

MATHEMATICS

1. If $\theta = \tan^{-1} \frac{1}{1+2} + \tan^{-1} \frac{1}{1+(2)(3)} + \tan^{-1} \frac{1}{1+(3)(4)} + \dots + \tan^{-1} \frac{1}{1+n(n+1)}$ then $\tan \theta$ is equal to

- (a) $\frac{n}{n+1}$ (b) $\frac{n+1}{n+2}$ (c) $\frac{n}{n+2}$ (d) $\frac{n+1}{n+2}$

2. If the distance of any point (x, y) from the origin is defined as $d(x, y) = \max(|x|, |y|)$, then the locus of the point (x, y) where $d(x, y) = 1$ is

- (a) a square of area 1 sq. unit
(b) a circle of radius 1
(c) a triangle
(d) a square of area 4 sq. units

3. The number of solutions for

$$\tan^{-1} \sqrt{x(x+1)} + \sin^{-1} \sqrt{x^2 + x + 1} = \frac{\pi}{2} \text{ is}$$

- (a) zero (b) one (c) two (d) infinite

4. Let ABC be an isosceles triangle with $AB = BC$. If base BC is parallel to x-axis and m_1, m_2 are slopes of medians drawn through the angular points B and C, then

- (a) $m_1 m_2 = -1$ (b) $m_1 + m_2 = 0$

(c) $m_1 m_2 = 2$

(d) $(m_1 - m_2)^2 + 2m_1 + m_2 = 0$

5. If $a + b + c \neq 0$, then the system of equations

$$(b + c)(y + z) - ax = b - c$$

$$(c + a)(z + x) - by = c - a$$

$$(a + b)(x + y) - cz = a - b \text{ has}$$

- (a) a unique solution
(b) no solution
(c) infinite number of solutions
(d) finitely many solutions

6. The value of $\int_0^{\pi} \frac{x \sin x}{1 + \cos^2 x} dx$ is

- (a) $\frac{\pi^2}{3}$ (b) $\frac{\pi^2}{4}$ (c) $\frac{\pi^2}{6}$ (d) $\frac{\pi^2}{2}$

7. If $\tan^{-1} 2x + \tan^{-1} 3x = \frac{\pi}{4}$, then x is

- (a) 1/6 (b) 1/3 (c) 1/2 (d) 1/4

8. If $A = \cos^2 \theta + \sin^4 \theta$, then for all values of θ

(a) $1 \leq A \leq 2$ (b) $\frac{13}{16} \leq A \leq 1$

(c) $\frac{3}{4} \leq A \leq \frac{13}{16}$ (d) $\frac{3}{4} \leq A \leq 1$

9. A man has 5 coins, two of which are double-headed, one is double-tailed and two are normal. He shuts his eyes, picks a coin at random, and tosses it. The probability that the lower face of the coin is a head is

- (a) 1/5 (b) 2/5 (c) 3/5 (d) 4/5

10. How many different paths in the xy-plane are there from $(1, 3)$ to $(5, 6)$, if a path proceeds one step at a time by going either one step to the right (R) or one step upward (U) ?

- (a) 35 (b) 40 (c) 45 (d) None

11. Water runs into a conical tank of radius 5 feet and height 10 feet, at a constant rate of 2 feet³/minute. How fast is the water level rising when the water is 6 feet deep ?

(a) $\frac{2}{9}$ feet / minute (b) $\frac{2}{9\pi}$ feet / minute

(c) $\frac{2\pi}{9}$ feet / minute (d) $\frac{\pi}{9}$ feet / minute

12. The vector $\vec{B} = 3\hat{i} + 4\hat{k}$ is to be written as the sum of a vector \vec{B}_1 parallel to $\vec{A} = \hat{i} + \hat{j}$ and a vector \vec{B}_2 perpendicular to \vec{A} , then \vec{B}_1 is

(a) $\frac{3}{2}(\hat{i} + \hat{j})$ (b) $\frac{2}{3}(\hat{i} + \hat{j})$

(c) $\frac{1}{2}(\hat{i} + \hat{j})$ (d) None of these

13. A and B are independent witnesses in a case. The probability that A speaks the truth is 'x' and that B speaks the truth is 'y'. If A and B agree on a certain statement, the probability that the statement is true is

