# NTSE STAGE – I

# SAT

# PAPER – II

# SSS – 2016 – 17

**Time : 90 Minutes**

**Full Marks : 100**

**No. of items : 100**

**INSTRUCTIONS :**

1. Each question has four probable answers of which one is correct. You have to choose the correct one and blacken your choice in the OMR answer sheet by a black/blue ball point pen.

2. For wrong answer, there is no deduction of marks. One mark shall be awarded for each correct response.

3. No mark will be awarded for a question if a candidate darkens more than one choice.

**ROLL NO. : _____**

**NAME : _____**

# NTSE STAGE – I SAT

1. Rise in Green Net National Income implies higher sustainable development in an economy. Green Net National Income is the difference between
(A) Difference between Net National Income and gross savings
(B) Difference between Net National Income and depreciation of natural capital
(C) Difference between Net National Income and depreciation of man-made capital
(D) Both (B) and (C)

2. Match List-I with List-II and select answer using the appropriate code from among the following alternatives.

| | List – I | | List – II |
|---|---|---|---|
| (A) | Disparities in income in a developing economy | (I) | Trickle Down theory |
| (B) | Economic development benefits the poor | (II) | Change in occupational structure |
| (C) | Shifting of labour from agricultural to non agricultural sector | (III) | Less redistribution of income in favour of poor |
| (D) | Increase in the capabilities of people | (IV) | Human development |

(A) A – II, B – III, C – I, D – IV (B) A – I, B – II, C – III, D – IV
(C) A – III, B – I, C – II, D – IV (D) A – IV, B – II, C – I, D – III

3. If Life Expectancy Index for a country is 0.53, Educational Attainment Index is 0.67 and Per Capita Real GDP Index is 0.42, then HDI for the country will be
(A) 0.93 (B) 0.70 (C) 0.54 (D) 0.68

4. If cash reserve ratio of banks is 20% and currency reserves in the banking system amount to 50 million rupees, the maximum amount of demand deposits which can be created by the banks is
(A) 200 million rupees (B) 250 million rupees (C) 500 million rupees (D) 1000 million rupees

5. The Government of India supplies food grains and other essential commodities to BPL households through fair price shops. Name of the programme is
(A) ICDS (B) MDM (C) PDS (D) Antodaya

6. Free trade in goods among nations is called
(A) Privatisation (B) Liberalisation (C) Globalisation (D) Exclusion

7. NITI Ayog prepares
(A) Five year plans for the country (B) Five year plans for the states
(C) Annual plans for the country as well as states (D) None of the above

8. Indira Awas Yojana houses are given to the
(A) STs only (B) SCs only (C) BPL households (D) Both (A) and (B)

9. In which of the following countries the Baluchistan Plateu is located?
(A) Afghanistan (B) Pakistan (C) China (D) India

10. What is the percentage of surface covered by India?
(A) 2.4 (B) 3.4 (C) 4.4 (D) 5.4

11. Which of the following places is known as the "Island of Pearls"?
(A) Australia (B) Madagascar (C) Baharin (D) Srilanka

12. Durand Line is the boundary between:
(A) India and Pakistan (B) India and China
(C) Pakistan and Afghanistan (D) India and Afghanistan

13. In which of the following countries world's largest reserves of uranium is located?
(A) Australia (B) Canada (C) China (D) Brazil

14. Select the odd one from the following:
(A) Chilika (B) Pulicat (C) Vembanad (D) Kolleru

15. What is Karewa?
(A) A type of soil (B) A type of plant (C) A type of animal (D) A type of tribe

16. Which of the following pairs is not correct?
(A) Berlin – Rhine (B) London – Thames (C) New York – Hudson (D) Viena – Danube

17. Which of the following groups accounts for over 90% of India's annual coal production?
(A) Bihar, Odisha, Madhya Pradesh (B) Bihar, Madhya Pradesh, Tamil Nadu
(C) West Bengal, Odisha, Madhya Pradesh (D) Bihar, Odisha, West Bengal

