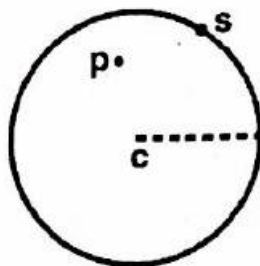


**NTSE STAGE – I (2019 – 20) HARYANA STATE
(For Class – X)
SCHOLASTIC APTITUDE TEST (SAT)**

QUESTIONS (SET – C)

1. The force between a hollow sphere 'S' and a point mass 'P' inside it, as shown in figure is:

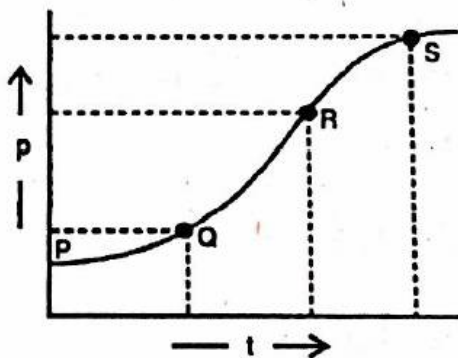


- (1) Attractive and Constt.
(2) Repulsive and Constt.
(3) Attractive and depends upon the location of P w.r.t centre
(4) Zero
2. Read the following statements.
Statement – I : Plaster of Paris is stored in moisture proof containers.
Statement – II : Plaster of Paris on reaction with water changes into a hard solid gypsum.
Select the correct answer from the options given below:
(1) Statement – I is true, Statement – II is false
(2) Statement – I is false, Statement – II is true
(3) Both Statement are true and Statement - II provides explanation to Statement - I
(4) Both Statements are true but Statement - II does not provide explanation to Statement - I
3. Two organic compounds 'X' and 'Y' react with sodium metal and both produce same gas 'A' .
With sodium hydrogen carbonate only compound 'Y' reacts to produce gas 'B' identify X, Y, A
and B:
(1) $X = C_2H_4$ $Y = C_2H_5OH$ $A = CO_2$ $B = H_2$
(2) $X = C_2H_5OH$ $Y = CH_3COOH$ $A = H_2$ $B = CO_2$
(3) $X = CH_3OH$ $Y = C_2H_5OH$ $A = H_2$ $B = CO_2$
(4) $X = CH_3COOH$ $Y = HCOOH$ $A = CO_2$ $B = H_2$
4. Which of the following statements are correct in relation to Liberal Nationalism in 19th C.
Europe?
I. Freedom for the individual and equality of all before the law.
II. Government by consent of all.
III. End of autocracy and the privileges of clergy.
IV Equal political rights for women and non – propertied men
(1) I, II, IV
(2) I, II, III
(3) II, III, IV
(4) I, III, IV
5. How many valence electrons are present in Cl^- ion?
(1) 5
(2) 6
(3) 7
(4) 8
6. Which of the following were the famous three demands of Lenin that are also known as 'April Theses'?

- I. The war be brought to close.
- II. Land be transferred to the peasants.
- III. Restrictions on public meetings be imposed
- IV. Banks be nationalized

- (1) I, II, III
- (2) II, III, IV
- (3) I, III, IV
- (4) I, II, IV

7. Carrying the flag, holding it aloft during marches in Indian National movement, was a symbol of:
- (1) Leadership
 - (2) Defiance
 - (3) Non – Violence
 - (4) Satyagrah
8. Organs which look different and perform different functions but have similar basic structure and origin are called:
- (1) Analogous organs
 - (2) Homologous organs
 - (3) Similar organs
 - (4) Dissimilar organs
9. A person of weight W jumps to ground with his legs fixed and comes to rest with an upward acceleration of $3g$. (g = acceleration due to gravity). The force exerted by him during landing is:
- (1) W
 - (2) $2W$
 - (3) $3W$
 - (4) $4W$
10. Which of the following organ in human male is called thermoregulator?
- (1) Vas deferens
 - (2) Ejaculatory ducts
 - (3) Scrotum
 - (4) Cowper's gland
11. What did freedom mean for the plantation workers of Assam?
- (1) Self Government
 - (2) Freedom fro Zamindars
 - (3) Fare labour
 - (4) Right to move freely in and out of the plantations
12. In a two body collision, the momentum is varying with time as shown in graph. The instantaneous force is maximum at:

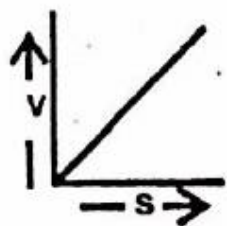


- (1) P
- (2) Q
- (3) R
- (4) S

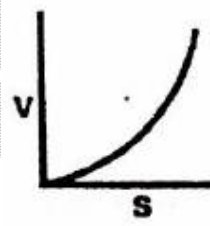
13. If $\frac{3}{\sqrt{28+10\sqrt{3}-\sqrt{7-4\sqrt{3}}}} = a + \sqrt{3b}$, where a and b are integers, then the value of $\sqrt{5a+12b}$ is:
- (1) 4
 - (2) 3
 - (3) $\sqrt{11}$
 - (4) $\sqrt{13}$

14. The graphs of the equations $2x + 3y = A$ and $x + 2y = B$ intersect at the point P, which also lies on the graph of the equation:
- (1) $5x + 3y = A - B$ (2) $3x - 5y = A + B$
 (3) $3x - 5y = A - B$ (4) $3x + 5y = A + B$
15. What is the mass of 2.5 moles of CO_2 ?
- (1) 100 g (2) 110 g
 (3) 88 g (4) 98 g

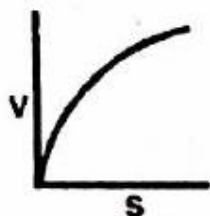
16.
$$\text{CH}_3 - \overset{\text{OH}}{\underset{|}{\text{CH}}} - \text{CH}_2 - \overset{\text{O}}{\parallel}{\text{C}} - \text{CH}_2 - \overset{\text{O}}{\parallel}{\text{C}} - \text{H}$$
- Which functional groups are present in this organic compound?
- (1) Alcohol, ketone and ester (2) Alcohol, ketone and carboxylic acid
 (3) Alcohol, ketone and aldehyde (4) Alcohol, aldehyde and carboxylic acid
17. A body is dropped from rest. Its velocity varies with displacement covered as:



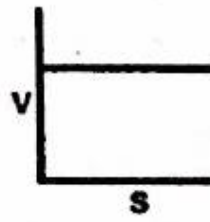
(1)



(2)

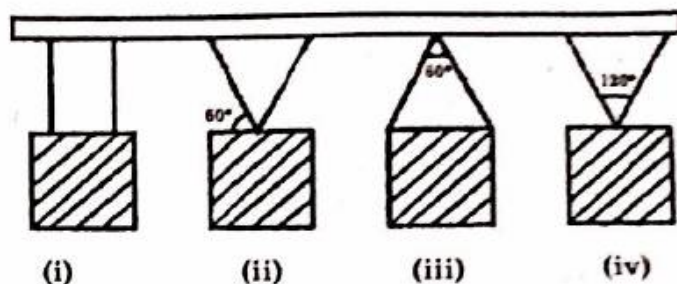


(3)