(a) $\frac{xy}{xy + (1-x)(1-y)}$ (b) $\frac{xy}{(1-x)(1-y)}$

(c) $\frac{(1-x)(1-y)}{xy + (1-x)(1-y)}$ (d) $\frac{(1-x)(1-y)}{xy}$

14. There are 10 points in a plane. Out of these 6 are collinear. The number of triangles formed by joining these points is

- (a) 100 (b) 120 (c) 150 (d) None

15. The straight lines $\frac{x}{a} - \frac{y}{b} = k$ and $\frac{x}{a} + \frac{y}{b} = \frac{1}{k}$, $k \neq 0$ meet on
 (a) a parabola (b) an ellipse
 (c) a hyperbola (d) a circle
16. The total number of relations that exist from the set A with m elements in to the set A \times A is
 (a) m^2 (b) m^3 (c) m (d) None
17. Let A and B be two events such that $P(\overline{A \cup B}) = \frac{1}{6}$, $P(A \cap B) = \frac{1}{4}$ and $P(\overline{A}) = \frac{1}{4}$. Then events A and B are
 (a) independent but not equally likely
 (b) mutually exclusive and independent
 (c) equally likely and mutually exclusive
 (d) equally likely but not independent
18. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, then, $I + A + A^2 + \dots \infty$ equals to
 (a) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ (b) $\begin{bmatrix} -1 & -2 \\ -3 & -4 \end{bmatrix}$
 (c) $\begin{bmatrix} 1 & -1 \\ 2 & -3 \end{bmatrix}$ (d) $\begin{bmatrix} -1 & 1 \\ 4 & 3 \end{bmatrix}$
 (e) $\begin{bmatrix} 1 & 1 \\ -1 & 0 \end{bmatrix}$ (f) $\begin{bmatrix} 1 & 1 \\ 2 & 0 \end{bmatrix}$
19. A square with side 'a' is revolved about its centre through 45° . What is the area common to both the squares?
 (a) $2(\sqrt{2}-1)a^2$ (b) $(\sqrt{2}+1)\frac{a^2}{2}$
 (c) $(\sqrt{3}-1)a^2$ (d) $(\sqrt{5}-1)a^2$
20. If $P = \{(4^n - 3n - 1)/n \mid n \in N\}$ and $Q = \{(9n - 9)/n \mid n \in N\}$, then $P \cup Q$ is equal to
 (a) N (b) P (c) Q (d) none
21. Let $f(x) = [x^2 - 3]$ where [] denotes the greatest integer function. Then, the number of points in the interval (1, 2) where the function is discontinuous is
 (a) 4 (b) 2 (c) 6 (d) none
22. If \vec{a}, \vec{b} and \vec{c} are unit vectors, then $|\vec{a} - \vec{b}|^2 + |\vec{b} - \vec{c}|^2 + |\vec{c} - \vec{a}|^2$ does not exceed
 (a) 9 (b) 4 (c) 8 (d) 6
23. If $2x^4 + x^3 - 11x^2 + x + 2 = 0$, then the values of $x + \frac{1}{x}$ are
 (a) $-3, \frac{5}{2}$ (b) $-\frac{5}{2}, 3$ (c) $\frac{2}{3}, \frac{1}{3}$ (d) $\frac{1}{3}, -5$
24. If A is 3×3 matrix with $\det(A) = 3$, then $\det(\text{adj } A)$ is
 (a) 3 (b) 9 (c) 27 (d) 8
25. If $x < -1$ and $2^{|x+1|} - 2^x = |2^x - 1| + 1$, then the value of x is
 (a) -2 (b) 2 (c) 0 (d) 1
26. If $\sin^{-1} x + \cos^{-1}(1-x) = \sin^{-1}(-x)$, then x satisfies the equation
 (a) $2x^2 - x + 2 = 0$ (b) $2x^2 - 3x = 0$
 (c) $2x^2 + x - 1 = 0$ (d) none of these
27. If $\vec{a}, \vec{b}, \vec{c}$ are non-coplanar unit vectors such that $\vec{a} \times (\vec{b} \times \vec{c}) = \frac{\vec{b} + \vec{c}}{\sqrt{2}}$, then the angle between \vec{a} and \vec{b} is
 (a) $\frac{\pi}{4}$ (b) $\frac{3\pi}{4}$ (c) $\frac{\pi}{2}$ (d) π
28. The equation $\sin^4 x + \cos^4 x + \sin 2x + \alpha = 0$ is solvable for
 (a) $-\frac{1}{2} \leq \alpha \leq \frac{1}{2}$ (b) $-3 \leq \alpha \leq 1$
 (c) $-\frac{3}{2} \leq \alpha \leq \frac{1}{2}$ (d) $-1 \leq \alpha \leq 1$
29. A and B throw a die in succession to win a bet with A starting first. Whoever throws '1' first wins an amount of Rs. 110. What are the respective expectations of A and B?
 (a) Rs. 70 and Rs. 40 (b) Rs. 60 and Rs. 50
 (c) Rs. 75 and Rs. 35 (d) None of these
30. The probability that a man who is 85 yrs. old will die before attaining the age of 90 is $\frac{1}{3}$. A_1, A_2, A_3 and A_4 are four are four persons who are 85 yrs. old. The probability that A_1 will die before attaining the age of 90 and will be the first to die is
 (a) $\frac{65}{81}$ (b) $\frac{13}{81}$ (c) $\frac{65}{324}$ (d) $\frac{13}{108}$
31. Find the value of k in the equation $x^3 - 6x^2 + kx + 64 = 0$, if it is known that the roots of the equation are in geometric progression.
 (a) 24 (b) 16 (c) -16 (d) -24
32. If $(1+x-2x^2)^6 = 1 + a_1x + a_2x^2 + \dots + a_{12}x^{12}$, then the value of $a_2 + a_4 + a_6 + \dots + a_{12}$ is
 (a) 1024 (b) 64 (c) 32 (d) 31
33. The smaller of the areas bound by $y = 2 - x$ and $x^2 + y^2 = 4$ is
 (a) $\pi - 1$ (b) $\pi - 2$ (c) $2\pi - 1$ (d) $2\pi - 2$