18. Which National Highway connects Amritsar with Kolkata via Delhi?
(A) N.H. 1 (B) N.H. 2 (C) N.H. 4 (D) N.H. 8

19. In which state is the Guru Sikhar Peak Located?
(A) Gujarat (B) Rajasthan (C) Maharashtra (D) Madhya Pradesh

20. Tehri Hydropower Project is located on:
(A) Alakananda River (B) Bhagirathi River (C) Mandakini River (D) Dhauliganga River

21. In the context of which event we read about the activities of Mensheviks and Bolshevicks?
(A) French Revolution (B) World war I (C) Russian Revolution (D) Indian Nationalist movement

22. Who was the Czar of Russia in 1917?
(A) Alexander I (B) Alexander II (C) Nicholas I (D) Nicholas II

23. In which country was the Weimar Republic formed after the World War I?
(A) Germany (B) Italy (C) France (D) England

24. Find out which statement mentioned below is true
(A) Hitler came to power in Italy
(B) Hitler deliberately violated the terms of the Treaty of Versailles
(C) Hitler was a poor orator
(D) Hitler encouraged the Jews

25. Who has written the Odia novel Chhamana Athaguntha?
(A) Rama Shankar Ray (B) Nandakishore Bal
(C) Fakir Mohan Senapati (D) Surendra Mohanty

26. Where did Mahatma Gandhi start his first Satyagraha movement?
(A) South Africa (B) Kheda (C) Champaran (D) Nagpur

27. Whose cause did Mahatma Gandhi champion in organizing a satyagraha movement in Ahemadabad in 1918?
(A) Peasants (B) Agricultural Labours (C) Zamindars (D) Cotton mill workers

28. What was the date fixed for observing a countrywide hartalin protest against the Rawlatt Act?
(A) 18 March 1919 (B) 19 March 1919 (C) 6 April 1919 (D) 9 April 1919

29. Who presided over the Lahore session of the Indian National Congress in December 1929?
(A) Motilal Nehru (B) Jawaharlal Nehru
(C) Subhas Chandra Bose (D) Mahatma Gandhi

30. Who was the Viceroy of India when the Salt Satyagraha began in 1930?
(A) Lord Irwin (B) Lord Willingdon (C) Lord Linlithgow (D) Lord Wavell

31. How was response of the Indian women towards the Salt Satyagraha?
(A) They were against the movement (B) They remained indifferent

(C) They participated in large number (D) They were not allowed to participate

32. Which one of the following is written in correct chronological order of the given events?
(A) Chaurichaura Incident, Gandhi – Irwin Pact, Second Round Table conference, Dandi March
(B) Dandi March, Chaurichaura incident, Second Round Table Conference, Gandhi – Irwin Pact
(C) Second Round Table Conference, Dandi March, Gandhi – Irwin Pact, Chaurichaura Incident
(D) Chaurichaura Incident, Dandi March, Gandhi – Irwin Pact, Second Round Table Conference

33. Which part of the Indian Constitution mentions that the State shall endeavour to promote international peace and security?
(A) Part I (B) Part II (C) Part III (D) Part IV

34. How many members from the Anglo-Indian Community be nominated to the State Legislative Assembly by the Governor?(A) 1 (B) 2 (C) 3 (D) 4

35. What happens if there is a disagreement between the two Houses of the Parliament regarding a Constitution Amendment Bill?
(A) Joint sitting of both the House is convened. (B) The bill is sent to the State Legislative
(C) There is an end to the Bill (D) Advice of the Supreme Court is solicited

36. What can be the maximum number of elected members of a State Legislative Assembly?
(A) 500 (B) 507 (C) 509 (D) 510

37. Which of the following Amendments Converted Right to Property into a Legal Right?
(A) $44^{th}$ Amendment (B) $42^{nd}$ Amendment (C) $73^{rd}$ Amendment (D) $86^{th}$ Amendment

38. How long a Chief Minister of a State holds office?
(A) For full 5 years
(B) So long as he remains the leader of the majority party in the State Legislative
(C) So long as the Governor desires
(D) None of the above

39. Who can create or abolish an All-India Service?
(A) Lok Sabha (B) Rajya Sabha (C) President (D) The Parliament

40. Which of the Articles says that a Money Bill shall not be introduced in the Council of States?
(A) Article 107 (B) Article 108 (C) Article 109 (D) Article 110

