?
(A) 1284 (B) 1282 (C) 1286 (D) 1288

44. Consider the following minterm expression for F.
$F(P, Q, R, S) = \sum 0, 2, 5, 7, 8, 10, 13, 15$
The minterms 2, 7, 8 and 13 are 'do not care' terms. The minimal sum of-products form for F is
(A) $Q\bar{S} + \bar{Q}S$
(B) $QS + \bar{Q}\bar{S}$
(C) $\bar{Q}R\bar{S} + \bar{Q}R\bar{S} + QR\bar{S} + QRS$
(D) $\bar{P}\bar{Q}\bar{S} + \bar{P}QS + PQS + P\bar{Q}\bar{S}$

45. Consider the equation $(43)_x = (y3)_8$ where x and y are unknown. The number of possible solutions is
(A) 4 (B) 6 (C) 5 (D) 7

46. Subtract $(1010)_2$ from $(1101)_2$ using first complement
(A) $(1100)_2$ (B) $(0101)_2$ (C) $(1001)_2$ (D) $(0011)_2$

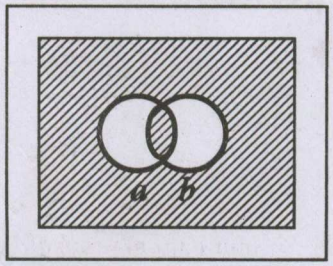
47. A hard disk has a rotational speed of 6000 rpm. Its average latency time is
(A) 5×10^{-3} sec (B) 0.05 sec (C) 1 sec (D) 0.5 sec

48. The 2's complement representation of the number $(-100)_{10}$ in an 8 bit computer is
(A) 10011011
(B) 01100100
(C) 11100100
(D) 10011100

49. The range of n-bit signed magnitude representation is

(A) 0 to $2^n - 1$
(B) $-(2^{n-1} - 1)$ to $(2^{n-1} - 1)$
(C) $-(2^n - 1)$ to $(2^n - 1)$
(D) 0 to $2^{n-1} - 1$

50. The Boolean expression represented by the following Venn diagram is



(A) a XOR b
(B) $a'b + ab'$
(C) $ab + a'b'$
(D) $(a + b')(a' + b)$

Mathematics

51. If C is the midpoint of AB and P is any point outside AB, then

(A) $\overrightarrow{PA} + \overrightarrow{PB} = 2\overrightarrow{PC}$
(B) $\overrightarrow{PA} + \overrightarrow{PB} = \overrightarrow{PC}$
(C) $\overrightarrow{PA} + \overrightarrow{PB} + 2\overrightarrow{PC} = \vec{0}$
(D) $\overrightarrow{PA} + \overrightarrow{PB} + \overrightarrow{PC} = \vec{0}$

52. The average marks of boys in class is 52 and that of girls is 42. The average marks of boys and girls combined is 50. the percentage of boys in the class is

(A) 80%
(B) 60%
(C) 40%
(D) 20%

53. The number of 5 people groups that can be selected from 9 people when two particular persons are not to be in the same group is

(A) 126
(B) 35
(C) 91
(D) 252

54. The solution set of equation $\log_x 2 \log_{2x} 2 = \log_{4x} 2$ is

(A) $\{2^{-\sqrt{2}}, 2^{\sqrt{2}}\}$
(B) $\{1/2, 2\}$
(C) $\{1/4, 2^2\}$
(D) $\{1/4, 2\}$

55. If a twelve sided regular polygon is inscribed in a circle of radius 3 centimeters, then the length of each side of the polygon is

(A) 3
(B) $18 - 9\sqrt{3}$
(C) $18 + 9\sqrt{3}$
(D) $9(1-\sqrt{3})$

56. $\int \frac{x^2-1}{x^3\sqrt{2x^4-2x^2+1}}dx$ is equal to

(A) $\frac{\sqrt{2x^4-2x^2+1}}{x^2}+C$ (B) $\frac{\sqrt{2x^4-2x^2+1}}{x^3}+C$

(C) $\frac{\sqrt{2x^4-2x^2+1}}{x}+C$ (D) $\frac{\sqrt{2x^4-2x^2+1}}{2x^2}+C$

57. If $\vec{a}, \vec{b}$ and $\vec{a}+\vec{b}$ are vectors of magnitude α then the magnitude of the vector $\vec{a}-\vec{b}$ is