34. The number of distinct integral values of 'a' satisfying the equation $2^{2a} - 3(2^{a+2}) + 2^5 = 0$ is
(a) 0 (b) 1 (c) 2 (d) 3
35. A_1, A_2, A_3 and A_4 are subsets of a set U containing 75 elements with the following properties : Each subset contains 28 elements; the intersection of any two of the subsets contains 12 elements; the intersection of any three of the subsets contains 5 elements; the intersection of all four subsets contains 1 element. The number of elements belonging to none of the four subsets is
(a) 15 (b) 17 (c) 16 (d) 18
36. From 50 students taking examination in Mathematics, Physics and Chemistry, 37 passed Mathematics, 24 Physics and 43 Chemistry. At most 19 passed Mathematics and Physics, at most 29 Mathematics and Chemistry and at most 20 Physics and Chemistry. The largest possible number that could have passed all three examinations is
(a) 10 (b) 12 (c) 9 (d) none
37. If $y = f(x)$ is an odd and differentiable function defined on $(-\alpha, \alpha)$ such that $f'(3) = -2$, then $f'(-3)$ equals to
(a) 4 (b) 2 (c) -2 (d) 0
38. An open-top box is to be made out of a piece of cardboard measuring $6m \times 6m$ by cutting off equal squares from the corners and turning up the sides. The height of the box for maximum volume is
(a) $2m$ (b) $2.5m$ (c) $1.2m$ (d) none
39. An anti aircraft gun can take a maximum of four shots at an enemy plane moving away from it. The probabilities of hitting the plane at first, second, third and fourth shot are 0.4, 0.3, 0.2 and 0.1 respectively. The probability that the gun hits the plane then is
(a) 0.6972 (b) 0.6978
(c) 0.6976 (d) 0.6974
40. A random variable X has the distribution law as given below :
- | | | | |
|--------|-----|-----|-----|
| x | 1 | 2 | 3 |
| P(X=x) | 0.3 | 0.4 | 0.3 |
- The variance of the distribution is
(a) 0.4 (b) 0.6 (c) 2 (d) None
41. If the straight line $ax + by + c = 0$ always passes through $(1, -2)$ then a, b, c are in
(a) A.P. (b) H.P.
(c) G.P. (d) None of these
42. The area of the parallelogram whose diagonals are $\vec{a} = 3\vec{i} + \vec{j} - 2\vec{k}$ and $\vec{b} = \vec{i} - 3\vec{j} + 4\vec{k}$ is
(a) $10\sqrt{3}$ (b) $5\sqrt{3}$
(c) $10\sqrt{2}$ (d) $5\sqrt{2}$
43. If $\log_x y = 100$ and $\log_2 x = 10$, then the value of y is
(a) 2^{10} (b) 2^{100} (c) 2^{1000} (d) 2^{10000}
44. Let T_n denote the number of triangles which can be formed by using the vertices of a regular polygon of n sides. If $T_{n+1} - T_n = 21$ then n equals
(a) 5 (b) 7 (c) 6 (d) 4
45. The number of words that can be formed by using the letters of the word MATHEMATICS that start as well as end with T is
(a) 80720 (b) 90720 (c) 20860 (d) 37528
46. If $A - B = \frac{f}{4}$, then $(1 + \tan A)(1 - \tan B)$ is equal to
(a) 2 (b) 1 (c) 0 (d) 3
47. If two towers of heights h_1 and h_2 subtend angles 60° and 30° respectively at the mid point of the line joining their feet, then $h_1 : h_2$ is
(a) 1 : 2 (b) 1 : 3 (c) 2 : 1 (d) 3 : 1
48. What is the value of a for which $f(x) = \begin{cases} \sin x & \text{if } x \leq \frac{f}{2} \\ ax & \text{if } x > \frac{f}{2} \end{cases}$ is continuous ?
(a) f (b) $\frac{f}{2}$ (c) $\frac{2}{f}$ (d) 0
49. If the real number x when added to its inverse gives the minimum value of the sum, then the value of x is equal to
(a) -2 (b) 2 (c) 1 (d) -1
50. A set contains $(2n+1)$ elements. If the number of subsets which contain at most n elements is 4096, then the value of n is
(a) 28 (b) 21 (c) 15 (d) 6