41. Which one of the following is not a factor of respiration?
(A) Oxygen (B) Carbondioxide (C) Water (D) Temperature

42. Which one of the following does not contain any enzyme?
(A) Bile (B) Gastric Juice (C) Saliva (D) Pancreatic Juice

43. Mark the tissue in which the starch is stored in the body of plants
(A) Spongy parenchyma (B) Aerenchyma
(C) Apical meristem (D) Stomata

44. Which one of the following tissues contains stone cells?
(A) Parenchyma (B) Collenchyma (C) Sclerenchyma (D) Tracheids

45. Which of the following is the correct scientific name of man?
(A) Homo Sapiens (B) Homo sapien (C) Homosapien (D) Homo sapiens

46. Which of the following does repire by the tracheal system?
(A) Mollusca (B) Arthropoda (C) Anneilda (D) Nematohelminthes

47. Basing on classification, which of the following is different from the other three?

(A) Pumpkin (B) Maize (C) Pea (D) Groundnut

48. Which one of the following is involved in the formation of endosperm?
(A) Antipodal cell (B) Polar nucleus (C) Synergids (D) Eggcell

49. Which one of the following is the crossing over seen?
(A) Anaphase (B) Diplotene (C) zygotene (D) Diakinesis

50. Which one of the following is attached to the right ventricle?
(A) Pulmonary artery (B) Pulmonary vein (C) Superior Venacava (D) Inferior venacava

51. Which one of the following is not a function of the kidney?
(A) Filtration (B) Oxidation (C) Absorption (D) Secretion

52. How many spinal nerves are attached to the spinal cord of man?
(A) 62 (B) 42 (C) 31 (D) 21

53. Which endocrine gland does regulate the level of phosphorus in blood?
(A) Thyroid (B) Parathyroid (C) Adrenal (D) Pituitary

54. Which one of the following pairs do regulate the flowering in plants?
(A) Auxin and Ethylene (B) Cytokinin and Ethylene
(C) Florigen and Phytochrome (D) Gibberellin and Ethylene

55. If $a + 8b = 14$ and $5a - 2b = 16$, then what is the mean of a and b?
(A) 15 (B) 7.5 (C) 5 (D) 2.5

56. A letter is chosen at random from the word MATHEMAICS. What is the probability that it will be a vowel?
(A) $\frac{1}{2}$ (B) $\frac{3}{8}$ (C) $\frac{3}{11}$ (D) $\frac{4}{11}$

57. The line containing the points (c, 8) and (a, 0) in perpendicular to the line containing the points (– c, c) and (3c, a). If $a = 10$, then what is the value of $a + c$?
(A) 22 (B) 12 (C) 10 (D) 6

58. Which point in the y-axis is equidistant from the points (3, –2) and (4, 5)?
(A) (0, 2) (B) (0, – 2) (C) (0, 3) (D) (0, –3)

59. If $A + B + C = 180°$and $\cos B.\cos C = \cos A$, then what is the value of $\tan B.\tan C$?
(A) – 2 (B) – 1 (C) 2 (D) 1

60. What is the solution of the equation $3x5^{2x-1} - 2x5^{x-1} = 0.2$ ?
(A) $x = 5$ (B) $x = 1$ (C) $x = -1$ (D) $x = 0$

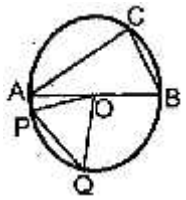
61. If $\alpha$ and $\beta$ are the roots of the quadratic equation $4x^2 - 20x = p^2$, what is the difference between $\alpha$ and $\beta$?
(A) $\sqrt{25 + p^2}$ (B) $\sqrt{25 - p^2}$ (C) $5 + p$ (D) $5 - p$

62. In $\Delta ABC$, $2(m\angle A + m\angle B) = 3m\angle B = m\angle C$. If O is the circum centre of $\Delta ABC$ and the diameter of the circum circle of $\Delta ABC$ is 16 cm, what is the area of $\Delta OAB$?
(A) 8 sq. cm (B) $8\sqrt{3}$ sq. cm (C) 16 sq. cm (D) $16\sqrt{3}$ sq. cm

