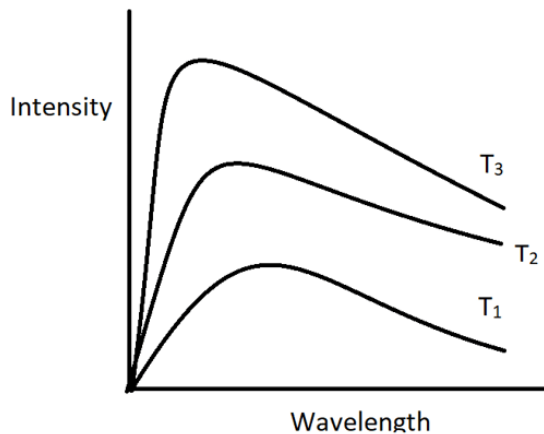


**(Post Name: Aviator-II , Date of Exam: 26-04-2023 , Time of Exam: 9:30 AM)**

1. The work done by a friction force is
  - (a) always positive
  - (b) always negative
  - (c) always zero
  - (d) either positive or negative depending upon the situation
  
2. Cyclotron cannot accelerate electrons because
  - (a) these are tiny particle
  - (b) electrons are imaginary particles
  - (c) at higher velocity the mass of electron changes which also changes the frequency of revolution
  - (d) electron is a negative charged particle
  
3. Kirchoff's first law is based on
  - (a) conservation of charges
  - (b) conservation of angular momentum
  - (c) conservation of energy
  - (d) conservation of mass
  
4. The probability of finding an electron is uniform in every direction is in which orbital?
  - (a) s
  - (b) p
  - (c) d
  - (d) none of the options
  
5. which of the following is a dimensionless constant?
  - (a) density
  - (b) area
  - (c) specific gravity
  - (d) gravitational constant
  
6. X-ray crystallography uses which characteristic of light?
  - (a) Polarization
  - (b) Interference
  - (c) Diffraction
  - (d) Coherency.

7. The Kinetic energy of a photoelectron emitted on shining a light of wavelength  $6.2 \times 10^{-6} \text{ m}$  on a metal surface of work function  $0.1 \text{ eV}$  is \_\_\_\_
- (a)  $0.01 \text{ eV}$  (b)  $0.02 \text{ eV}$   
(c)  $0.1 \text{ eV}$  (d)  $1 \text{ eV}$

8. What is the relation between  $T_1$ ,  $T_2$  and  $T_3$  from the figure



- (a)  $T_1 > T_2 > T_3$  (b)  $T_3 > T_1 > T_2$   
(c)  $T_3 > T_2 > T_1$  (d)  $T_2 > T_1 > T_3$

9. Which of the following is also known as pressure waves?

- (a) Transverse waves (b) Longitudinal waves  
(c) Mechanical waves (d) Stationary waves

10. Which of the following is associated with an electron microscope?

- (a) Matter waves (b) Electrical waves  
(c) Magnetic waves (d) Electromagnetic waves

11. Calculate the de-Broglie wavelength of an electron which has been accelerated from rest on application of potential of  $400 \text{ volts}$ .

- (a)  $0.1653 \text{ \AA}$  (b)  $0.5125 \text{ \AA}$   
(c)  $0.6135 \text{ \AA}$  (d)  $0.2514 \text{ \AA}$

12. The binding energy of an electron to a proton (i.e., hydrogen atom) is 13.6 eV. The loss of mass in the formation of one atom of hydrogen is \_\_\_\_\_
- (a)  $2.42 \times 10^{-35}$  Kg (b)  $3.34 \times 10^{-35}$  Kg  
(c)  $4.58 \times 10^{-35}$  Kg (d)  $5.19 \times 10^{-35}$  Kg
13. The fringes of equal inclination produced by using Michaelson Interferometer are called as:
- (a) Equi-inclination Fringes (b) Michaelson's Fringes  
(c) Haidinger's Fringes (d) Morley's Fringes
14. When sound travels from air to water, which parameter does not change?
- (a) Wavelength (b) Frequency  
(c) Velocity (d) Temperature
15. A particle executes simple harmonic motion, its time period is 16s. If it passes through the centre of oscillation, then its velocity is 2 m/s at time 2s. The amplitude will be:.....
- (a) 7.2m (b) 4cm  
(c) 6cm (d) 0.72m
16. A hollow spherical pendulum is filled with mercury has time period T. If mercury is thrown out completely, then the new time period \_\_\_\_\_
- (a) Increases  
(b) Decreases  
(c) Remains the same  
(d) First increases and then decreases
17. The total energy of a particle performing simple harmonic motion depends on .....
- (a) k, a, m (b) k, a  
(c) k, a, x (d) k, x