ANALYTICAL ABILITY AND
LOGICAL REASONING

51. Bala had three sons. He had some chocolates which he distributed among them. To his eldest son, he gave 3 chocolates more than half the number of chocolates with him. To his second eldest son he gave 4 chocolates more than one-third of the remaining number of chocolates with him. To his youngest son he gave 4 chocolates more than one-fourth of the remaining number of chocolates with him. He was left with 11 chocolates. How many chocolates did he initially have ?
(a) 180 (b) 78
(c) 144 (d) 120

52. Find the value of 'x', if

$$\left(\frac{1}{2^{\log_x 4}}\right)\left(\frac{1}{2^{\log_x 16}}\right)\left(\frac{1}{2^{\log_x 256}}\right)\dots \infty = 2$$

- (a) 2 (b) 1/2 (c) 4 (d) 1/4

53. Find the unit digit of $(13687)^{3265}$

- (a) 1 (b) 3 (c) 7 (d) 9

54. How many pairs of letters are there in the word 'PRISON', each of which has as many letters between its two letters in the word as there are between them in the English alphabet ?

- (a) Two (b) One (c) Four (d) Three

55. Twelve villages in a district are divided into 3 zones with 4 villages per each zone. The telephone department of the district intends to connect the villages with telephone lines such that every two villages in the same zone are connected with three direct lines and every two villages belonging to different zones are connected with two direct lines. How many direct lines are required ?

- (a) 210 (b) 96 (c) 54 (d) 150

56. Sum of all three digit numbers (no digit being zero) having the property that all digits are perfect squares is

- (a) 3108 (b) 6216 (c) 13986 (d) None

57. A teacher gave a student the task of adding 'N' natural numbers starting from 1. After a while, the student reported his result as 700. The teacher replied that his result was wrong. The student realized that he had added one number twice by mistake. Find the sum of the digits of the number which the student had added twice.

- (a) 5 (b) 6 (c) 7 (d) 8

58. Computer A takes 3 minutes to process an input while computer B takes 5 minutes. If computers A, B and C can process an average of 14 inputs in one hour, how many minutes does computer C alone take to process one input ?

- (a) 10 (b) 4 (c) 6 (d) None

59. If $A + B = C + D$, $B + D = 2A$, $D + E > A + B$, $C + D > A + E$, then which of the following is true ?

- (a) $D > B > E > A > C$ (b) $A > B > D > E > C$
(c) $A > D > B > E > C$ (d) $D > A > B > E > C$

60. Reena visited her High School friend, Natasha after their 25th school reunion. "What a nice pair of children you have, are they twins?", Reena asked.

"No my sister is older than I", said Natasha's son Rahul. "The square of my age plus the cube of her age is 7148".

"The square of my age plus the cube of his age is 5274", said Preeti, Natasha's daughter.