63. If $a + b = 3$, $ab = 2$ and $a > b$, then what is the value of $2^{a^3 - b^3}$ ?
(A) 32 (B) 64 (C) 128 (D) 256

64. If $\alpha$, $\beta$ and $\gamma$ each isa zero of $x^3 - 6x^2 - x + 30$ and $\alpha \neq \beta \neq \gamma$, then what is the value of $5(\alpha\beta + \beta\gamma + \gamma\alpha)$?
(A) – 1 (B) – 5 (C) 1 (D) 5

65. $\overline{AB}$ is a diameter of the circle shown in the figure and O is the centre of it. If $m\angle A = 30°$ and $m\angle POQ = 60°$, what is the ratio between the areas of $\Delta POQ$ and $\Delta ABC$?




(A) $\sqrt{3}:2$ (B) $\sqrt{3}:1$
(C) 3 : 2 (D) 1 : 2

66. The roots of the quadratic equation $x^2 - 4x - \log_3 a = 0$ are real. Then what is the least value of a?

(A) 64 (B) $\frac{1}{81}$ (C) $\frac{1}{64}$ (D) 81

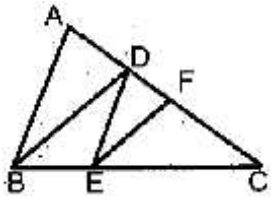
67. The sum of the lengths of all the edges of a cube is 6 cm. What is the volume of the cube in cubic cm?

(A) $\frac{1}{8}$ (B) $\frac{1}{6}$ (C) $\frac{1}{4}$ (D) $\frac{1}{2}$

68. If $\operatorname{cosec}\theta + \cot\theta = m$, then what is the value of $\sec\theta$?

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

69. In the given figure, $\Delta ABC$ has points D and F in $\overline{AC}$ and point E in $\overline{BC}$ such that $\overline{DE} \parallel \overline{AB}$ and $\overline{EF} \parallel \overline{BD}$. If CF = 4cm and AC = 9 cm, what is the length of $\overline{DC}$?




(A) 7 cm (B) 6 cm
(C) 5 cm (D) 4 cm

70. If a : b = 3 : 5 and a : c = 5 : 7, what (b – c) : (b + c) equal to?
(A) 4 : 49 (B) 49 : 4 (C) 5 : 48 (D) 48 : 5

71. If the $m^{th}$ term of an A.P. is $\frac{1}{n}$ and the $n^{th}$ term of it is $\frac{1}{m}$, then what is the $mn^{th}$ term equal to?

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

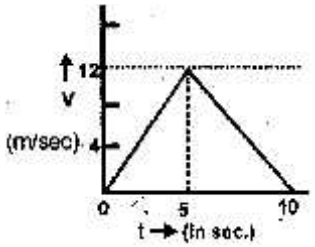
72. The area of a circle inscribed in an equilateral triangle is $48\pi$ sq. cm. What is the perimeter of the triangle?
(A) 24 cm (B) 27 cm (C) 36 cm (D) 72 cm

73. A is the centre of a circle with diameter 8 cm and B is the centre of another circle with radius 8 cm. If the two circles touch each other externally, then what is the area in sq. cm of the circle drawn with $\overline{AB}$ as diameter?
(A) $12\pi$ (B) $36\pi$ (C) $48\pi$ (D) $64\pi$

74. Two tangent segments $\overline{BC}$ and $\overline{BD}$ are drawn to a circle with centre O. If $m\angle CBD = 120°$ and OB = 12 cm, then what is the length of $\overline{CD}$?
(A) $6\sqrt{3}$ cm (B) $12\sqrt{3}$ cm (C) 6 cm (D) 12 cm

75. First half of the distance between two places is covered by a car at a speed of 40 km/hr and the second half is covered at a speed of 80 km/hr. Then what would be the average speed of the car?
(A) 50 km/hr (B) 120 km/hr (C) 53.3 km/hr (D) 40 km/hr

76. The speed (v) time (t) graph of a body moving along a fixed direction is as shown in the figure below. Then how much distance the body must have travelled during time t = 0 to t = 10 sec?




