

NTSE – II-2014
SCHOLASTIC ABILITY TEST
(FOR STUDENTS OF CLASS – X)

1. Which one of the following statements is **NOT** true about evolution?
(1) Evolution leads to generation of diverse forms of life
(2) Time dating and fossil studies help in understanding of evolution
(3) Evolution is not always progressive series of changes that occur in organism
(4) Human beings have not evolved from chimpanzees.
1. 4
Sol. Human beings are evolved from chimpanzees as per organic evolution.
2. Which one of the following is known as energy currency of cell?
(1) Adenosine diphosphate (2) Adenosine triphosphate
(3) Pyruvate (4) Glucose
2. 2
Sol. Adenosine Tri phosphate is known as energy currency of cell because of Adenine and phosphate.
3. An analysis of soil sample revealed 0.1 mg of a pesticide and 1 mg of the same pesticide was found in grains. However in the adipose tissue of birds the concentration was 2 mg. The reason for this is the phenomenon known as
(1) Bio-absorption (2) Bio-translocation
(3) Bio-magnification (4) Bio-multiplication
3. 3
Sol. Concentration of Nutrients increases in each level of food chain causes Biomagnification.
4. Diseases that spreads by vector such as mosquitoes are
(1) Encephalitis and Malaria (2) Syphilis and AIDS
(3) Tuberculosis and sleeping sickness (4) Kala-azar and SARS
4. 1
Sol. Vectors of encephalitis is culex mosquito and Malaria is female Anopheles.
5. Which one of the following is correct route for passage of sperms?
(1) Testes – scrotum – vasdeferens – urethra – penis
(2) Scrotum – testes – urethra – vasdeferens – penis
(3) Testes – vasdeferens – urethra – seminal vesicles
(4) Testes – vasdeferens – urethra – penis
5. 4
Sol. Correct route of movement of sperms in male reproductive tract is testes – Vas deferens – urethra – penis.
6. Suggest which among the following is **NOT** a function attributed to endoplasmic reticulum
(1) Detoxification of poisons and drugs
(2) Digestion/egestion of foreign materials outside the cell
(3) Manufacture of fat and lipid molecules
(4) Biogenesis of membranes
6. 2
Sol. Digestion / egestion of foreign materials outside the cell is done by digestive bag (Lysosome)
7. In nitrogen cycle, atmospheric nitrogen is fixed by bacteria and converted into ammonia. Ammonia is further converted into other forms of nitrogen. At the end of the cycle it returns to the atmosphere by the process of :
(1) Ammonification (2) Nitrification
(3) Denitrification (4) Assimilation

7. 3
Sol. Change of nitrates and nitrites in the form of nitrogen is known as denitrification done by pseudomonas bacteria.
8. Cell organelles that are involved in the waste disposal system of the cell are :
(1) Golgi apparatus (2) Lysosomes
(3) Chromosomes (4) Ribosomes
8. 2
Sol. Lysosomes are also known as cellular scavenger or cellular housekeeper.
9. Sequence of events which occur in a reflex action are
(1) Receptor – motor neuron – CNS – sensory neuron – effector muscle
(2) Effector muscle – CNS – sensory nerve – sensory organ
(3) CNS – sensory neuron – motor neuron – effector muscle
(4) Receptor organ – sensory neuron – CNS – motor neuron – effector muscle
9. 4
Sol. Path of reflex arc is Receptor – sensory neuron – CNS – motor Neuron – effector muscles.
10. Movement of food in digestive tract is due to
(1) concentration gradient (2) secretions
(3) peristalsis (4) villi
10. 3
Sol. Movement of food in digestive tract takes place by the contraction and relaxation of muscles that is known as peristalsis or peristaltic movement.
11. A pea plant with round green (RRyy) pea seed is crossed another pea plant with wrinkled yellow (rrYY) seeds. What would be the nature of seed in the first generation (F₁ generation)?
(1) Round green (2) Wrinkled green
(3) Wrinkled yellow (4) Round yellow
11. 4
Sol. Law of Dominance given by Mendal.
12. Some organisms are sensitive to different levels of air pollution and are used as pollution-indicators. Suggest which among the following fits into the category.
(1) Fungi (2) Fresh water algae
(3) Bacteria (4) Lichens
12. 4
Sol. Lichens are indicator of air pollution.
13. A group of laboratory mice having tails are bred together and their progeny studied. The progeny had tails. However, scientist surgically removed the tails of the progeny and again bred them for four successive generations. What do you think would be the nature of the new progeny?
(1) All mice born will have tails
(2) All mice born will have no tails
(3) The ratio of tail less to tailed mice will be 1 : 3
(4) The ratio of tail less to tailed mice will be 1 : 4
13. 1
Sol. It is because inheritens of acquired characters does not takes place in very short period of time.
14. Which of the following statements is **NOT** correct?
(1) Tendons are tissues with great strength and flexibility
(2) Bones are connected to each other by tendons
(3) Cartilage smoothens bone surface at joints
(4) Tendons connect muscles to bones