How old were they ?

- (a) Preeti 23 Rahul 14 (b) Preeti 18 Rahul 16
(c) Preeti 21 Rahul 19 (d) Preeti 19 Rahul 17

61. What will come in place of the question mark (?) in the following series ?

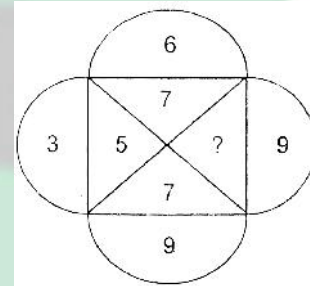
12 22 69 272 1365 ?

- (a) 8196 (b) 8195 (c) 6830 (d) 8184

62. Divide Rs. 1074 (in whole Rs. having incremental amounts) into a number of bags so that I can ask for any amount between Re. 1 and Rs. 1074, and you can give me the proper amount by selecting a certain number of these bags without opening them. What is the minimum number of bags you will require ?

- (a) 12 (b) 10 (c) 9 (d) 11

63. Which number will be there in the place of question mark (?) in the following figure ?



- (a) 5 (b) 6 (c) 4 (d) 8

64. The remainder when $x = 1! + 2! + 3! + \dots + 100!$ is divided by 240 is

- (a) 153 (b) 33 (c) 73 (d) 187

65. Using the digits 1, 5, 2, 8 all possible four digit numbers are formed and the sum of all such numbers is between

- (a) 10000 & 20000 (b) 20000 & 50000
(c) 50000 & 100000 (d) 100000 & 150000

66. The sum of the numbers from 1 to 100, which are not divisible by 3 and 5, is

- (a) 2946 (b) 2732 (c) 2632 (d) 2317

67. You are in the land of logic, where there are 3 types of rabbits. Blue rabbits always tell the truth, green rabbits sometimes tell the truth and red rabbits never tell the truth. Assume you cannot distinguish colours. A rabbit says to you "I always lie". What colour of rabbit is speaking to you.

- (a) Blue (b) Red
(c) Green (d) Cannot be concluded

68. All the letters of the word 'INDIA' are permuted in all possible ways and the words so formed are written as in dictionary then the 58th word in the list is

- (A) NIIDA (R) INIDA (C) NIDIA (D) NIDAI

Directions for question 69 : Choose the ordered pair of statements (P to S) where the first statement implies the second, and two statements are logically consistent with the main statement.

69. Each time Sachin is the captain India loses

- (P) Sachin is the captain (Q) India did not win
(R) Sachin is not the captain (S) India won

- (a) PS (b) SR (c) SP (d) RP
70. 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) 330 (b) 333 (c) 219 (d) 279
71. Recently, while in Bangalore, I decided to walk down the escalator of a tube station. I did some quick calculation in my mind. I found that if I walk down twenty six steps, I require thirty seconds to reach the bottom. However, if I am able to step down thirty four stairs I would only require eighteen seconds to get to the bottom. If the time is measured from the moment the top step begins to descend to the time I step off the last step at the bottom, what is the height of the stairway in steps ?
(a) 40 (b) 46 (c) 52 (d) 58
72. When you reverse the digits of the number 13, the number increases by 18. How many other two-digit numbers increase by 18 when their digits are reversed ?
(a) 5 (b) 6 (c) 7 (d) 8
73. Pick the 1st, 2nd, 4th, 5th and 6th letters in the word REASONING, form yet another word and then write the first and last letters of the word formed.
(a) SE (b) ES (c) NE (d) OR
74. A train after travelling 60 km meets with an accident and then proceeds at $\frac{3}{4}$ of its former rate and arrives at the terminus 40 minutes late. Had the accident happened 25km further on, it would have arrived 10 minutes sooner. Find the speed of the train and the distance, respectively.
(a) 160 km / hr, 150 km (b) 160 km / hr, 140 km
(c) 50 km / hr, 160 km (d) 40 km / hr, 160 km
75. How many 5s are there in the following number series each of which is immediately followed by 4 but not immediately preceded by 6 ?
456 656 455 455 654 456 456 5454
(a) One (b) Three (c) Four (d) Two

Read the following passage to answer the questions from 76 – 78.