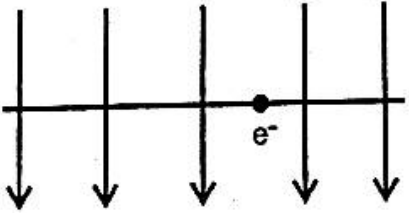


(4)

18. How many numbers lie between 100 and 400 which when divided by 9 leave a remainder 6, and when divided by 21, leave a remainder 12?
- (1) 3 (2) 4
 (3) 5 (4) 6
19. Element M forms a chloride with the formula MCl_3 . Element M would most likely in the same group of periodic table as:
- (1) Si (2) Al
 (3) Mg (4) Na
20. Which of the following is not a part of human hind brain?
- (1) Crura cerebri (2) Medulla oblongata
 (3) Pons varoli (4) Cerebellum
21. A 10 kg box is suspended from a beam in three ways as shown in figure. In which case, tension in string is maximum?



- (1) i
(3) iii
- (2) ii
(4) iii & iv both
22. If a, b and c are integers such that $(\sqrt[3]{4} + \sqrt[3]{2} - 2)(\sqrt[3]{4a} + \sqrt[3]{2b} + c) = 20$, then which one of the following is true?
 (1) $a + b - c = 10$
 (2) $a - b + c = 10$
 (3) $a + b = 2c$
 (4) $a + b + c = 16$
23. Blood cells are manufactured in our:
 (1) Bone marrow
 (2) Liver
 (3) Spleen
 (4) Pancreas
24. If $a = (\sin \theta - \cos \theta)^4$, $b = \sin^6 \theta + \cos^6 \theta$ and $c = (\sin \theta + \cos \theta)^2$, then the value of $\sqrt{3a + 4b + 6c}$ lies between:
 (1) 2 and 3
 (2) 3 and 4
 (3) 4 and 5
 (4) 5 and 6
25. A cork is immersed in a jar of water and released. How the cork will move if the jar is assumed to be kept in a satellite orbiting earth:
 (1) Sink
 (2) Rise
 (3) Remain where left
 (4) Depends upon the satellite velocity
26. Headquarter of UNESCO is at
 (1) Geneva
 (2) Rome
 (3) Paris
 (4) London
27. Maintaining the proper amount of water and proper ionic balance in the body is named as
 (1) Homeostasis
 (2) Osmoregulation
 (3) Excretion
 (4) Nutrition
28. What model of government did Montesquieu propose in his book 'A spirit of Laws'?
 (1) To refute the doctrine of the divine and absolute rights of the monarch
 (2) A government based on the social contract between people and their representatives
 (3) Division of powers within the government between the legislative, the executive and the judiciary
 (4) Concentrations of all the powers in the hands of a monarch and his group of loyal people
29. How many subjects are given in central list?
 (1) 97
 (2) 66
 (3) 50
 (4) 47
30. Which of the following statement does not match the Nazi view on women?
 (1) Women are radically different from men
 (2) Women must become good mother and rear pure blooded 'Aryan' children
 (3) Women should be entitled equal rights to men
 (4) Women must produce more children

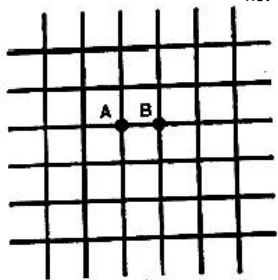
31. What kind of a disease is arthritis?
 (1) Acute disease (2) Chronic disease
 (3) Infectious disease (4) Communicable disease
32. The arithmetic progressions: 1, 4, 7 and 2, 10, 18, each contains 100 terms. How many terms are common to both the progression?
 (1) 10 (2) 12
 (3) 13 (4) 14
33. Which one of the following is not an example of fixed capital?
 (1) Tools (2) Raw material
 (3) Machines (4) Buildings
34. A uniform magnetic field pointing top to bottom in a plane of paper. When an electron is allowed to move perpendicular to it, it get deflected outwards. The electron must be moving along:
- 
- (1) left to right (2) right to left
 (3) it is stationary (4) it can't deflect outward
35. Consider the following statements
 (A) The velocity of sound in air increases due to presence of moisture in it.
 (R) The presence of moisture in air lowers the density of air.
 In the above statements:
 (1) both A & R are correct and R is the correct explanation of A
 (2) both A & R are correct and R is not the correct explanation of A
 (3) A is correct, R is incorrect
 (4) A is incorrect, R is correct
36. Each exterior angle of a regular polygon is less than 40° and the sum of its interior angles is less than 1980° , if N is the number of sides of the polygon, then the number of possible values of N is
 (1) 7 (2) 5
 (3) 3 (4) 2
37. Ram was working with his father in their farm. His father was small farmer. Income generated from the farm was not enough for the family. Ram got an opportunity to get loan from the bank under a govt. programme. He bought a rickshaw with that money and started working as a rickshaw puller in the city. Now he is able to earn good enough and their family income is increased than earlier. Such kind of activity done by Ram to improve his financial conditions comes under
 (1) primary sector (2) secondary sector
 (3) manufacturing sector (4) service sector
38. Arrange the following in a chronological sequence
 I. Second round table conference
 II. Establishment of depressed class association
 III. Breaking of salt law and beginning of civil disobedience movement
 IV. Lahore congress
 (1) II, III, IV, I (2) I, II, III, IV
 (3) IV, II, III, I (4) III, I, II, IV