18. **Statement:** The ratio  $C_p/C_v$  is more for helium gas than that for hydrogen gas.  
**Reason:** Atomic mass of helium is more than that of hydrogen
- (a) Both statement and reason are true and the reason is the correct explanation of the statement  
(b) Both statement and reason are true but the reason is not a correct explanation of the statement  
(c) Statement is true but the reason is false  
(d) Both statement and reason are false
19. The number of degrees of freedom for a diatomic gas molecule is \_\_\_\_\_
- (a) 2 (b) 3  
(c) 5 (d) 6
20. At constant volume temperature is increased, then \_\_\_\_\_
- (a) Collisions on walls will be less  
(b) No. of collisions per unit time will increase  
(c) Collisions will be in straight line  
(d) Collisions will not change
21. If the temperature of the source is increased, the efficiency of a Carnot engine?
- (a) Increases  
(b) Decreases  
(c) Remains constant  
(d) First increases and then remains constant
22. Which of the following have well defined geometrical external shapes?
- (a) Amorphous solids  
(b) Liquids  
(c) Gases  
(d) Crystalline solids
23. According to Hooke's law of elasticity, if stress is increased, the ratio of stress to strain?
- (a) Increased (b) Decreased  
(c) Becomes zero (d) Remains constant
24. The knee voltage for germanium is
- (a) 0.1 V (b) 0.3 V  
(c) 0.5 V (d) 0.7 V
25. If the input components of a NOR Gate are inverted, the resultant output mimics that of-
- (a) AND gate (b) OR Gate  
(c) NOR Gate (d) NAND Gate

26. Time intervals between successive pulses of the clock are referred to as \_\_\_\_\_?
- (a) Pulse Reallocation (b) Pulse Retrieving  
(c) Pulse Repetition Time (d) Post Reallocation Time
27. \_\_\_\_\_ in radars enhances signals desired?
- (a) Transmitter (b) Receiver  
(c) Source (d) Antenna
28. What is the angle between the normal to the reference ellipsoid and the equatorial plane at a point called?
- a) Geodetic angle b) Correction factor  
c) Geodetic latitude d) Earth angle
29. Which coordinate system is used in satellite-based radio navigation?
- a) Earth centered, Earth fixed b) Earth centered inertial  
c) Geodetic spherical coordinates d) Geodetic wander azimuth
30. Which of the following is not a TDMA standard of 2.5G network?
- a) GPRS b) GSM  
c) HSCSD d) EDGE
31. Which of the following leads to the 3G evolution of GSM, IS-136 and PDC systems?
- a) GPRS b) HSCSD  
c) W-CDMA d) EDGE
32. Which of the following specifies a set of media access control (MAC) and physical layer specifications for implementing WLANs?
- a) IEEE 802.11 b) IEEE 802.16  
c) IEEE 802.15 d) IEEE 802.3
33. Why is the Fly By Wire (FBW) system used?
- a) To control aerodynamically efficient but unstable body  
b) For communications in aircraft  
c) Better navigation  
d) Reduced chances of enemy detection
34. How is Fly By Wire (FBW) system implemented in an aircraft?
- a) By using control rods and linkages connecting stick to control surfaces  
b) By using high power radio transmitters and receivers  
c) By using computers and actuators to control surfaces  
d) Artificial intelligence