Rajita has a unique way of attempting the question paper having 50 questions. She starts from question 1 and attempts all questions which are in A.P. with a common difference of 3 in the forward direction and 3 in the reverse direction. If she reaches a stage when she cannot attempt any more question, she starts in the reverse direction with the first unanswered question. She repeats the same process and when she reaches a stage when she can not process any further, she reverses her direction again starting with the first unanswered question.

76. How many times does she reverse her direction ?
(a) 3 (b) 4 (c) 5 (d) 6
77. Which is the last question that she answers if she attempts all the 50 questions ?

- (a) 50 (b) 49 (c) 48 (d) 3
78. Which is the 20th question Rajita answers ?
(a) 50 (b) 48 (c) 47 (d) 44
79. If $A_1 = \{3\}$, $A_2 = \{5, 7, 9\}$, $A_3 = \{11, 13, 15, 17, 19\}$, $A_4 = \{21, 23, 25, 27, 29, 31, 33\}$ and so on, what is the average of the numbers of the set A_{20} ?
(a) 761 (b) 763 (c) 765 (d) 767

Read the following passage to answer the questions from 80 to 83.

In each question below are given three statements followed by three conclusions numbered I, II and III. You have to take the three given statements to be true even if they seem to be at variance from commonly known facts. Read all the conclusions and then decide which of the given conclusions logically follow(s) from the given statements disregarding commonly known facts. Then decide which of the answers (A), (B), (C) and (D) is the correct answer.

80. Statements :

- Some trees are branches.
- All buds are branches.
- All flowers are trees.

Conclusions,

- I. Some branches are buds.
 - II. Some trees are flowers..
 - III. Some buds are trees.
- (a) Only I follows (b) Only II follows
(c) Only I and II follow (d) All follow

81. Statements :

- Some pots are eatables.
- All eatables are drinks.
- No banana is pot.

Conclusions :

- I. Some pots are drinks.
 - II. All eatables are pots.
 - III. Some drinks are eatables.
- (a) Only I follows (b) Only III follows
(c) Only II follows (d) Only I and III follow

82. Statements :

- All jewels are rings.
- Some rings are necklaces.
- Some cakes are jewels.

Conclusions :

- I. Some necklaces are jewels.
 - II. Some rings are cakes.
 - III. No jewel is necklace.
- (a) Only II and either I or III follow
(b) Only either I or III follows
(c) Only II and III follow
(d) Only II follows

83. Statements

- All actors are writers.
- Some writers are dancers.
- All poets are writers.

Conclusions

- I. All actors are poets
 - II. Some dancers are writers
 - III. Some dancers are actors
- (a) None follows
 - (b) Only I and II follow
 - (c) Only II and III follow
 - (d) Only I and III follow

Passage for Questions : 84 – 88

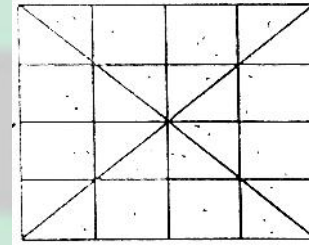
Five houses lettered A, B, C, D, & E are built in a row next to each other. The houses are lined up in the order A, B, C, D, & E. Each of the five houses have coloured roofs and chimneys. The roof and chimney of each house must be painted as follows

1. The roof must be painted either green, red, or yellow.
2. The chimney must be painted either white, black or red.
3. No house may have the same colour chimney as the colour of roof.
4. No house may use any of the same colours that the every next house uses.
5. House E has a green roof.
6. House B has a red roof and a black chimney.

- 84.** Which statement is false ?
- (a) House A has a yellow roof.
 - (b) House A & C have different colour chimneys.
 - (c) House D has a black chimney.
 - (d) House E has a white chimney.
- 85.** Which of the following is true ?
- (a) At least two houses have black chimneys.
 - (b) At least two houses have red roofs.
 - (c) At least two houses have white chimneys.
 - (d) At least two houses have green roofs.
- 86.** What is maximum total number of green roofs for houses
- (a) 1 (b) 2 (c) 3 (d) 4
- 87.** Which possible combinations of roof & chimney can a house have ?
- I. A red roof & a black chimney.
 - II. A yellow roof & a red chimney.
 - III. A yellow roof & a black chimney.
- (a) I & II & III (b) II only
 - (c) III only (d) I & II only
- 88.** If house C has a yellow roof, which one of the following is true ?