(A) $\sqrt{2}\,\alpha$ (B) $\sqrt{3}\,\alpha$ (C) 2α (D) 3α

58. A box contains 2 blue caps, 4 red caps, 5 green caps and 1 yellow cap. If four caps are picked at random, the probability that none of them is green is

(A) 7/99 (B) 7/12 (C) 5/99 (D) 5/12

59. The line $3x + 5y = k$ touches the ellipse $16x^2 + 25y^2 = 400$ if k is

(A) $\pm\sqrt{5}$ (B) $\pm\sqrt{15}$ (C) ± 25 (D) $\pm\sqrt{35}$

60. If $X=\{4^n-3n-1, n\in N\}$ and $Y=\{9n-9, n\in N\}$, then X∪Y is equal to

(A) Y (B) X (C) N (D) None of these

61. $\int\left\{\frac{(\log x-1)}{1+(\log x)^2}\right\}^2 dx$ is equal to

(A) $\frac{xe^x}{1+x^2}+C$ (B) $\frac{x}{(\log x)^2+1}+C$

(C) $\frac{\log x}{(\log x)^2+1}+C$ (D) $\frac{x}{x^2+1}+C$

62. The volume of the parallelepiped determined by u = i + 2j – k, v = – 2i + 3k and w = 7j – 4k is

(A) 21 (B) 22 (C) 23 (D) 24

63. The vector perpendicular to the plane passing through (1, –1, 0) (2, 1, –1) and (–1, 1, 2) is

(A) $6\bar{i}+6\bar{k}$ (B) $6\bar{i}+7\bar{k}$

(C) $7\bar{i}+6\bar{k}$ (D) $7\bar{i}+8\bar{k}$

64. The equation of a circle with diameters are $2x - 3y + 12 = 0$ and $x + 4y - 5 = 0$ and area of 154 sq. units is

(A) $x^2+y^2-6x+4y-36=0$ (B) $x^2+y^2+6x-4y-36=0$

(C) $x^2+y^2-6x-4y+25=0$ (D) None of these

65. For any two events A and B, the probability that atleast one of them occur is 0.6. If A and B occur simultaneously with a probablity 0.3, then $P(A') + P(B')$ is

(A) 0.9 (B) 1.15 (C) 1.1 (D) 1.0

66. Two finite sets A and B are having m and n elements. The total number of subsets of the first set is 56 more than the total number of subsets of the second set. The value of m and n are

(A) 7, 6 (B) 6, 3 (C) 5, 3 (D) 8, 7

67. Which of the following statements is FALSE?

(A) $2 \in A \cup B$ implies that if $2 \notin A$ then $2 \in B$.

(B) $\{2, 3\} \subseteq A$ implies that $2 \subseteq A$ and $3 \subseteq A$.

(C) $A \cap B \supseteq \{2, 3\}$ implies that $\{2, 3\} \subseteq A$ and $\{2, 3\} \subseteq B$..

(D) $\{2\} \in A$ and $\{3\} \in A$ implies that $\{2, 3\} \subseteq A$.

68. If $2x^2 + 7xy + 3y^2 + 8x + 14y + \lambda = 0$ represents a pair of straight lines, the value of λ is

(A) 2 (B) 4 (C) 6 (D) 8

69. The area of the region bounded by the lines $y = |x - 1|$ and $y = 3 - |x|$ is

(A) 3 sq. units (B) 4 sq. units

(C) 6 sq. units (D) 2 sq. units

70. In a triangle ABC, a = 4, b = 3, $\angle BAC = 60°$, then the equation for which c is the root, is

(A) $c^2 + 3c + 7 = 0$ (B) $c^2 + 3c - 7 = 0$

(C) $c^2 - 3c + 7 = 0$ (D) $c^2 + 3c - 7 = 0$

71. If $Cos\theta = \frac{5}{13}, \frac{3\pi}{2} < \theta < 2\pi$, then $\tan 2\theta$ is

(A) $\frac{-120}{119}$ (B) $\frac{-120}{169}$ (C) $\frac{119}{169}$ (D) $\frac{120}{119}$