35. Which one of the following is not true with respect to the Fly By Wire (FBW) system?
- FBW is not necessary for every aircraft
  - FBW makes an aircraft stealthy
  - FBW provides better control and carefree flying
  - FBW makes aircraft with low stability fly smoothly
36. The value of  $x$  for  $\sin x \cos x = 0$  such that  $0 \leq x < \pi$  is
- $0, \frac{\pi}{2}, \pi$
  - $0, \frac{\pi}{4}, \pi$
  - $0, \frac{\pi}{2}, \frac{\pi}{4}$
  - $\pi, \frac{\pi}{2}, \frac{\pi}{4}$
37.  $(3 + 4i)(3 - 4i) =$
- $9 - 16i$
  - $25$
  - $9 + 16i$
  - $12 + 16i$
38. The equation of the ellipse whose one vertex is  $(0, 13)$ , one focus is  $(0, -12)$  and centre at  $(0, 0)$  is
- $\frac{x^2}{169} + \frac{y^2}{144} = 1$
  - $\frac{x^2}{25} + \frac{y^2}{144} = 1$
  - $\frac{x^2}{144} + \frac{y^2}{169} = 1$
  - $\frac{x^2}{25} + \frac{y^2}{169} = 1$
39. If two dice are tossed, then the probability of throwing a total of 7 is
- $\frac{1}{6}$
  - $\frac{2}{7}$
  - $\frac{1}{3}$
  - $\frac{1}{7}$
40.  $\lim_{n \rightarrow \infty} \frac{n^2+2}{2n^2-3n} =$
- $1$
  - $\frac{1}{4}$
  - $\frac{1}{2}$
  - $-\frac{1}{2}$
41. The first derivative of  $y = 3(2x^2 - 3)^{1/2}$  is
- $12x(2x^2 - 3)^{1/2}$
  - $\frac{6x}{(2x^2-3)^{1/2}}$
  - $\frac{12x}{(2x^2-3)^{3/2}}$
  - $\frac{4x}{(2x^2-3)^{1/2}}$

42. The determinant of  $\begin{bmatrix} 1 & 2 \\ -3 & 1 \end{bmatrix}$  is

- (a)  $-5$  (b)  $5$   
(c)  $7$  (d)  $-7$

43. The solution set of  $\left| \frac{3}{x-3} \right| > 1, x \neq 3$  is

- (a)  $(0,6)$  (b)  $(3,6)$   
(c)  $(0,3) \cup (3,6)$  (d)  $(0,3)$

44.  $\lim_{x \rightarrow 2} \frac{x^3 - 2^3}{x - 2} =$

- (a)  $0$  (b)  $12$   
(c)  $2$  (d) *does not exist*

45. If  $f(x) = \begin{cases} \frac{\cos x}{\frac{\pi}{2} - x}, & x \neq \frac{\pi}{2} \\ 1, & x = \frac{\pi}{2} \end{cases}$ , then the function  $f(x)$  at  $x = \frac{\pi}{2}$

- (a) does not exist (b) not continuous  
(c) the value of  $f(x)$  is 0 (d) continuous

46. The value of  $I = \int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin^2 x \, dx$  is

- (a)  $0$  (b)  $1$   
(c)  $\frac{\pi}{2}$  (d)  $\pi$

47. The solution of the differential equation  $\frac{dy}{dx} = e^{3x-2y} + x^2 e^{-2y}$  is

- (a)  $\frac{2}{3}(x^3 + 3x^2) + c$  (b)  $\frac{1}{2} \ln \left[ \frac{2}{3}(x^3 + e^{3x}) + c \right]$   
(c)  $\frac{1}{3} \ln \left[ \frac{1}{2}(x^3 + e^{2x}) + c \right]$  (d)  $\frac{1}{2} \ln \left[ \frac{2}{3}(x^2 - e^{2x}) + c \right]$

48. The probability of not rolling any 6's in four rolls of a balanced die is

(a)  $\frac{625}{1296}$

(b)  $\frac{5}{6}$

(c)  $\frac{1}{6}$

(d)  $\frac{25}{36}$

49. In a survey of 80 people, 30 people read newspaper Hindustan Times, 35 read Times of India, 28 read The Tribune, 15 read both Hindustan Times and The Tribune, 18 read both Times of India and The Tribune, 20 read both Hindustan Times and Times of India and 5 read all the three newspapers. The number of people who don't read any newspaper are:

(a) 35

(b) 25

(c) 75

(d) 45

50. The solution of  $Max z = 3x_1 + 2x_2 ; s. t. x_1 - x_2 \leq 2, 3x_1 \leq 3$  is

(a) (1, 2)

(b) infeasible

(c) (2, 3)

(d) unbounded

51. The equation of the line which passes through the point of intersection of the lines  $x + 4y - 18 = 0$  and  $x + 2y - 2 = 0$  and parallel to the line  $3x + 8y + 1 = 0$  is

(a)  $3x + 8y - 22 = 0$

(b)  $2x + 6y - 20 = 0$

(c)  $5x + 14y - 19 = 0$

(d)  $x - y + 8 = 0$

52. The direction cosine of the lines passing through P1 (3, 4, 5) and P2 (-1, 2, 3) and directed from P1 to P2 is

(a)  $\left[ \frac{2}{\sqrt{6}}, -\frac{1}{\sqrt{6}}, \frac{1}{\sqrt{3}} \right]$

(b)  $\left[ \frac{1}{\sqrt{6}}, -\frac{1}{\sqrt{6}}, \frac{1}{\sqrt{3}} \right]$

(c)  $\left[ -\frac{2}{\sqrt{6}}, -\frac{1}{\sqrt{6}}, -\frac{1}{\sqrt{6}} \right]$

(d)  $\left[ -\frac{2}{\sqrt{3}}, -\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}} \right]$