(A) 120 m
(B) 60 m
(C) 50 m
(D) 10 m

77. A machine gun of mass 10 kg fires 20 g bullets with speed of 500 m/s at the rate of 10 bullets per second. To hold the gun steady in its position how much force is necessary?
(A) 200 N (B) 500 N (C) 100 N (D) 250 N

78. The relative density of ice with respect to sea water is 0.90. Then the percentage of the submerged portion of an iceberg would be:
(A) 45% (B) 90% (C) 60% (D) 50%

79. A man weighing 60 kg climbs up 45 steps stair case of a building in 9 seconds. If height of each step is 10 cm, then how much power the man has employed? (Take g = 10 m/s²)
(A) 300 w (B) 250 w (C) 500 w (D) 450 w

80. If the momentum of a body is increased by 3 times of its initial momentum, then by how much its kinetic energy will increase above its initial value which was100J?
(A) 200 J (B) 300 J (C) 900 J (D) 800 J

81. Velocity of sound in air at 47°C is 360 m/s. what would be this velocity at 17°C?
(A) 336 m/s (B) 342.7 m/s (C) 350 m/s (D) 330 m/s

82. A convex lens of focal length f produces a real image of size m-times the size of the object. Then the object distance is:
(A) $\left(\frac{m+1}{m}\right)f$ (B) (m + 1)f (C) $\frac{(m+1)}{f}$ (D) $\frac{fm}{(m+1)}$

83. The absolute refractive index of a medium is 1.5. Then what would be the velocity of light in this medium?
(A) $2\times10^{8}\,m/s$ (B) $1.5\times10^{8}\,m/s$ (C) $3.5\times10^{8}\,m/s$ (D) $2.5\times10^{8}\,m/s$

84. Two lenses of power +4 and –6 dioptres are placed in contact with each other. The focal length of the combination will be:
(A) 0.5 meter (B) – 0.1 meter (C) – 0.5 meter (D) 0.1 meter

85. Two electric bulbs with ratings (100 W, 250 V) and (50 W, 250 V) are connected in series across a 250 V source. Calculate the output power.
(A) 150 W (B) 33.33 W (C) 50 W (D) 250 W

86. A long straight wire carries 5A current. Find the magnetic field induction produced at a radial distance of 5 cm from its axis. (Here $\mu_0 = 4\pi\times10^{-7}\,N/A^2$)
(A) $0.1\times10^{-4}$ Tesla (B) $0.3\times10^{-5}$ Tesla (C) $0.2\times10^{-4}$ Tesla (D) $0.5\times10^{-4}$ Tesla

87. Two resistors $R_1$ = 6Ω and $R_2$ a= 12Ω are connected in parallel to a source of voltage V and a current IA is flowing in the circuit. If $Q_1$ and $Q_2$ are the heat produced in $R_1$ and $R_2$ respectively, what is $Q_1/Q_2$?
(A) 1/2 (B) 1/4 (C) 3/4 (D) 2

88. Copper sulfate solution is electrolysed with platinum electrodes. Which of the following changes does not occur in the process?
(A) The blue colour of the solution gradually fades.
(B) $O_2(g)$ is liberated at anode
(C) PH of the solution decreases
(D) $H^+$ concentration decreases

89. Which of the following salts fails to give brown gas on heating?
(A) Lead nitrate (B) Lithium nitrate (C) Magnesium nitrate (D) Potassium nitrate

90. A colourless gas $G_1$, produced on treating conc. $H_2SO_4$ with common salt, is introduced into one end of a glass-tube. Through the other end, another pungent smelling colourless gas, $G_2$, of molecular mass 17 is introduced. A white sublimate, S is produced inside the tube. Which of the following statements is wrong?
(A) Both the gas $G_1$ and $G_2$ are water-soluble
(B) Sublimate S, contains covalent bond and ionic bond
(C) Sublimate, S when treated with caustic soda liberates $G_2$ gas
(D) Aqueous solution of each $G_1$ and $G_2$ gas is acidic in nature