72. An experiment has 10 equally likely outcomes. Let A and B be two non-empty events of the experiment. If A consists of 4 outcomes, the number of outcomes that B must have so that A and B are independent, is

(A) 2, 4 or 8 (B) 3, 6 or 9 (C) 4 or 8 (D) 5 or 10

73. Let $\vec{a}, \vec{b}$ and $\vec{c}$ be three non-zero vectors, no two of which are collinear. If the vector $\vec{a} + 2\vec{b}$ is collinear with $\vec{c}$ and $\vec{b} + 3\vec{c}$ is collinear with $\vec{a}$, then $\vec{a} + 2\vec{b} + 6\vec{c}$ is equal to

(A) $\lambda\vec{a}$ (B) $\lambda\vec{b}$ (C) $\lambda\vec{c}$ (D) $\vec{0}$

74. The value of a, for which the sum of the squares of the roots of the equation $x^2 - (a - 2)x - (a + 1) = 0$, assumes the least value is

(A) 3 (B) 2 (C) 0 (D) 1

75. There are n equally spaced points 1, 2, ..., n marked on the circumference of a circle. If the point 15 is directly opposite to the point 49, then the total number of points is

(A) 50 (B) 68 (C) 66 (D) 70

76. Let $S = \{1, 2, \cdots, n\}$. The number of possible pairs of the form (A, B) with $A \subseteq B$ for subsets A, B of S is

(A) 2^n (B) 3^n

(C) n! (D) $\sum_{k=0}^{n} \binom{n}{k}\binom{n}{n-k}$

77. The probability that A speaks truth is 4/5 while this probability for B is 3/4. The probability that they contradict each other when asked to speak on a fact is

(A) 3/20 (B) 1/5 (C) 7/20 (D) 4/5

78. The sum of the expression $\frac{1}{\sqrt{1}+\sqrt{2}}+\frac{1}{\sqrt{2}+\sqrt{3}}+\frac{1}{\sqrt{3}+\sqrt{4}}+\cdots+\frac{1}{\sqrt{80}+\sqrt{81}}$ is

(A) 7 (B) 8 (C) 9 (D) 10

79. Consider the function f defined by $f(x)=\begin{cases} x^2-1, & x<3 \\ 2ax, & x\geq 3 \end{cases}$ for all real numbers x. If f is continuous at $x=3$, then value a is

(A) 8 (B) 3/4 (C) 1/8 (D) 4/3

80. Three houses are available in a locality. Three persons apply for the houses. Each applies for one house without consulting others. The probability that all the three apply for the same house is

(A) 8/9 (B) 7/9 (C) 2/9 (D) 1/9

81. Five horses are in a race. Mr. A selects two of the horses at random and bets on them. The probability that Mr. A selected the winning horse is

(A) 3/5 (B) 1/5 (C) 2/5 (D) 4/5

82. If $3^x = 4^{x-1}$, then x =

(A) $\frac{2-\log_3 2}{2\log_3 2-1}$ (B) $\frac{2}{2\log_3 2-1}$

(C) $\frac{2-\log_3 2}{2\log_3 2+1}$ (D) $\frac{2\log_3 2}{2\log_2 3-1}$

83. The matrix A has x rows and $(x+5)$ columns and the matrix B has y rows and $(11-y)$ columns. If both the matrices AB and BA exist, then the values of x and y are

(A) 8, 3 (B) 3, 5 (C) 3, 8 (D) 8, 5

84. A circus artist is climbing a 20 m long rope, which is tightly stretched and tied from the top of a vertical pole to the ground. Find the height of the pole, if the angle made by the rope with the ground level is 30°.

(A) 10 m (B) 20 m (C) 30 m (D) 40 m

85. There are 4 books on fairy tales, 5 novels and 3 plays. In how many ways can they be arranged in the order, books on fairy tales, novels and then plays so that the books of same category are put together?