39. Teacher wrote following points on the blackboard about a particular crop i.e. Temp 20° - 35° C, Rainfall not less than 200 cm, Terrain - undulating, Soil - laterite, red, yellow. Which of the following crop the teacher is discussing about?
 (1) Jute (2) Millet
 (3) Coffee (4) Rubber
40. The number of integral solutions (x, y) of the system of equations $x^2 - xy + 8 = 0$ and $x^2 - 8x + y = 0$ is:
 (1) 1 (2) 2
 (3) 3 (4) 0
41. Which of the following does not have poison apparatus?
 (1) Scorpion (2) Centipede
 (3) Spider (4) Crab
42. Which is the ruling party in Telangana?
 (1) T.D.P (2) Indian National Congress
 (3) B.J.D (4) T.R.S
43. India imports Chinese toy at Rs 100, whereas the same toy is manufactured and available in India for Rs 150. Now if Indian Govt. puts tax of Rs 50 on import of that toy. This practice of Indian Govt. is known as
 (1) Export substitution (2) Trade barrier
 (3) Import substitution (4) Dumping
44. The vapour density of an organic compound is 30. This organic compound can be
 (1) ethanol (2) ethanal
 (3) ethanoic acid (4) methyl ethanoate
45. Which of the following UT does not have its own Assembly?
 (1) Delhi (2) J & K
 (3) Ladakh (4) Pondicherry
46. A conical paper cup with height 16 cm and base radius 6 cm is filled to the top with water. If $\frac{19}{27}$ of the water is removed, then water level in the cup will drop by (in cm)
 (1) $5\frac{1}{3}$ (2) $4\frac{2}{3}$
 (3) $4\frac{1}{3}$ (4) $5\frac{2}{3}$
47. Match the following states with respect to their highest literacy rate:
- | State | Literacy Rate% |
|----------------|----------------|
| A. Kerala | (i) 91.85 |
| B. Lakshwadeep | (ii) 91.33 |
| C. Mizoram | (iii) 94.00 |
| D. Tripura | (iv) 87.78 |
- (1) A – ii, B – iii, C – i, D – iv (2) A – iii, B – iv, C – i, D – ii
 (3) A – iii, B – i, C – ii, D – iv (4) A – iv, B – iii, C – ii, D – i
48. A metal sphere is dipped in water. If at 0° C & 4° C the buoyancies in water are β_1 & β_2 respectively, then
 (1) $\beta_1 > \beta_2$ (2) $\beta_2 > \beta_1$
 (3) $\beta_1 = \beta_2$ (4) It depends upon radius of sphere
49. Which Indian soil is formed due to weathering of basic igneous rock?
 (1) Lignite soil (2) Alluvial soil
 (3) Desert soil (4) Black soil

50. The seasonal or periodic movement of pastoral farmer with their livestock over relatively short distances seeking fresh pastures between two areas of different climatic conditions is called as:
- (1) Lay farming (2) Crop rotation
(3) Transhumance (4) Ground farming

51. Who among the following coined the phrase 'Jet Stream'?
- (1) H.Seilkoph (2) Wiley Post
(3) Herodotus (4) Sir Gilbert Walker

52. Consider an infinite grid with square cells. The resistance between two adjacent joints is R. Find the net resistance R_{net} of the whole grid between two points A & B



- (1) R (2) R/2
(3) R/4 (4) 4R
53. Choose the correct statement:
- (1) Lok Sabha and Rajya Sabha have equal power in financial bill
(2) Lok Sabha and Rajya Sabha have equal power on ordinary bill
(3) Lok Sabha and Rajya Sabha have equal power on constitutional amendment bill
(4) Rajya Sabha is house of general people
54. Anything we get from the physical environment to fulfill our needs is called
- (1) Resource (2) Agriculture
(3) Domestication (4) Horticulture
55. ABCD is a cyclic quadrilateral in which AB = 14.4 cm, BC = 12.8 cm and CD = 9.6 cm. If AC bisects BD, then what is the length of AD?
- (1) 16.4 cm (2) 13.6 cm
(3) 15.8 cm (4) 19.2 cm
56. Mark the correct reason for the following statement – Karnataka has developed as an in state for the growth of silk industry:
- (1) Availability of good market, skilled labour and political reasons
(2) Availability of good market, good climate and political reasons
(3) Good climate, availability of soft water and mulberry plants
(4) Availability of soft water, good climate and nearness to port
57. Which atom has the smallest size?
- (1) B (2) N
(3) Al (4) P

Direction: (Q 58 - 61) Read the statements and select the correct answer form the options given below:

- (1) Statement – I is true
Statement – II is false
- (2) Statement – I is false
Statement – II is true

- (3) Both statements are true and statement - II provides explanation to statement - I
- (4) Both statements are true but statement - II does not provide explanation of statement - I
58. **Statement – I:** Three wars over seven years with Austria, Denmark and France ended in Prussian Victory and completed the process of unification of Germany
Statement – II: On 18th January, 1871 new German Empire was proclaimed headed by Kaiser William I of Prussia in the Palace of Versailles
59. **Statement – I :** On 5th May, 1789, Louis XVI called together an assembly of the Estate General to pass proposals for new taxes.
Statement – II : The members of the third estate demanded that voting now be conducted by the principle that each estate had one vote.
60. **Statement – I :** Under the shadow of the Second World War Germany had waged a genocidal war, which resulted in the mass murder of selected groups of innocent civilians of Europe.
Statement – II : Germany's conduct during the war, especially those actions which came to be called 'Crimes Against Humanity' raised serious moral and ethical question and invited worldwide condemnation.
61. **Statement – I :** After the corn laws were scrapped the condition of peasants deteriorated as they were unable to compete with imports.
Statement – II : Around the world in Eastern Europe, Russia, America and Australia lands were cleared and food production expanded to meet the British demand.
62. On which basis, the sectors can be classified into Public and Private sector?
 (1) Ownership of enterprises
 (2) The nature of economic activity
 (3) Number of workers employed in the enterprise
 (4) Employment conditions
63. A dice is constructed so that when it is thrown each even number is twice as likely to come up as each of the odd number. What is the probability of getting 6, when it is thrown once?
 (1) $\frac{1}{6}$ (2) $\frac{1}{9}$
 (3) $\frac{2}{9}$ (4) $\frac{1}{3}$
64. Which of the following type of teeths are called as tearing teeth?
 (1) Incisors (2) Canines
 (3) Premolars (4) Molars
65. Which metallic mineral is famous in the Balaghat district of Madhya Pradesh?
 (1) Gold (2) Iron
 (3) Copper (4) Zinc
66. Which British banned sati in India?
 (1) William Bentinck (2) Lord Cornwallis
 (3) Lord Dalhousie (4) Lansdown
67. A screen bearing a real image of magnification m_1 , formed by a convex lens, is moved by a distance x . The object is then moved until a new image of magnification m_2 is formed on screen. The focal length of lens is:

$$(1) \frac{x}{m_2 - m_1}$$

$$(2) \frac{m_2 - m_1}{x}$$

$$(3) \frac{x}{m_1 - m_2}$$

$$(4) \frac{m_1 - m_2}{x}$$

68. Match the following famous place with their respective states.

| I | II |
|-------------------------------|------------------------|
| A Pampa Sagar lake | (i) Tamil Nadu |
| B Dibang Multipurpose Project | (ii) Arunachal Pradesh |
| C Umnanda Island | (iii) Karnataka |
| D Anicut Canal | (iv) Guwahati |

(1) A (ii), B (i), C (iii), D (iv)

(2) A (iii), B (ii), C (iv), D (i)

(3) A (iii), B (iv), C (i), D (ii)

(4) A (iv), B (ii), C (i), D (iii)

69. Tracheal respiration is found in:

(1) Birds

(2) Reptiles

(3) Mammals

(4) Insects

70. If $\sqrt{\frac{1 - \cos \theta}{1 + \cos \theta}} \times \sqrt{\frac{\operatorname{cosec} \theta - \cot \theta}{\operatorname{cosec} \theta + \cot \theta}} = \frac{r - 1}{r + 1}$ then:

$$(1) \tan \theta = \sqrt{r^2 - 1}$$

$$(2) \cos \theta = r$$

$$(3) \sin \theta + \cos \theta = \frac{\sqrt{r^2 + 1}}{r}$$

$$(4) \cot \theta = \sqrt{1 - r^2}$$

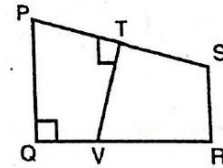
71. In the figure, $PT = TS$, $PQ \perp QR$ and $PQ \parallel SR$. If $PQ = 9$ cm, $QR = 8$ cm and $SR = 7$ cm, then what is the area (in cm^2) of quad (PTVQ)?