- (a) House E has a white chimney.
- (b) House E has a black chimney.
- (c) House E has a red chimney.
- (d) House D has a red chimney,

- 89.** You have 13 balls which all look identical. All the balls are of the same weight except for one. Using only a balance scale, you can find the odd one out with how many minimum number of weighing ?
- (a) 3 (b) 5 (c) 6 (d) 4
- 90.** Identify the number of triangles in the figure given below :



- (a) 44 (b) 48 (c) 36 (d) 32

COMPUTER AWARENESS

- 91.** On receiving an interrupt from an I/O device, the CPUs
- (a) hand over the control of address and data bus to interrupting device.
 - (b) branch off to interrupt service subroutine immediately.
 - (c) branch off to interrupt service subroutine after completion of current instruction.
 - (d) None of the above
- 92.** Micro-programmed control unit is
- (a) faster than hard-wired unit.
 - (b) slower than hard-wired unit.
 - (c) to facilitate easy implementation of new instructions.
 - (d) both (B) and (C).
- 93.** Index register in a digital computer is used for
- (a) pointing to the stack address.
 - (b) indirect addressing.
 - (c) keeping track the number of times loop is executed.
 - (d) address modification.
- 94.** In the virtual memory system, the address space specified by address lines of the CPU must bethan the physical memory size and than the secondary storage size.
- (a) smaller, smaller (b) smaller, larger
 - (c) larger, smaller (d) larger, larger
- 95.** The switching expression corresponding to $f(A, B, C, D) = \sum (1, 4, 5, 9, 11, 12)$ is
- (a) $\overline{B} \overline{C} \overline{D} + \overline{A} \overline{C} \overline{D} + A \overline{B} D$

- (b) $ABC + ACD + \overline{B} \overline{C} D$
 (c) $AC\overline{D} + \overline{A} B\overline{C} + A\overline{C} \overline{D}$
 (d) $\overline{A} BD + AC\overline{D} + BC\overline{D}$
96. Assuming all numbers are in 2's complement representation, which of the following numbers is divisible by 11111011 ?
 (a) 11100100 (b) 11010111
 (c) 11011011 (d) 00000110
97. A switching circuit that produces one in a set of input bits as an output based on the control value of control bits is termed as
 (a) Full Adder (b) Inverter
 (c) Multiplexer (d) Converter
98. A Computer with a 32 bit word size uses 2's complement to represent numbers. The range of integers that can be represented by this computer is
 (a) -2^{32} to 2^{32} (b) -2^{31} to 2^{32}
 (c) -2^{31} to $2^{31} - 1$ (d) -2^{32} to 2^{31}
99. To change upper case to the lower case letter in ASCII, correct mask and operation should be
 (a) 0100000 and NOR. (b) 0100000 and NAND.
 (c) 0100000 and OR. (d) None of the above
100. Why is the width of a data bus so important to the processing speed of a computer ?
 (a) The narrower it is, the greater the computer's processing speed.
 (b) The wider it is, the more data can fit into the main memory.
 (c) The wider it is, the greater the computer's processing speed.
 (d) The wider it is, the slower the computer's processing speed.

GENERAL ENGLISH

101. A sentence has been given in active (or passive) voice. Out of the four alternatives select the one which best expresses the same sentence in passive (or active) voice. I know him.
 (a) He has been known by me (b) He was known to me
 (c) He is known by me. (d) He is known to me.
102. Select the set of words that best fits the meaning of the sentence as a whole. While the disease is in state it is almost impossible to determine its existence by
- (a) a dormant, postulate
 (b) a critical, examination
 (c) a cute, analysis
 (d) a latent, observation
103. For the word "QUIBBLE" find the most appropriate meaning from the alternatives given below