53. The inverse of the matrix  $A = \begin{bmatrix} 1 & 0 & 0 \\ 1 & 1 & 0 \\ -2 & 1 & 1 \end{bmatrix}$  is

(a)  $\begin{bmatrix} 1 & 0 & 0 \\ -1 & 1 & 1 \\ -1 & -1 & 1 \end{bmatrix}$

(b)  $\begin{bmatrix} 1 & 0 & 0 \\ 1 & 0 & 1 \\ 3 & 1 & 1 \end{bmatrix}$

(c)  $\begin{bmatrix} 1 & 0 & 0 \\ 1 & 1 & 1 \\ -3 & -1 & 1 \end{bmatrix}$

(d)  $\begin{bmatrix} 1 & 0 & 0 \\ -1 & 1 & 0 \\ 3 & -1 & 1 \end{bmatrix}$

54. The ninth term of  $\left(x - \frac{1}{x^{1/2}}\right)^{12}$  is

(a) 400

(b) 495

(c) 500

(d) 408

55. The three numbers between 1 and 256 such that the sequence is in GP are

(a) 4, 16, 64

(b) 2, 8, 16

(c) 4, 16, 32

(d) 2, 4, 8

56. The most widely used code that represents each character as a unique 8 bit code is

(a) UNICODE

(b) ASCII

(c) BCD

(d) EBCDIC

57. Which of the following memory stores information permanently?

(a) RAM

(b) ROM

(c) Cache

(d) None of the above

58. Convert the hexadecimal number  $(C35D)_{16}$  to a binary number.

(a)  $(1101001101010101)_2$

(b)  $(1100001100011001)_2$

(c)  $(1100001101011101)_2$

(d)  $(1111001101011101)_2$

59. Computer uses the \_\_\_\_\_ number system to store data and perform calculations.

(a) Binary

(b) Decimal

(c) Octal

(d) Hexadecimal

60. If column-major order is used, how is the following matrix stored in memory?  
1 2 3  
4 5 6  
7 8 9
- (a) 987654321 (b) 123456789  
(c) 369258147 (d) 147258369
61. Consider a situation where swap operation is very costly. Which of the following sorting algorithms should we prefer so that the swapping operations are minimized?
- (a) Heap Sort (b) Selection Sort  
(c) Insertion Sort (d) Merge Sort
62. Which one of the following nodes is considered the top of the stack if the stack is implemented using the linked list?
- (a) First node (b) Second node  
(c) Last node (d) None of them
63. The following numbers are inserted into an empty binary search tree in the given order: 8, 1, 3, 4, 15, 11, 16. What is the height of the binary search tree (the height is the maximum distance of a leaf node from the root)?
- (a) 3 (b) 2  
(c) 6 (d) 5
64. Which of the following principle does Queue use?
- (a) LIFO principle (b) FIFO principle  
(c) Linear tree (d) Ordered array
65. The worst case time complexity of Merge Sort is
- (a)  $O(n)$  (b)  $O(n^2)$   
(c)  $O(\log n)$  (d)  $O(n \log n)$
66. Which of the following statements is correct about virtual memory?
- (a) It is a combination of the logical-memory and physical-memory  
(b) It is a separation of user logical memory and physical memory  
(c) It is a virtual network memory  
(d) None of the these
67. SSTF stands for \_\_\_\_\_.
- (a) Shortest Signal Time First (b) Shortest Seek Time First  
(c) System Seek Time First (d) System Shortest Time First

68. Switching the CPU to another process requires performing a state save of the current process and a state restore of a different process is known as
- (a) Swapping (b) Context Switch  
(c) Demand Paging (d) Page Fault
69. Which one of the following is the deadlock avoidance algorithm?
- (a) Banker's algorithm (b) Round-Robin algorithm  
(c) Elevator's algorithm (d) Paging
70. In which allocation method does the user indicate the size of the file before creating the file?
- (a) Contiguous (b) Linked  
(c) Indexed (d) None of the these
71. Which of the following refers collection of the information stored in a database at a specific time?
- (a) Independence (b) Instance of the database  
(c) Schema (d) Data domain
72. Which one of the following commands is used to restore the database to the last committed state?
- (a) Savepoint (b) Rollback  
(c) Commit (d) Both (a) & (b)
73. Which one of the following commands is used for removing (or deleting) a relation forms the SQL database?
- (a) Delete (b) Drop  
(c) Remove (d) All of the above
75. Which of the following commands is used to save any transaction permanently into the database?
- (a) Commit (b) Rollback  
(c) Savepoint (d) None of the above
75. Which one of the following commands is used to delete the existing row in a table?
- (a) Delete (b) Insert  
(c) Update (d) None of the above
76. Which of the following is used in the application programs to request data from the database management system?
- (a) Data Manipulation language (b) Data Definition Language  
(c) Data Control Language (d) All of the above

77. Which of the following refers to the number of attributes in a relation?
- (a) Degree
  - (b) Row
  - (c) Column
  - (d) All of the above
78. The term FTP stands for?
- (a) File transfer program
  - (b) File transmission protocol
  - (c) File transfer protocol
  - (d) File transfer protection
79. The term WAN stands for?
- (a) Wide Area Net
  - (b) Wide Access Network
  - (c) Wide Area Network
  - (d) Wide Access Net
80. In specific, if the systems use separate protocols, which one of the following devices is used to link two systems?
- (a) Repeater
  - (b) Gateway
  - (c) Bridge
  - (d) Hub

81. Ten eggs are distributed among ABCD in ratio 1:2:3:4 randomly. It is known that A gets less eggs than B, and C gets more eggs than D. If C gets at least two more eggs than D, then which one of the following is necessarily true?
- (a) A gets at least two eggs less than B
  - (b) B gets more eggs than D
  - (c) D gets less eggs than A
  - (d) A and B together get at least five eggs

82. Read the following and answer the question
- (i) Ramesh, Suresh, Nagesh, Devesh, Lokesh and Himanshu work at companies A, B, C, D, E and F. These companies have uniforms with shirts of Red, Yellow, Green, Brown, Purple and pink colour which its employees are supposed to wear.
  - (ii) Uniform of Company D has brown shirt and Uniform of Company A is Green shirt
  - (iii) Himanshu works in either A,B,D or F.
  - (iv) Company B has Pink shirt and Ramesh is its employee.
  - (v) Nagesh does not work in company E
  - (vi) Company C does not have purple shirt as uniform
  - (vii) Neither Nagesh Nor Devesh is employee of Company D
  - (viii) Suresh works in company F
  - (ix) Company E does not have Purple or Yellow coloured uniform
  - (x) Lokesh works in company A.