(1) 22

(2) 24

(3) 25

(4) 26



72. Muscles involved in the movement of the arm are:

(1) Striated

(2) Non striated

(3) Cardiac

(4) Smooth

73. The daily wage of a person in rural area is Rs. 200 and the poverty line for a person is fixed at Rs. 800 per month for rural areas. Following table shows the detail of employment of four families living in a village. Identify the family living below poverty line:

| Family | Total days of Employment of got in a month by the family | Members of family |
|--------|----------------------------------------------------------|-------------------|
| Ram | 10 | 2 |
| Radha | 18 | 3 |
| Raju | 12 | 4 |
| Pooja | 25 | 5 |

(1) Pooja

(2) Ram

(3) Radha

(4) Raju

74. If $x^4 - 83x^2 + 1 = 0$, then a value of $x^3 - x^{-3}$ is:

(1) 758

(2) 756

(3) 739

(4) 737

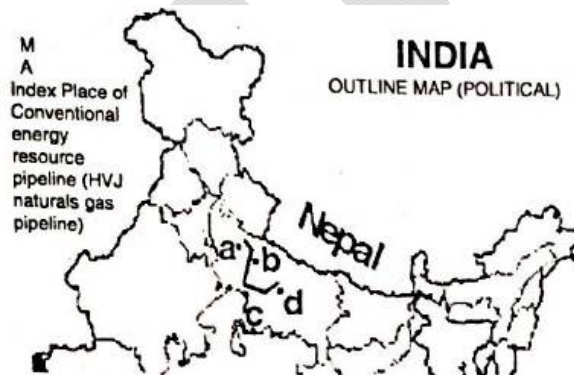
75. Choose the wrong statements in the following:

(1) India has unity in diversity.

(2) India has Parliamentary democracy.

- (3) India is Republic.
 (4) India is not member of commonwealth countries.

76. The %age of irrigated land in India is about _____ as per 2017 datas.
 (1) 45% (2) 65%
 (3) 25% (4) 35%
77. Who was the author of Arthashastra?
 (1) Kautilya (2) Plato
 (3) Aristotle (4) Mechiavelli
78. 'Ratoon Cropping' is gaining popularity among which of the following crop cultivators?
 (1) Sugarcane (2) Millet
 (3) Rice (4) Wheat
79. Which statement out of following is true? Isobars have:
 (1) Same protons (2) Same electrons
 (3) Same neutrons (4) Same nucleons
80. Arrange the following in a chronological sequence:
 I Abdication of Tsar II Bloody Sunday
 III Formation of Comintern IV Civil War
 (1) II, I, IV, III (2) III, IV, I, II
 (3) I, III, II, IV (4) I, IV, III, II
81. Observe the map given below. Identify the correct marked points of a pipeline of conventional energy reason with a sequence:



- (1) (a) Aonla (b) Shahjahanpur (c) Auraiya (d) Jagdishpur
 (2) (a) Jagdishpur (b) Aonla (c) Shahjahanpur (d) Auraiya
 (3) (a) Auraiya (b) Shahjahanpur (c) Aonla (d) Jagdishpur
 (4) (a) Shahjahanpur (b) Aonla (c) Auraiya (d) Jagdishpur
82. The equations $x^2 + rx + 64 = 0$ and $x^2 - 8x + r = 0$, where $r > 0$, have real roots. Then r satisfies the equation:
 (1) $r^2 - 15r + 8 = 0$ (2) $r^2 - 14r - 30 = 0$
 (3) $r^2 - 13r - 48 = 0$ (4) $r^2 - 12r - 56 = 0$
83. Radha works in an office from 9 am to 5 pm. She gets her salary regularly every month and also she gets provident fund, medical and other allowances as per the rules laid down by the govt. Sunday is a paid holiday for her. She was given an appointment letter stating all the terms and conditions of work at the time of joining. Her cousin Ram is a daily wage labourer in a cloth shop. He goes to shop at 8 am and works till 8 pm in the evening. He does not get any type of allowances apart form his wages. He is not paid for days he does not work i.e. He

does not get paid holidays. Also, he did not get any appointment letter. In which sectors, Both Radha and Ram work?

- (1) Both are in organised sectors.
- (2) Both are in unorganised sectors.
- (3) Radha works in organised sector while Ram works in unorganised sector.
- (4) Radha works in unorganised sector while Ram works in organised sector.

84. Select the correct set of statements regarding change in properties, as we move left to right in the second period of periodic table.

- | | |
|-----------------------------------|-----------------------------------|
| (I) Atomic size decreases | (II) Valency remains same |
| (III) Electronegativity increases | (IV) Metallic character decreases |

- | | |
|-------------------|--------------------|
| (1) I, II and III | (2) II, III and IV |
| (3) I, II and IV | (4) I, III and IV |

85. A person has a rectangular sheet of metal. He has to make cylindrical vessel whose both circular ends are closed. When he minimize the wastage of the sheet, then what is the ratio of

the wasted sheet to the utilized sheet? $\left(\pi = \frac{22}{7}\right)$

- | | |
|--------------------|--------------------|
| (1) $\frac{1}{22}$ | (2) $\frac{3}{11}$ |
| (3) $\frac{1}{11}$ | (4) $\frac{5}{22}$ |

86. The nature of a solution obtained by dissolving soluble metal oxide in water is:

- | | |
|------------|----------------|
| (1) Acidic | (2) Neutral |
| (3) Basic | (4) Amphoteric |

87. Shivasamudram fall is found on which river?

- | | |
|--------------|-------------|
| (1) Mahanadi | (2) Chenab |
| (3) Cauvery | (4) Krishna |

88. A normal bar magnet is 6 cm long. It's north pole will be away from its mid point at a distance of:

- | | |
|-----------------------------|-----------------------------|
| (1) 6 cm | (2) 3 cm |
| (3) Slightly more than 3 cm | (4) Slightly less than 3 cm |

89. If Samir withdraws Rs. 25,000 from his bank account by submitting a self cheque in bank for making payments and he also gave a account Pay cheque for Rs. 52,000 issued by his employer in his favour. Now what happens to the Balance in his account?