(A) 17280 (B) 103680 (C) 51840 (D) 360

86. Suppose a population A has 100 observations 101, 102, ... 200 and another population B has 100 observations 151, 152, ..., 250. If V_A and V_B represent variance of the two populations respectively, then $\frac{V_A}{V_B}$ is

(A) 9/4 (B) 4/9 (C) 1 (D) 2/3

87. Sum of the roots of the equation $4^x - 3\,(2^{x+3}) + 128 = 0$ is

(A) 5 (B) 6 (C) 7 (D) 8

88. If the sum of the slopes of the lines given by $x^2 - 2cxy - 7y^2 = 0$ is four times their product, then the value of c is

(A) 1 (B) -1 (C) -2 (D) 2

89. The system of equations

$$x + y + 2z = a$$
$$x + z = b$$
$$2x + y + 3z = c$$

has a solution if

(A) $b = c$ (B) $c = a + b$ (C) $c = a + 2b$ (D) $a = b = c$

90. Let $f(x) = x^2 - bx + c$, b is an odd positive integer. If $f(x) = 0$ has two prime numbers as roots and $b + c = 35$, then the global minimum value of $f(x)$ is

(A) $-183/4$ (B) $173/16$

(C) $-81/4$ (D) $17/2$

91. The vertex of the parabola whose focus is $(-1, 1)$ and directrix is $4x + 3y - 24 = 0$ is

(A) $\left(0, \frac{3}{2}\right)$ (B) $\left(0, \frac{5}{2}\right)$

(C) $\left(1, \frac{3}{2}\right)$ (D) $\left(1, \frac{5}{2}\right)$

92. The number of points in $(-\infty, \infty)$, for which $x^2 - x \sin x - \cos x = 0$ is

(A) 6 (B) 4 (C) 2 (D) 0

93. The permutations of {a, b, c, d, e, f, g} are listed in lexicographic order. Which of the following permutations are just before and just after the permutation bacdefg?

(A) agfedbc and bacdfge
(B) agfedcb and badcefg
(C) agfebcd and bacedgf
(D) agfedcb and bacdegf

94. The foci of the ellipse $\frac{x^2}{16}+\frac{y^2}{b^2}=1$ and the hyperbola $\frac{x^2}{144}-\frac{y^2}{81}=\frac{1}{25}$ coincide. Then the value of b^2 is

(A) 5
(B) 7
(C) 9
(D) 1

95. If $\vec{a},\vec{b}$ are vectors such that $|\vec{a}+\vec{b}|=\sqrt{29}$ and $\vec{a}\times\left(2\hat{i}+3\hat{j}+4\hat{k}\right)=\left(2\hat{i}+3\hat{j}+4\hat{k}\right)\times\vec{b}$ then a possible value of $\left(\vec{a}+\vec{b}\right).\left(-7\hat{i}+2\hat{j}+3\hat{k}\right)$ is

(A) 0
(B) 3
(C) 4
(D) 8

96. Let $x_1, x_2, ..., x_n$ be n observations such that $\sum x_i^2 = 400$ and $\sum x_i = 80$. Then a possible value of n among the following is

(A) 10
(B) 15
(C) 20
(D) 8

97. Area of the greatest rectangle that can be inscribed in the ellipse is

(A) $\sqrt{ab}$
(B) $2ab$
(C) ab
(D) a/b

98. Two common tangents to the circle $x^2 + y^2 = 2a^2$ and parabola $y^2 = 8ax$ are

(A) $x = \pm(y + 2a)$
(B) $y = \pm(x + 2a)$
(C) $x = \pm(y + a)$
(D) $y = \pm(x + a)$

99. If $a_1, a_2, ..., a_n$ are in A. P. and $a_1 = 0$, then the value of $\left(\frac{a_3}{a_2}+\frac{a_4}{a_3}+\cdots+\frac{a_n}{a_{n-1}}\right)-a_2\left(\frac{1}{a_2}+\frac{1}{a_3}+\cdots+\frac{1}{a_{n-2}}\right)$ is equal to

(A) $(n-2)+\frac{1}{(n-2)}$
(B) $\frac{1}{n-2}$
(C) $n-2$
(D) $n-\frac{1}{n-2}$

100. The value of cos 20° + cos 100° + cos 140° is

(A) 0
(B) $\frac{1}{\sqrt{2}}$
(C) $\frac{1}{2}$
(D) 1

General English

Questions 101 to 104 are based on the following:

While cement is the basic raw material for producing cement tiles and cement paint which are used extensively in building construction. The main consumers of white cement are, therefore, cement tile and cement paint manufacturing units. These consumers, mostly in the small scale sector, are today facing a major crisis because of a significant increase in the price of white cement during a short period. The present annual licensed production capacity of white and grey cement in the country is approximately 3.5 lakh tonnes. The average demand is 2–2.5 lakh tonnes. This means that there is idle capacity to the tune of one lakh tonnes or more. The price rise is, therefore, not a phenomenon arising out of inadequate production capacity but evidently because of artificial scarcity created by the manufacturers in their self-interest.

The main reason for the continuing spurt in cement price is its decontrol. As it is, there is stiff competition in the cement paint and tile manufacturing business. Any further price revision at this stage is bound to have a severe adverse impact on the market conditions. The Government should take adequate steps to ensure that suitable controls are brought in. Else it should allow import of cement.

101. What is the crisis being faced by the cement tile manufacturers as described in the passage?
(A) White cement prices are very high
(B) White cement is not of good quality
(C) White cement usage is high
(D) White cement is priced very low

102. Which of the following words has the same meaning as the word 'artificial' as used in the passage?
(A) Deliberate
(B) Prolonged
(C) Practical
(D) Unnatural

103. Which of the following words has the opposite meaning as the word 'basic' as used in the passage?
(A) Vital
(B) Unimportant
(C) Acidic
(D) Last

104. Why is the price of cement going up?
(A) Because the Government is controlling the quota
(B) Because of export of white cement
(C) Because of the large usage of white cement
(D) None of the above

105. Which of the following words means 'Theatrical'?
(A) Thrilling
(B) Histrionic
(C) Delicate
(D) Delicious

106. Identify the word which is different from the rest of the words:
(A) Indisputable
(B) Uncertain
(C) Dubious
(D) Doubtful

107. Choose the word that accurately signifies a person who makes money by starting or running business:
(A) Antreprenour
(B) Andrapreneur
(C) Entrapranour
(D) Entrepreneur

108. Which of the following is correct phrase to describe a group of insects?
(A) A flock of insects
(B) A swarm of insects
(C) A school of insects
(D) A shoal of insects

109. Which of the following has closest meaning to the word 'REPUTATION'?
(A) Character
(B) Respect
(C) Fame
(D) Honour

110. The meaning of the word "EGRESS" is
(A) Entrance (B) Exit
(C) Double (D) Program

111. Choose the answer which best expresses the meaning of the idiom/phrase 'Elbow room'
(A) Opportunity for freedom of action (B) Special room for the guest
(C) To give enough space to move or work in (D) To add a new room to the house

112. Select the pair that best expresses a relationship similar to that expressed in SCALE : TONE
(A) Physician : Medicine (B) Wave : Amplitude
(C) Spectrum : Colour (D) Rainbow : Shower

113. Choose the answer which best expresses the meaning of the idiom/phrase "to burn a hole in the pocket".
(A) Steal from someone's pocket. (B) To destroy other's belongings.
(C) To be very miserly. (D) Money that is spent quickly.

114. Choose the correct alternative to fill the blank
My window look _____ the garden.
(A) up on (B) out on (C) in (D) at

115. Fill in the blank with suitable article
_____ darkest cloud has a silver lining.
(A) An (B) A (C) The (D) From

116. Fill in the blank with appropriate adjective
This steak is completely_____, it is cold and tough.
(A) edible (B) erratic (C) unswerving (D) thedible

117. Fill in the blank with a suitable preposition
We have been looking for a new flat_____ ages.
(A) since (B) for (C) during (D) in

118. Fill in the blank with appropriate verb
Where is he? He should_____ home hours ago.
(A) be (B) have been (C) had been (D) were

119. Fill in the blank with appropriate question tag
You should n't be here on a holiday,_____
(A) should n't you? (B) should you not?
(C) would n't you? (D) should you?

120. Change the following sentence into passive sentence
They studied Mathematics last year.
(A) Mathematics was studied by them last year.
(B) Mathematics were studied by them last year.
(C) Mathematics has been studied by them last year.
(D) Mathematics studied them last year.

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