14. 2
Sol. Bones are connected to each other by ligaments.
15. Which of the following are the correct examples of matter?
(1) Glass bottle, water and noise (2) Air, wood and vacuum
(3) Silver foil, hot air and chalk (4) Sand, oxygen and light flash
15. 3
Sol. All three are material object
16. Two identical beakers labeled as (X) and (Y) contain 100 cm^3 of water each at 20°C . To the water in the beaker(X) 100 g of water at 0°C was added and stirred to mix thoroughly. To the beaker(Y) 100 g of ice at 0°C was added and stirred till it melted into water. The water in the beaker(Y) will be
(1) hotter than water in beaker X (B) colder than water in beaker X
(3) heavier than water in beaker X (D) lighter than water in beaker X
16. 2
Sol. Due to absorption of latent heat of fusion, beaker Y has water colder than water in X
17. At 283 K a saturated solution of solid X can be prepared by dissolving 21.0 g of it in 100 g of water. The maximum amount of X which can be dissolved in 100 g of water at 313 K is 62.0 g . An attempt is made to dissolve 50.0 g of X in 100 g of water at 313 K
(A) All the 50.0 g of X will dissolve at 313 K
(B) At 313 K 29.0 g of X will remain undissolved
(C) Solubility of X decrease with increase of temperature
(D) On cooling the solution of X from 313 K to 283 K more than 21.0 g of X will crystallize out
Which of the above statements are correct?
(1) A and B (2) A and D
(3) B and C (4) A, C and D
17. 2
Sol. On decreasing temperature solubility of solid decreases, so excess solute will crystallize.
18. Two elements A and B contain 13 and 8 proton respectively. If the number of neutrons in them happen to be 14 and 8 respectively, the formula unit mass for the compound between A and B unit would be
(1) 43 (2) 75
(3) 102 (4) 112
18. 3
Sol.
- | | | | | | |
|---|----|----|---|----|---|
| | P | n | | P | n |
| A | 13 | 14 | B | 8 | 8 |
| | 27 | | | 16 | |
- A = Al B = O
 $\text{Al}_2\text{O}_3 = 27 + 27 + 48 = 102$
19. The reaction of burning carbon in oxygen is represented by the equation
 $\text{C(s)} + \text{O}_2(\text{g}) \longrightarrow \text{CO}_2(\text{g}) + \text{Heat} + \text{Light}$
 When 9.0 g of solid carbon is burnt in 16.0 g of oxygen gas, 22.0 g of carbon dioxide is produced. The mass of carbon dioxide gas formed on burning of 3.0 g of carbon in 32.0 g of oxygen would be (Note: Atomic mass of C = 12.0 u , O = 16.0 u)
(1) 6.60 g (2) 7.33 g
(3) 8.25 g (4) 11.00 g
19. 4
Sol.
- | | | | | |
|------|---|----------------|---|-----------------|
| C | + | O ₂ | → | CO ₂ |
| 12 g | | 32 g | | → 44 g |
| 9 g | | 16 g | | → 22 g |
| 3 g | | 32 g | | → |

$$\text{For 3 g carbon} = \frac{44}{12} \times 3 = 11\text{g}$$

20. An atom of an element(X) has its K, L and M shells filled with some electrons. It reacts with sodium metal to form a compound NaX. The number of electrons in the M shell of the atom(X) will be