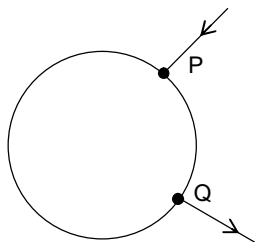
- (1) Samir's bank balance will increase by Rs. 77,000
- (2) Samir's bank balance will decrease by Rs. 77,000
- (3) Samir's bank balance will increase by Rs. 27,000
- (4) Samir's bank balance will decrease by Rs. 27,000

90. Arrange the following households in ascending order of per capita income.

| Name of Household | Total Income of Household | Size of the Household |
|-------------------|---------------------------|-----------------------|
| Rajat | 6000 | 5 |
| Raman | 5000 | 5 |
| Suman | 3200 | 4 |
| Priya | 8400 | 6 |

- | | |
|-----------------------------------|-----------------------------------|
| (1) Suman < Raman < Rajat < Priya | (2) Priya < Rajat < Raman < Suman |
| (3) Raman < Rajat < Suman < Priya | (4) Suman < Rajat < Raman < Priya |

91. A uniform wire of resistance 9Ω having resistance $1\Omega/m$ is bent in the form of a circle as shown in figure. If the equivalent resistance between P & Q is 2Ω , what is the length of shorter section?



- (1) 4 m
(2) 3 m
(3) 6 m
(4) 2 m
92. The I.U.P.A.C. name of following compound is:
- $$\begin{array}{ccccccc} \text{CH}_3 & - & \text{CH} & - & \text{CH}_2 & - & \text{CH} & - & \text{CH}_3 \\ & & | & & & & | & & \\ & & \text{C}_2\text{H}_5 & & & & \text{C}_2\text{H}_5 & & \end{array}$$
- (1) 2, 4-Diethyl pentane
(2) 2, 4-Diethyl butane
(3) 3, 5-Dimethyl hexane
(4) 3,5-Dimethyl heptane
93. Which has the maximum number of atoms?
- (1) 24 g of C (12)
(2) 56 g of Fe (56)
(3) 27 g of Al (27)
(4) 108 g of Ag (108)
94. When a cell is placed in strong salt solution. It shrinks, because:
- (1) Salt solution enters in cell
(2) Cytoplasm of the cell begins to decompose
(3) Water came out of the cell to develop equilibrium
(4) Water enter inside the cell to develop equilibrium
95. Which of the following statements is incorrect about honey bees?
- (1) Queen bee is the largest in size
(2) Worker bees outnumber the others
(3) Drone keep the hive clean
(4) Bees have no sense of direction
96. A pulse crop is grown in the time interval between two cereal crops to compensate for the:
- (1) Loss of phosphate
(2) Loss of sulphur
(3) Loss of potassium
(4) Loss of nitrogen
97. When $x^{100} - 2x^{51} + 1$ is divided by $x^2 - 1$, the remainder is $r(x)$. The value of $r(-2) + r(2)$ is:
- (1) 0
(2) 4
(3) 6
(4) 8
98. The coordinates of vertices A and B of a triangle ABC are (0, 0) and (36, 15), respectively. If the coordinates of C are integers, then what is the minimum area (in sq. units) that ΔABC can have?
- (1) 1
(2) $\frac{3}{2}$
(3) 2
(4) $\frac{5}{2}$
99. In ΔABC , BE and CD are the perpendiculars on sides AC and AB, respectively and intersect each other at O. The bisectors of $\angle OBC$ and $\angle OCB$ meet at P. If $\angle BPC = 146^\circ$, then what is the measure of $\angle A$?
- (1) 34°
(2) 68°
(3) 73°
(4) 36.5°

NTSE STAGE – I (HARYANA STATE)
(For Class – X)
SCHOLASTIC APTITUDE TEST (SAT)

ANSWER KEYS

| | | | | | | | |
|-----|---|-----|---|-----|---------|------|---|
| 1. | 4 | 2. | 3 | 3. | 2 | 4. | 2 |
| 5. | 4 | 6. | 4 | 7. | 2 | 8. | 2 |
| 9. | 4 | 10. | 3 | 11. | 4 | 12. | 3 |
| 13. | * | 14. | 4 | 15. | 2 | 16. | 3 |
| 17. | 3 | 18. | 2 | 19. | 2 | 20. | 1 |
| 21. | * | 22. | * | 23. | 1 | 24. | 2 |
| 25. | 3 | 26. | 3 | 27. | 2 | 28. | 3 |
| 29. | 1 | 30. | 3 | 31. | 2 | 32. | 3 |
| 33. | 2 | 34. | 1 | 35. | 1 | 36. | 3 |
| 37. | 4 | 38. | 3 | 39. | 4 | 40. | 1 |
| 41. | 4 | 42. | 4 | 43. | 2 | 44. | 3 |
| 45. | 3 | 46. | 1 | 47. | 3 | 48. | 2 |
| 49. | 4 | 50. | 3 | 51. | 1 | 52. | 2 |
| 53. | 2 | 54. | 1 | 55. | 4 | 56. | 3 |
| 57. | 2 | 58. | 3 | 59. | 1 | 60. | 4 |
| 61. | 3 | 62. | 1 | 63. | 3 | 64. | 2 |
| 65. | 3 | 66. | 1 | 67. | 1 and 3 | 68. | 2 |
| 69. | 4 | 70. | 1 | 71. | 4 | 72. | 1 |
| 73. | 4 | 74. | 2 | 75. | 4 | 76. | 4 |
| 77. | 1 | 78. | 1 | 79. | 4 | 80. | 1 |
| 81. | 1 | 82. | 3 | 83. | 3 | 84. | 4 |
| 85. | 1 | 86. | 3 | 87. | 3 | 88. | 4 |
| 89. | 3 | 90. | 1 | 91. | 2 | 92. | 4 |
| 93. | 1 | 94. | 3 | 95. | 3 and 4 | 96. | 4 |
| 97. | 2 | 98. | 2 | 99. | 2 | 100. | 4 |

***Observations:**

13. Incorrect Question

21. No option is correct

22. Incorrect Question

NTSE STAGE – I (HARYANA STATE)
(For Class – X)
SCHOLASTIC APTITUDE TEST (SAT)