Which of the following “colour of shirt-company-person” combinations are correct?

- (a) Green-C-Nagesh
- (b) Brown-D-Lokesh
- (c) Red-E-Devesh
- (d) Yellow-C-Suresh

83. Read the following and answer the question
- i) Rajesh, Mahesh, Yogesh, Nagesh and Pravesh are Doctor, Engineer, Architect, Teacher and Manager. Each one of them plays a different sport amongst Football, Cricket, Snooker, Table Tennis and Hockey
  - ii) Mahesh, a Doctor, plays either Cricket or Hockey
  - iii) Pravesh is neither Engineer nor Manager
  - iv) Rajesh is teacher and plays Cricket
  - v) Neither Pravesh nor Yogesh plays Snooker

What is the profession of the person that plays Hockey

- (a). Engineer
- (b) Doctor
- (c) Either Engineer or Manager
- (d) Data Inadequate

84. Read the statement below and answer the question

Raju has set up a mobile manufacturing unit. He launched a cheap mobile in market and estimated that he will be able to sell 1 lakh units before competition arrives in the market. The fixed cost of the company is Rs 4 cr and the variable cost per mobile is Rs 1000. He has kept the selling price of the mobile as Rs 2000.

Find the change in Profit if the variable cost increase by 10% while the sales remains same

- (a) Profit would decrease by 10.33%
- (b) Profit would decrease by 15%
- (c) Profit would decrease by 16.67%
- (d) Profit would decrease by 12.24%

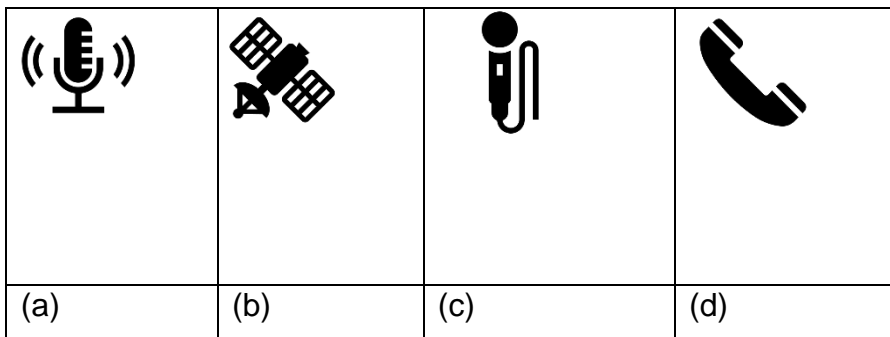
85. Find two numbers such that their geometric mean is 4 and their third proportional is 32

- (a) 2,6
- (b) 4,8
- (c) 2,8
- (d) 4,6

86. Some balls are arranged to form an equilateral triangle such that the first row has one ball, second row has 2 balls, third row has three balls and so on. If 669 more balls are added, these balls may be arranged in form of a square such that each side contains 8 balls less than each side of triangle. Initial number of ball is-

- (a) 1650
- (b) 1450
- (c) 1540
- (d) 1360

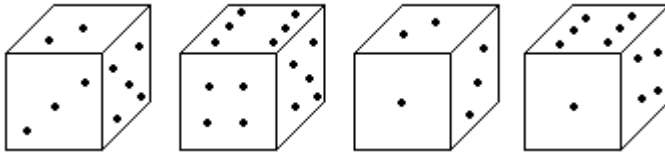
87. Of the four figures shown below, three are similar in a manner. Choose the figure which is different from the rest.



88. In the context of water images; which word will have different water image?

- (a) COKE (b) CODE  
(c) COBE (d) COXE

89. Shown in the figure below the side of cubes containing dots.



The face opposite to the one containing five dots contains --- dot(s).