- (1) Eight (2) Seven
(3) Two (4) One

20. 2

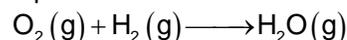
Sol. NaX

X has valency = 1

Na⁺X⁻

X has seven valence electrons

21. Oxygen gas reacts with hydrogen to produce water. The reaction is represented by the equation

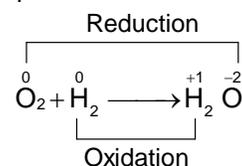


The above reaction is an example of

- (a) Oxidation of hydrogen (b) Reduction of oxygen
(c) Reduction of hydrogen (d) Redox reaction
(1) a, b and c (2) b, c and d
(3) a, c, and d (4) a, b and d

21. 4

Sol.



22. Match the items of column – I with the items of column – II

Column – I		Column – II	
(a)	$\text{NH}_4\text{OH} + \text{CH}_3\text{COOH} \longrightarrow \text{CH}_3\text{COONH}_4 + \text{H}_2\text{O}$	(i)	Thermal decomposition
(b)	$2\text{AgBr} \longrightarrow 2\text{Ag} + \text{Br}_2$	(ii)	Thermit reaction
(c)	$\text{ZnCO}_3 \longrightarrow \text{ZnO} + \text{CO}_2$	(iii)	Photochemical reaction
(d)	$2\text{Al} + \text{Fe}_2\text{O}_3 \longrightarrow 2\text{Fe} + \text{Al}_2\text{O}_3$	(iv)	Neutralization reaction

- (1) (d)ii (c)iv (b)i (a)iii (2) (c)i (a)ii (d)iii (b)iv
(3) (b)ii (d)i (a)iii (c)iv (4) (a)iv (b)iii (c)i (d)ii

22. 4

Sol.

(a) $\text{NH}_4\text{OH} + \text{CH}_3\text{COOH} \longrightarrow \text{CH}_3\text{COONH}_4 + \text{H}_2\text{O}$ - Neutralization reaction

(b) $2\text{AgBr} \longrightarrow 2\text{Ag} + \text{Br}_2$ - Photochemical reaction

(c) $\text{ZnCO}_3 \longrightarrow \text{ZnO} + \text{CO}_2$ - Thermal decomposition

(d) $2\text{Al} + \text{Fe}_2\text{O}_3 \longrightarrow 2\text{Fe} + \text{Al}_2\text{O}_3$ - Thermit reaction

23. Which of the following represents the correct order of the acidic strength for equimolar aqueous solution of HCl, H₂SO₄, NH₄OH and NaOH

- (1) HCl < NH₄OH < NaOH < H₂SO₄ (2) NH₄OH < NaOH < H₂SO₄ < HCl
(3) HCl < H₂SO₄ < NH₄OH < NaOH (4) NaOH < NH₄OH < HCl < H₂SO₄

23. 4

Sol.

NaOH < NH₄OH < HCl < H₂SO₄
pH = 11 pH = 10 pH = 3 pH = 2.73

24. Metals like sodium, potassium, calcium and magnesium are extracted by electrolysis of their chlorides in molten state. These metals are not extracted by reducing of their oxides with carbon because

- (a) reduction with carbon is very expensive
 (b) carbon readily makes alloy with these metals
 (c) carbon has less affinity for oxygen than these metals
 (d) carbon is weaker reducing agent than these metals

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

24. 3

Sol. Carbon has less affinity for oxygen than these metals & carbon is weaker reducing agent than these metals

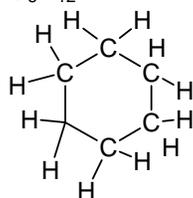
25. A hydrocarbon has a molecular formula as C_6H_{12} . It does not react with hydrogen to give C_6H_{14} nor does it react with chlorine to give $C_6H_{12}Cl_2$. The hydrocarbon C_6H_{12} is

- (a) A saturated hydrocarbon
 (b) An unsaturated hydrocarbon
 (c) An open chain hydrocarbon
 (d) a cyclo-alkane