HINTS & SOLUTIONS

1. 4
1. \therefore gravitational field inside the spherical shell is zero. So, force is zero.
2. 3
2. Plaster of Paris is hygroscopic and absorbs water readily.
3. 2
3. $X = C_2H_5OH$ (Alcohol); $Y = CH_3COOH$ (Carboxylic Acid); Both X, Y liberate H_2 (A) when treated with Na metal; $CH_3COOH + NaHCO_3 \longrightarrow CH_3COONa + H_2O + CO_2 \uparrow$. So B is CO_2 gas.
4. 2
5. 4
5. $Cl + 1e^- \longrightarrow Cl^-$, with configuration 2, 8, 8 \Rightarrow 8 valence electrons.
6. 4
7. 2
8. 2
8. Organ which look different and perform different functions but have similar basic structure and origin are called Homologous organs.
9. 4
9. $N - W = m(3g)$; $W = mg$
 $N = 4W$
10. 3
10. In human male, scrotum is called thermo regulator.
11. 4
12. 3
12. Slope of P–t graph is maximum at R. So, instantaneous force is maximum.
13. * (best possible answer is option (2) if the question is $\frac{3}{\sqrt{28+10\sqrt{3}} - \sqrt{7-4\sqrt{3}}} = a + \sqrt{3}b$.
13. $\frac{3}{\sqrt{28+10\sqrt{3}} - \sqrt{7-4\sqrt{3}}} = a + \sqrt{3}b$
 $\Rightarrow \frac{3}{(5+\sqrt{3}) - (2-\sqrt{3})} = a + \sqrt{3}b$

$$\Rightarrow \frac{3}{3+2\sqrt{3}} = a + \sqrt{3}b$$

$$\Rightarrow \frac{3(3-2\sqrt{3})}{9-12} = a + \sqrt{3}b$$

$$\Rightarrow 2\sqrt{3} - 3 = a + \sqrt{3}b$$

$$\Rightarrow a = -3, b = 2$$

$$\therefore \sqrt{5a+12b} \Rightarrow \sqrt{-15+24} = 3$$

14. 4

14. $2x + 3y - A = 0$

$x + 2y - B = 0$

$$\frac{x}{-3B+2A} = \frac{y}{-A+2B} = \frac{1}{4-3}$$

$x = 2A - 3B$

$y = 2B - A$

Option 1 : $5(2A - 3B) + 3(2B - A)$

$= 10A - 3A - 15B + 6B$

$\neq A - B$

Option 2 : $3(2A - 3B) - 5(2B - A)$

$= 6A + 5A - 9B - 10B$

$= 11A - 19B \neq A + B$

Option 3 : $3x - 5y = 11A - 19B \neq A - B$

Option 4 : $3x + 5y = 6A - 5A - 9B + 10B$

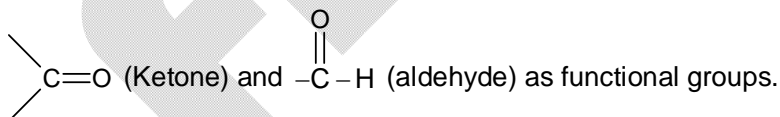
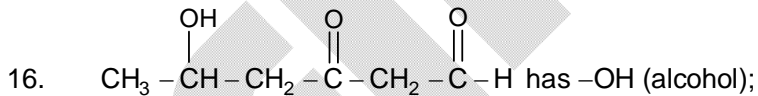
$= A + B$

\therefore Option (4) satisfies

15. 2

15. One mole $\text{CO}_2 = 44 \text{ g} \Rightarrow 2.5 \text{ moles} = 2.5 \times 44 = 110 \text{ g}$ of CO_2 .

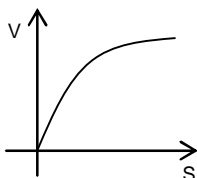
16. 3



17. 3

17. $v^2 = 2as$

$y^2 \propto x$



18. 2

18. $N = 9k_1 + 6 \rightarrow (1)$

$N = 21k_2 + 12 \rightarrow (2)$

First such number (greater than 100)
 = 159
 and other numbers will be 159, 222, 285,.....,
 $\Rightarrow 159 + 63(n-1) < 400$
 $\Rightarrow n-1 < 3.8$
 $\Rightarrow n < 4.8$
 $\Rightarrow n = 4$
 \therefore 4 terms

19. 2
 19. $MCl_3 \Rightarrow M$ has +3 oxidation state, so it belongs to Aluminium family.

20. 1
 20. Crura cerebri is not a part of hind brain.

21. No option is correct.

21. $2T = Mg$ $2T \sin 60 = Mg$ $2T \cos 30^\circ = Mg$ $2T \cos 60^\circ = Mg$
 $T = \frac{Mg}{2}$ $2T \frac{\sqrt{3}}{2} = Mg$ $2T \times \frac{\sqrt{3}}{2} = Mg$ $2T \times \frac{1}{2} = Mg$
 $T = \frac{Mg}{\sqrt{3}}$ $T = \frac{Mg}{\sqrt{3}}$ $T = Mg$

Maximum tension in (IV) case.

22. *
 22. No integral values of a, b and c satisfy any of the options.

23. 1
 23. Blood cells are manufactured in our bone marrow.

24. 2
 24. $a = (\sin \theta - \cos \theta)^4$
 $= (\sin^2 \theta + \cos^2 \theta - 2 \sin \theta \cos \theta)^2$
 $= (1 - 2 \sin \theta \cos \theta)^2$
 $= 1 - 4 \sin \theta \cos \theta + 4 \sin^2 \theta \cos^2 \theta$
 $b = \sin^6 \theta + \cos^6 \theta$
 $= (\sin^2 \theta)^3 + (\cos^2 \theta)^3$
 $= (\sin^2 \theta + \cos^2 \theta)(\sin^4 \theta + \cos^4 \theta - \sin^2 \theta \cos^2 \theta)$
 $= ((\sin^2 \theta + \cos^2 \theta)^2 - 3 \sin^2 \theta \cos^2 \theta)$
 $= 1 - 3 \sin^2 \theta \cos^2 \theta$
 $c = (\sin \theta + \cos \theta)^2 = 1 + 2 \sin \theta \cos \theta$
 $3a + 4b + 6c = 3 - 12 \sin \theta \cos \theta + 12 \sin^2 \theta \cos^2 \theta + 4 - 12 \sin^2 \theta \cos^2 \theta + 6 + 12 \sin \theta \cos \theta = 13$
 $\sqrt{3a + 4b + 6c} = \sqrt{13}$ lies between $\sqrt{9}$ and $\sqrt{16}$
 \Rightarrow lies between 3 and 4

25. 3
 25. $\therefore g_{\text{eff}}$ is zero.