91. A metal is strongly heated in presence of air to form a black mass. So the metal is
(A) Potassium (B) Platinum (C) Copper (D) Zinc

92. Which of the following is nota redox reaction?
(A) $2Mg + O_2 \rightarrow 2MgO$ (B) $CaCO_3 + 2HCl \rightarrow CaCl_2 + CO_2 + H_2O$
(C) $2CuCl_2 \rightarrow Cu_2Cl_2 + Cl_2$ (D) $SO_2 + I_2 + 2H_2O \rightarrow H_2SO_4 + 2HI$

93. Bauxite is an ore of aluminium. It is concentrated suitably on treating with
(A) Conc. NaOH solution (B) $Na_2CO_3$
(C) Coke and $N_2$ (D) Any of the above

94. Pick up the incorrect pair of metal-ore from the following:
(A) Ag – Galena (B) Mg – Carnallite (C) Sn – Cassiterite (D) Hg – Cinnabar

95. An element, X has electronic configuration 2, 8, 4. Which of the following is not appropriate for X?
(A) It belongs to group 14 and 3$^{rd}$ period of periodic Table
(B) It is a chalcogen
(C) Its oxide is a solid
(D) It can have maximum covalency of six

96. Which of the following organic molecules does not have carbon-carbon double bond
(A) $C_3H_4O$ (B) $C_3H_4O_2$ (C) $C_3H_8O$ (D) $C_6H_6O$

97. Soaps are used to clean clothes. Which one is correct statement in this respect?
(A) Soap is a sodium salt of an aromatic acid
(B) During cleaning micelles are formed
(C) Using soap hard-water cannot be distinguished
(D) Soap can be used in hard-water for better cleaning of clothes

98. An organic compound A on treating with acidified potassium dichromate solution gives B with molecular mass 60 gm/mol. A on heating with conc. $H_2SO_4$ at 443 k produces a gas that decolourises bromine water. The compound A is
(A) n – propyl alcohol (B) iso –propylalcohol
(C) ethyl alcohol (D) acetaldehyde

99. Which of the following does not form salt either with acid or with alkali?
(A) BeO (B) ZnO (C) CaO (D) SnO

100. Aquaregia can dissolve gold because:
(A) it contains an oxidant, conc. $H_2SO_4$ (B) It is 3 : 1 mixture of conc. $HNO_3$ and conc. HCl
(C) it contains a strong reducing agent (D) it contains nascent Cl.

# NTSE STAGE – I_SAT_SET-C_06.11.2016

## ANSWERS

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

# ANSWERS, HINTS & SOLUTIONS

## BIOLOGY

41. A (Oxygen is considered as a extinction point, not a factor).
42. A
43. A
44. C (Sclereid also known as stone cells found in Sclerenchyma)
45. D
46. B
47. B (Pumpkin, Pea plant, Groundnut all are dicot plant except maize)
48. B
49. B (Followed by pachytene)
50. A
51. B
52. A
53. B (Parat hormone)
54. C (Florigen is a flowering hormone and phytochrome is a pigment controls photoperiodism also known as flowering)

## MATHEMATICS

55. D

Given, a + 8b = 14

5a – 2b = 16

$\therefore$ 6a + 6b = 30 $\Rightarrow$ a + b = 5

$\therefore$ mean $\frac{a+b}{2}=2.5$

56. D

$n(E)=4$

$n(s)=11$

$P(E)=\frac{4}{11}$

57. B

$A(c,8), B(a,0), C(-c,c), D(3c,a)$

Slope of (AB) × slope of CD = –1

$\therefore$ c = 2

$\therefore$ a + c = 12

58. A

A(3, –2), B(4, 5)

Let C(0, y) . Here AC = BC $\Rightarrow$ y = 2

$\therefore$ C(0, 2)

59. C

Given A + B + C = 180 $\downarrow$ cos B cos C = cos A …. (1)

$\therefore$ cos(B + C) = – cos A

cos A – sin B sin C = – cos A

sin B sin C = 2 cos A …. (2)

(2)/(1) = tan B tan C = 2

60. D

Let $5^x = y$

$\therefore$ y = 1 or $y = -\frac{1}{3}x$

$\therefore$ $5^x = 1 \Rightarrow x = 0$.