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

25. 4

Sol. C_6H_{12}



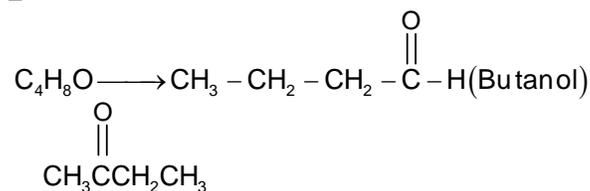
Is a saturated cyclo alkane which does not react with H_2 or Cl_2

26. An organic compound is a clear liquid having a molecular formula C_4H_8O . It has an open chain structure. Without any carbon-carbon double bond. The compound can be

- (a) an alcohol (b) an ester
 (c) an aldehyde (d) a ketone
 (1) a and b (2) c and d
 (3) b and d (4) d and a

26. 2

Sol.



2 - Butanone

27. An element with atomic number 17 is placed in the group 17 of the long form periodic table. Element with atomic number 9 is placed above and with atomic number 35 is placed below it. Element with atomic number 16 is placed left and with atomic number 18 is placed right to it. Which of the following statements are correct?

- (a) Valency of the element with atomic number 18 is zero
 (b) Elements with same valency will have atomic number 16, 17 and 18
 (c) Valency of elements with atomic number 9, 17 and 35 is one
 (d) Element with atomic number 17 is more electronegative than element with atomic numbers 16 and 35

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

27. 2

Sol $\left. \begin{array}{l} {}_{17}\text{A} = \text{Chlorine} \\ {}_9\text{B} = \text{Fluorine} \\ {}_{35}\text{C} = \text{Bromine} \\ {}_{16}\text{D} = \text{Sulphur} \end{array} \right\} \text{Valency} = 1$

${}_{18}\text{E} = \text{Argon} \rightarrow \text{Valency zero}$

Chlorine is more electronegative than sulphur & bromine

28. A car is moving with a constant speed of 70 km/h. Which of the following statements is correct?

- (1) The acceleration of the car is definitely zero.
- (2) The car has an acceleration only if it is moving along a curved path.
- (3) The car may have an acceleration even if it is moving along a straight path.
- (4) The car may not have an acceleration even if it is moving along a curved path.

28. 2

Sol. In curved path centripetal acceleration act.

29. A box of mass 20 kg is pushed along a rough floor with a velocity 2 m/s and then let go. The box moves 5 m on the floor before coming to rest. What must be the frictional force acting on the box?

- (1) 4 N
- (2) 2 N
- (3) 20 N
- (4) 8 N

29. 4

Sol. By work energy theorem

$$\frac{1}{2}mv^2 = fd$$

30. Two objects, one 4 times as massive as the other, are approaching each other under their mutual gravitational attraction. When the separation between the objects is 100 km, the acceleration of the lighter object is 1 m/s^2 . When the separation between them is 25 km, the acceleration of the heavier object is

- (1) 1 m/s^2
- (2) 2 m/s^2
- (3) 8 m/s^2
- (4) 4 m/s^2

30. 4

Sol. Gravitational force $F = \frac{GM_1M_2}{R^2}$

$$\frac{G(m)(4m)}{(100)^2} = m(a_1) \quad \text{-----(i)}$$

$$\frac{G(m)(4m)}{(25)^2} = (4m)a_2 \quad \text{-----(ii)}$$

31. A spring balance measures the weight of an object in air to be 0.1 N. It shows a reading of 0.08 N when the object is completely immersed in water. If the value of acceleration due to gravity is 10 m/s^2 , the volume of the object is

- (1) 20 cm^3
- (2) 80 cm^3
- (3) 200 cm^3
- (4) 2 cm^3

31. 4

Sol. The Buoyant force = $0.02 = vdg$

$$0.02 = V(10^3) \times (10)$$

$$V = 2 \text{ cm}^3$$

32. A force of 10 N is applied on an object of mass 1 kg of 2s, which was initially at rest. What is the work done on the object by the force?