26. 3
27. 2
27. Osmoregulation is the process of maintaining proper amount of water and proper ionic balance in the body.
28. 3
29. 1
30. 3
31. 2
31. Arthritis is a chronic disease.
32. 3
32. First common term = 10
 $d_1 = 3, d_2 = 8$
 \Rightarrow difference in series of common terms
 = l.c. m of d_1 and d_2
 = 24
 \therefore Common term series
 = 10, 34, 58
 100^{th} term of series 1 = $1 + 99(3)$
 = 298
 $10 + 24(n - 1) \leq 298$
 $24(n - 1) \leq 288$
 $(n - 1) \leq 12$
 $n \leq 13$
 $n = 13$
33. 2
34. 1
34. Using Fleming's left hand rule.
35. 1
35. $V_s = \sqrt{\frac{\gamma P}{\rho}}$ $\rho \rightarrow$ Density
 Due to presence of water molecules, density of air decreases.
36. 3
36. $\frac{360}{N} < 40^\circ$
 $N > 9$
 $180(N - 2) < 1980$
 $N - 2 < 11$
 $N < 13$
 N can be equal to 10, 11 or 12.
 $\therefore N$ can take 3 values.
37. 4

38. 3

39. 4

40. 1

40. $x^2 - xy + 8 = 0$

$$x^2 - 8x + y = 0$$

$$xy - 8 = 8x - y$$

$$y(x + 1) = 8(x + 1)$$

$$(y - 8)(x + 1) = 0$$

$$y = 8 \text{ or } x = -1$$

For $y = 8, x \neq -1$

\therefore Only 1 set of solution, $x = -1, y = -9$

41. 4

41. Crab does not bear poisonous apparatus.

42. 4

43. 2

44. 3

44. Molecular mass = 2 × vapour density = 2 × 30 = 60 \Rightarrow It is CH_3COOH ethanoic acid.

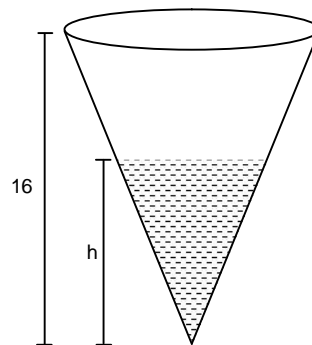
45. 3

46. 1

46. Let height of water left = h
and volume of whole cone = V
then volume of water left out

$$= \frac{8}{27}V \text{ then } \frac{V}{\frac{8}{27}V} = \left(\frac{16}{h}\right)^3 \Rightarrow h = \frac{32}{3}$$

$$\text{So, drop in water level} = 16 - \frac{32}{3} = \frac{16}{3}$$



47. 3

48. 2

48. $F_B = \rho_w Vg$

Density of water is maximum at 4°C .

So, $\beta_2 > \beta_1$

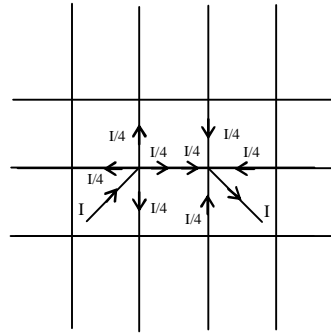
49. 4

50. 3

51. 1

52. 2

52. $V_{AB} = \frac{1}{2}R \Rightarrow I R_{eq}$
 $R_{eq} = \frac{R}{2}$



53. 2

54. 1

55. 4

55. Let $AD = x$ and $DO = OB = y$ then

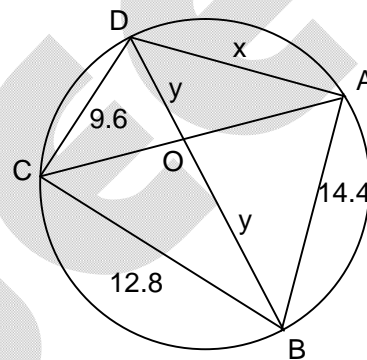
$\triangle DOA \sim \triangle COB$

$$\Rightarrow \frac{OA}{y} = \frac{x}{12.8} \dots\dots(1)$$

Similarly $\triangle AOB \sim \triangle DOC$

$$\Rightarrow \frac{OA}{y} = \frac{14.4}{9.6} \dots\dots(2)$$

From equation (1) and equation (2)
 $x = 19.2$



56. 3

57. 2

57. Atomic size decreases along the period and increases down the group. So 'N' is smallest.

58. 3

59. 1

60. 4

61. 3

62. 1

63. 3

63. Let probability of odd number = x
 Then probability of even number = $2x$
 then $P(1) + P(2) + P(3) + \dots + P(6) = 1$

$$\Rightarrow 9x = 1 \Rightarrow x = \frac{1}{9}$$

$$\text{So, } P(6) = \frac{2}{9}$$

64. 2

64. Canines are called as tearing teeth.

65. 3

66. 1

67. 1 and 3

67. $m = \frac{f - v}{f}$

If the screen is moved away $v_1 = v + x$

If the screen is brought closer to lens $v_2 = v - x$

$$m_1 = \frac{f - v}{f}$$

$$m_1 = \frac{f - v}{f}$$

$$m_2 = \frac{f - (v + x)}{f}$$

$$m_2 = \frac{f - (v - x)}{f}$$

$$f = \frac{x}{m_1 - m_2}$$

$$f = \frac{x}{m_2 - m_1}$$

Options 1 and 3 are correct.

68. 2

69. 4

69. Insects respire through trachea.

70. 1

70. $\sqrt{\frac{1 - \cos \theta}{1 + \cos \theta}} \times \sqrt{\frac{\operatorname{cosec} \theta - \cot \theta}{\operatorname{cosec} \theta + \cot \theta}} = \frac{r - 1}{r + 1}$

$$\Rightarrow \sqrt{\frac{1 - \cos \theta}{1 + \cos \theta}} \times \sqrt{\frac{\frac{1 - \cos \theta}{\sin \theta}}{\frac{1 + \cos \theta}{\sin \theta}}} = \frac{r - 1}{r + 1}$$

$$\Rightarrow \frac{1 - \cos \theta}{1 + \cos \theta} = \frac{r - 1}{r + 1}$$

By componendo and dividendo

$$\cos \theta = \frac{1}{r} \Rightarrow \tan \theta = \sqrt{r^2 - 1}$$

71. 4

71. From S draw $SM \perp PQ$

In $\triangle SMP$

$$PS = 2\sqrt{17}$$

$$\Rightarrow PT = TS = \sqrt{17}$$

$$\text{Let } QV = x \Rightarrow VR = 8 - x$$

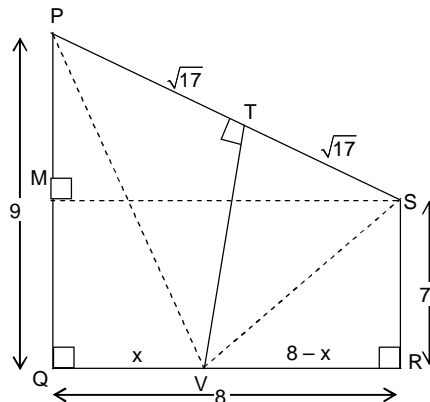
Since, $\triangle VTP \cong \triangle VTS$

$$\Rightarrow VP = VS \Rightarrow \sqrt{81 + x^2} = \sqrt{7^2 + (8 - x)^2}$$

$$\Rightarrow x = 2 \Rightarrow VT = 2\sqrt{17}$$

$$\text{ar}(\triangle PTVQ) = \frac{1}{2} \times \sqrt{17} \times 2\sqrt{17} + \frac{1}{2} \times 2 \times 9$$