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

90. In a cube, one pair of adjacent faces is painted black, second pair of adjacent faces is painted blue and third pair of adjacent faces is painted green. The cube is now cut into 64 identical cubes

Number of small cubes with at least two different colours on their faces

- (a) 22 (b) 24  
(c) 26 (d) 32

91. Read following statements for answering the question

- i) Three teams comprising of 3 persons each are to be formed from 9 volunteers A,B,C,D,E,F,G,H, I.
- ii) C and G must be in same team
- iii) D and E must be in same team
- iv) H and I cannot be in same team
- v) Either I or F or both must be in team of B
- vi) F must be in team no 2

Composition of a possible team is \_\_\_\_\_

- (a) HBF (b) FBI  
(c) CBF (d) EFG

92. Find the wrong term in the series 5,11,29,83,245,765,2189,6563

- (a) 245 (b) 765  
(c) 2189 (d) 6563

93. Refer the statements below for answering the question

A, B, C and D are members of a family which has one couple, their son and their daughter. It is known that both statements of only one of them are true. Following are their statements when asked about their relationship

- i) A says- (1) C is my daughter; (2) D is my husband.
- ii) B says - (1) C is my son ; (2) A is my mother.
- iii) C says - (1) A and B are of same gender; (2) B is my sister
- iv) D says - (1) B is of same gender as I; (2) C is my son

Whose both the statements are not true

- (a) B (b) C
- (c) D (d) Cannot be determined

94. Read following statements for answering question

- (i) In a meeting eight persons A, B, C, D, E, F, G, H are sitting around a round table
- (ii) A and D are neighbours but neither is neighbour of H
- (iii) B is 4th to the right of D and B and F are neighbours.
- (iv) E and H are neighbours and E is 3<sup>rd</sup> to the right of F.
- (v) G and C are not neighbours. G and D are not neighbours

Who is sitting 2nd to the right of D

- (a) A (b) C
- (c) G (d) None of the above



95. In the following question, statements are followed by two Conclusions. By considering the statements and conclusions, decide which of the conclusion(s) follows from given options:

**Statements:**

- (i) All cows are dogs.
- (ii) No dog is a mare.
- (iii) All mares are animals.

**Conclusions:**

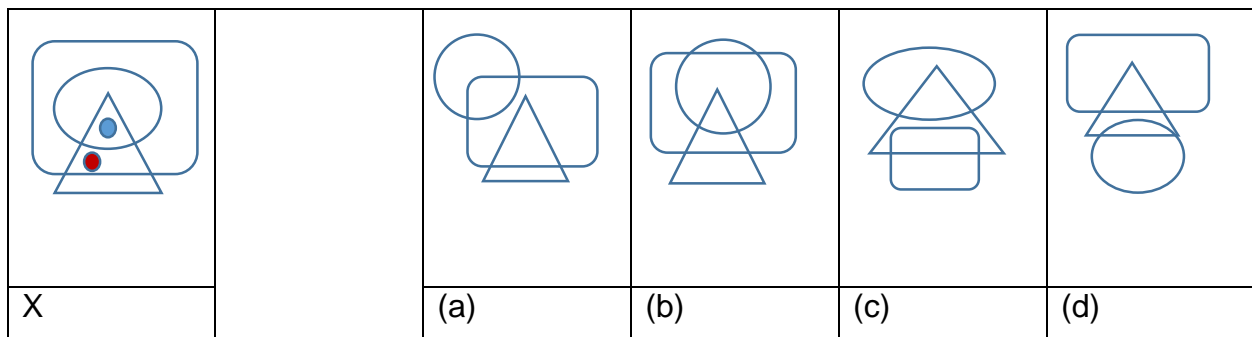
- I. No cow is a mare.
- II. Some animals are mares.
- III. Some dogs are cows.
- IV. Some cows are mares.

- (a) Only either I or IV and II follow
- (b) Only either I or II and both III and IV follow
- (c) Only either I or IV and both II and III follow
- (d) Only I, II and III follow

96. A X B means A is the sister of B, A + B means A is the daughter of B, A – B means A is the son of B. On the basis of the information, you have to tell, how is P related to S in the relationship P – Q X R + S?

- (a) Brother
- (b) Son
- (c) Grandson
- (d) Daughter's son

97. From amongst the figures (a), (b), (c) and (d), select the one which satisfies the same conditions of placement of dots as in figure X.



98. Ruin : Destruction :: Concise : ?

- (a) Calm
- (b) Pithy
- (c) Accept
- (d) Base