61. A

$\alpha + \beta = 5$

$\alpha\beta = -\frac{p^2}{4}$

We know, $(\alpha - \beta)^2 = (\alpha + \beta)^2 - 4\alpha\beta$

$\therefore \alpha - \beta = \sqrt{25 + p^2}$

62. D

From given relation,

$\angle A = 20°, \angle B = 40°, \angle C = 120°$

$[AOB] = \frac{1}{2}r^2 \sin 120 \left(\because \angle AOB = 120\right)$

$= \frac{8^2}{2} \times \frac{\sqrt{3}}{2} = 16\sqrt{3}\ cm^2$

63. C

$a = 2, b = 1$

$2^{a^3 - b^3} = 128$

64. B

$\alpha\beta + \beta\gamma + \gamma\alpha = \frac{c}{a} = -1$

$\therefore 5(\alpha\beta + \beta\gamma + \gamma\alpha) = -5$

65. D

$[POQ] = \frac{\sqrt{3}}{4}r^2$

$[ACB] = \frac{\sqrt{3}}{2}r^2$

$\therefore \frac{[POQ]}{[ACB]} = \frac{1}{2}$

66. B

$D \geq 0$

$\therefore$ $16 + 4 \log_3 a \geq 0$

$\log_3 a \geq -4$

$a \geq 3^{-4}$

67. A

Given length of each edge = $\frac{1}{2}$

$\therefore v = \frac{1}{8} cm^3$

68. D

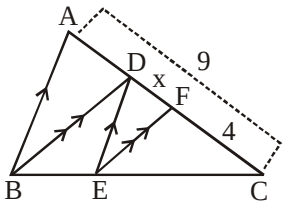
$\operatorname{cosec}\theta + \cot\theta = m$

$\operatorname{cosec}\theta - \cot\theta = \frac{1}{m}$

$\therefore \sin\theta = \frac{2m}{m^2+1}$

$\sec\theta = \frac{n^2+1}{m^2-1}$

69. B




Given $\Delta CFE \sim \Delta CDB$

$\therefore \frac{EC}{BC} = \frac{4}{4+n}$ .... (1)

Given, $\Delta CDF \sim \Delta CAB$

$\frac{EC}{BC} = \frac{4+n}{9}$ ... (2)

From (1) and (2), 4 + n = 6

70. A

None (Close Option A)

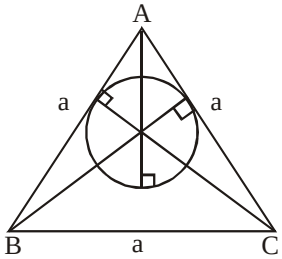
71. A

$a + (m-1)d = \frac{1}{n}$

$a + (n-1)d = \frac{1}{m}$

$\therefore a = d = \frac{1}{mn}$

72. D



Here $[ABC] = \frac{\sqrt{3}}{4}a^2$

$\frac{1}{2}r(a+a+a) = \frac{\sqrt{3}}{4}a^2$

$\frac{4\sqrt{3}}{2}(3a) = \frac{\sqrt{3}}{4}a^2$

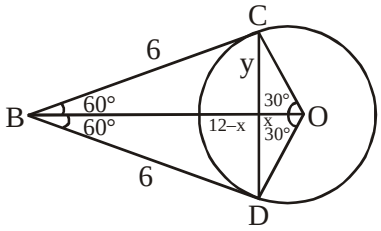
$a = 24$

$\therefore$ perimeter = 3a = 3 × 24 = 72.

73. B

Answer is 36π.

74. A




OB = 12

Let OD = x

$\therefore$ BD = 12 – x

$\therefore y^2 = (12-x)^2 - 6^2 = -x^2 + \left(\frac{6}{\sqrt{3}}\right)^2$

$\therefore y = 3\sqrt{3}$ $CD = 6\sqrt{3}$

## CHEMISTRY

99. C (Nearest answer)

Reason: BeO, ZnO, SnO are amphoteric in nature. CaO is basic in nature which forms salt with acid but not with base.