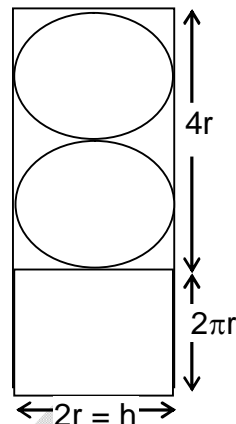
$$= 26$$



72. 1
72. Muscles involved in the movement of the arm are striated, multinucleated and voluntary.
73. 4
74. 2
74. $x^4 - 83x^2 + 1 = 0$
 $\Rightarrow x^2 + \frac{1}{x^2} = 83$
 $\Rightarrow x - \frac{1}{x} = \pm 9$
 $\left(x - \frac{1}{x}\right)^3 = x^3 - \frac{1}{x^3} - 3(\pm 9) = \pm 729$
 $\Rightarrow x^3 - \frac{1}{x^3} = \pm 729 + 3(\pm 9)$
 $= \pm 756$
75. 4
76. 4
77. 1
78. 1
78. Ratooning is the agricultural practice of harvesting a monocot crop by cutting most of the above-ground portion but leaving the roots and the growing shoot apices intact so as to allow the plants to recover and produce a fresh crop in the next season.
79. 4
79. Isobars are the atom of different elements but having same mass number. i.e. same (p + n) value.
80. 1
81. 1
82. 3
82. $x^2 + rx + 64 = 0$
for real roots $r^2 - 256 \geq 0$
 $\Rightarrow r \geq 16$
 $x^2 - 8x + r = 0$ have real roots
 $\Rightarrow 64 - 4r \geq 0 \Rightarrow r \leq 16$
So, $r = 16$
Now $r^2 - 13r - 48 = 16^2 - 13 \times 16 - 48 = 0$
83. 3
84. 4
84. Along the period –
(i) Size of atoms decreases with increasing effective nuclear charge.
(ii) Valence changes depending on the available valence electron and group number.
(iii) Electro negativity increases due to decrease in atomic size.
(iv) Extreme left are metals then it changes from metal to non-metal.

85. 1

85 Area of sheet = $(4r + 2\pi r) \times 2r$
 $= 2r(2 + \pi) \times 2r$
 $= 4r^2(\pi + 2)$
 Surface area of cylinder = used area
 $= 2\pi r(r + h)$
 $= 2\pi r(3r) = 6\pi r^2$
 \therefore Wasted area = $8r^2 - 2\pi r^2 = 2r^2(4 - \pi)$
 $\therefore \frac{\text{Wasted}}{\text{Used}} = \frac{2r^2(4 - \pi)}{6\pi r^2} = \frac{4 - \pi}{3\pi}$
 $= \frac{4 - \frac{22}{7}}{\frac{6 \times 22}{7}} = \frac{6}{6 \times 22} = \frac{1}{22}$



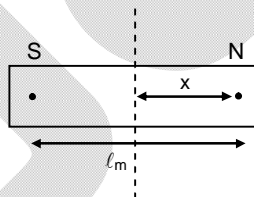
86. 3

86. Metal oxide + water = metal hydroxide (so basic solution)

87. 3

88. 4

88. $\ell_m \rightarrow$ magnetic length
 x is less than 3 cm.



89. 3

90. 1

91. 2

91. For parallel combination

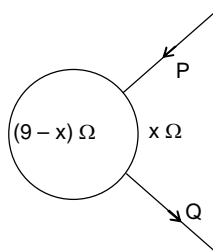
$$\frac{x(9-x)}{x+(9-x)} = 2$$

$$9x - x^2 = 18$$

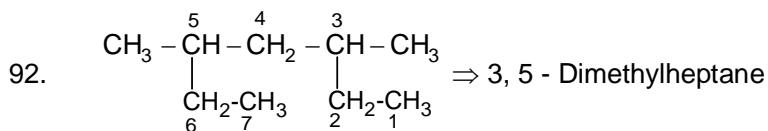
$$x = 3\Omega, 6\Omega$$

\therefore Resistance is proportional to length.

\therefore Length of shorter section is 3 m.



92. 4



93. 1

93. (1) 24 g of C = $\frac{24}{12} \times 6.022 \times 10^{23}$ atom (maximum)

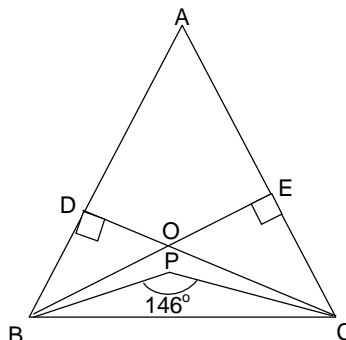
- (2) 56 g of Fe = $\frac{56}{56} \times 6.022 \times 10^{23}$ atoms
 (3) 27 g of Al = $\frac{27}{27} \times 6.022 \times 10^{23}$ atoms
 (4) 108g of Ag = $\frac{108}{108} \times 6.022 \times 10^{23}$ atoms

94. 3
 94. When a cell is placed in strong salt solution it shrinks, because water came out of the cell to develop equilibrium.
95. 3 and 4
 95. Drone is a male honey bee and its role is to mate.
 Bees have very good sense of direction
96. 4
 96. A pulse crop is grown in the time interval between two cereal crops to compensate for the loss of Nitrogen.

97. 2
 97. Let remainder is $ax + b$
 $x^{100} - 2x^{51} + 1 = (x^2 - 1)Q(x) + ax + b$
 Put $x = 1$, $a + b = 0$
 Put $x = -1$ $-a + b = 4$
 $\Rightarrow a = -2, b = 2$
 So, $r(x) = -2x + 2 \Rightarrow r(-2) + r(2) = 4$

98. 2
 98. Let the coordinate of 3rd vertex be (x, y)
 $\therefore \Delta = \frac{3}{2}|12y - 5x|$ and $\Delta > 0$
 Also, $x, y \in I, \Rightarrow 12y - 5x \in I$
 \therefore Minimum value that $|12y - 5x|$ can take is 1
 $\Rightarrow \Delta \geq \frac{3}{2}$ and, $\Delta = \frac{3}{2}$ is possible when $y = 2, x = 5$
 \therefore Minimum value of $\Delta = \frac{3}{2}$

99. 2
 99. Let $\angle PBC = \angle OBP = a$ and
 $\angle PCB = \angle OCP = b$
 Then $a + b = 34$
 $\Rightarrow 2a + 2b = 68$
 $\Rightarrow \angle ECO = \angle DBO = 22^\circ$
 $\Rightarrow \angle A = 180^\circ - 68^\circ - 22^\circ \times 2$
 $= 68^\circ$



100. 4

100. Let $BT = 7\ell, TE = \ell$

$AT = 5k, TD = k$

Draw $DF \parallel BE$

$$\Rightarrow DF = \frac{6\ell}{5}$$

In $\triangle CBE$,

$$\frac{CD}{CB} = \frac{\frac{6}{5}\ell}{8\ell} = \frac{3}{20}$$

$$\Rightarrow \frac{CD}{DB} = \frac{3}{17}$$