- (a) Agreement (b) Appreciation
 (c) Creation (d) Complain
104. If some one is "gung ho", then he / she is
 (a) stupid (b) childish
 (c) enthusiastic (d) loud
105. Find the antonym of the word "DISPARAGE".
 (a) degrade (b) improve (c) scatter (d) applaud
106. Fill in the blank
 I could not him to attend the meeting.
 (a) prevail over (b) prevail upon
 (c) prevail about (d) prevail in
107. Identify the correct sentence
 (a) I have difficulty in remembering people's names.
 (b) I get difficulty in remembering people's names.
 (c) I have difficulty on remembering people's names.
 (d) I am getting difficulty remembering people's names.
108. Choose the word which can be used to replace the underlined word, in both the sentences.
 I. It is certainly a thing which tempts people.
 II. I take exception to what he has just said
 (a) object (b) protest
 (c) issue (d) prototype
109. The idiom 'I will be a monkey's uncle' means
 (a) to want to keep a monkey
 (b) that I have been enlightened
 (c) that I have been fooled
 (d) to express disbelief
110. Choose the pair of words which exhibits the same relationship between each other as the given pair of words.
 WRITING : PLAGIARISM
 (a) confidence : deception
 (b) money : misappropriation
 (c) gold : theft (d) germ : disease
111. The pleasures of the table are never of consequence to one naturally abstemious. The word abstemious can be replaced by :
 (a) indulgent (b) temperate
 (c) discreet (d) profligate
112. The following passage consists of six sentences. The first sentence (S_1) is given in the beginning. The final sentence (S_6) is given in the last. The middle four sentences are jumbled up and labelled as P, Q, R and S. You are required to find out the proper sequence of the four sentences and mark accordingly.
- S_1 : Unlike many modern thinkers, Tagore had no blueprint for the world's salvation.
 P : His thought will therefore never be out of date.
 Q : He merely emphasised certain basic truths which men may ignore only at their peril.
 R : He believed in no particular 'ism'.
 S : He was what Gandhiji rightly termed the great sentinel.
 S_6 : As a poet he will always delight, as a singer he will always enchant, as a teacher he will always

enlighten.

The proper sequence should be

- (a) SRPQ (b) PRQS (c) RSPQ (d) RQPS

113. Which of the underlined parts in the sentence given below is a mistake which may need to be deleted or modified.

He can be able to pass the test in flying colours without any difficulties whatsoever.

- (a) be able (b) flying colours
(c) difficulties (d) whatsoever

Read the passage and select the most suitable answer to questions 114 and 115 from the given choices :

The fossil remains of the first flying vertebrates, the pterosaurs, have intrigued palaeontologists for more than two centuries. How such large creatures, which weighted in some cases as much as a piloted hang glider and had wingspans from 8 to 12 meters, solved the problems of powered flight, and exactly what these creatures were – reptiles or birds – are among the questions scientists have puzzled over.

Perhaps the least controversial assertion about the pterosaurs is that they were reptiles. Their skulls, pelvises, and hind feet are reptilian. The anatomy of their wings suggests that they did not evolve into the class of birds. In pterosaurs a greatly elongated fourth finger of each forelimb supported a wing like membrane. The other fingers were short and reptilian, with sharp claws. In birds the second finger is the principle strut of the wing, which consists primarily of feathers. If the pterosaur walked or remained stationary, the fourth finger, and with it the wing, could only turn upward in an extended inverted V-shape along side of the animal's body.

The pterosaurs resembled both birds and bats in their overall structure and proportions. This is not surprising because the design of any flying vertebrate is subject to aerodynamic constraints. Both the pterosaurs and the birds have hollow bones, a feature that represents a saving in weight. In the birds, however, these bones are reinforced more massively by internal struts.

114. It can be inferred from the passage that the scientists now generally agree that

- (a) enormous wingspan of the pterosaurs enable them to fly great distances.
(b) structure of the skeleton of the pterosaurs suggests a close evolutionary relationship to bats.
(c) fossil remains of the pterosaurs reveal how they solved the problem of powered flight.
(d) pterosaurs were reptiles.

115. According to the passage the skeleton of pterosaurs can be distinguished from that of a bird by the

- (a) the size of its wingspan.
(b) presence of hollow spaces in its bones.
(c) anatomic origin of its wing strut.
(d) presence of hooklike projections on its hind feet.

116. Pick the part of the sentence that has an error :

My elder brother is a MA whereas I am only a BA

- (a) My elder brother (b) is a MA
(c) whereas I am (d) only a BA

117. Choose the suitable phrasal verb for the blank in the sentence below.

I _____ my hopes when untimely rain threatened my crops.

- (a) gave in (b) gave out
(c) gave up (d) gave off

118. Out of the given alternatives, choose the word that is opposite in meaning to the word : AFFLUENT

- (a) Reluctant (b) Poor
(c) Clear (d) Enthusiastic

119. Fill in the blank with appropriate form of noun :

Don't blame yourself, it's not your _____!

- (a) misunderstanding (b) error
(c) slip (d) fault

120. Fill in the blank :

The instructor, along with the class, _____ angry about the room change.

- (a) are (b) have (c) has (d) is