- (1) 200 J
- (2) 20 J

(3) 16 J (4) 180 J

32. 1
Sol. $a = 10 \text{ m/sec}^2$

$$S = ut + \frac{1}{2}at^2$$

$$S = 0 + \frac{1}{2}(10) \times (4) \Rightarrow S = 20$$

$$W = (20) \times (10) = 200.$$

33. Stethoscope of doctors for finding quality, strength and frequency of human heart beat is based on the principle of

- (1) SONAR (2) Reverberation
(3) Multiple reflection (4) Echo

33. 3

Sol. Stethoscope of doctors for finding quality, strength and frequency of human heart beat is based on the principle of multiple reflection.

34. A ray of light is incident in medium 1 on a surface that separates medium 1 from medium 2. Let v_1 and v_2 represent the velocity of light in medium 1 and medium 2 respectively. Also let n_{12} and n_{21} represent the refractive index of medium 1 with respect to medium 2 and refractive index of medium 2 with respect to medium 1, respectively. If i and r denote the angle of incidence and angle of refraction, then

$$(1) \frac{\sin i}{\sin r} = n_{21} = \frac{v_1}{v_2}$$

$$(2) \frac{\sin i}{\sin r} = n_{21} = \frac{v_2}{v_1}$$

$$(3) \frac{\sin i}{\sin r} = n_{12} = \frac{v_1}{v_2}$$

$$(4) \frac{\sin i}{\sin r} = n_{12} = \frac{v_2}{v_1}$$

34. 1

Sol. By Snell's law.
 $n_1 \sin(i) = n_2 \sin(r)$

35. A convex lens has a focal length of 0.5 m. It has to be combined with a second lens, so that the combination has a power of 1.5 dioptre. Which of the following could be the second lens?

- (1) A concave lens of focal length 2 m (2) Another convex lens of focal length 0.5 m.
(3) A concave lens of focal length 0.5 m. (4) A convex lens of focal length 2 m.

35. 1

Sol. $\frac{1}{F} = \frac{1}{F_1} + \frac{1}{F_2}$; $1.5 = \frac{1}{0.5} + \frac{1}{F_2}$

36. Which of the following statements is correct?

- (1) A person with myopia can see nearby objects clearly.
(2) A person with hypermetropia can see nearby objects clearly.
(3) A person with myopia can see distant objects clearly.
(4) A person with hypermetropia cannot see distant objects clearly.

36. 1

Sol. By definition of myopia.

37. Consider two conducting plates A and B, between which the potential difference is 5 V, plate A being at a higher potential. A proton and an electron are released at plates A and B respectively. The two particles then move towards the opposite plates – the proton to plate B and the electron to plate A. Which one will have a larger velocity when they reach their respective destination plates?

- (1) Both will have the same velocity.
(2) The electron will have the larger velocity.
(3) The proton will have the larger velocity.
(4) None will be able to reach the destination point.

37. 2

Sol. The electron has less mass as compared to proton. Hence, gain larger velocity.

Work = (Charge) (Potential difference)

$$(q_e)(5V) = \frac{1}{2}m_e V_e^2 \quad \text{-----(I)}$$

$$(q_p)(5V) = \frac{1}{2}m_p V_p^2 \quad \text{-----(II)}$$

$$(q_e = q_p), (m_e < m_p)$$

38. Which one of the following statements best describes the nature of the field lines due to a bar magnet?

- (1) Field lines start from the north pole and end on the south pole. Any number of field lines can pass through a point.
- (2) Field lines start from the north pole and end on the south pole. Only one field line passes through a point.
- (3) Field lines are continuous lines passing inside and outside the magnet. Only one field line passes through a point.
- (4) Field lines are continuous lines passing inside and outside the magnet. Any number of field lines can pass through a point.

38. 3

Sol. The properties of magnetic lines of forces.

39. Which of the following statements is correct?

- (1) AC generator generates a higher voltage.
- (2) DC generator generates a higher voltage.
- (3) AC generator has a permanent magnet whereas a DC generator has an electromagnet.
- (4) There is a split-ring commutator in a DC generator but not in an AC generator.

39. 4

Sol. The construction of AC and DC generator.

40. A star produces its energy through the process of

- (1) nuclear fusion.
- (2) chemical reaction.
- (3) nuclear fission.
- (4) gravitational attraction between different parts of the star.

40. 1

Sol. A star produces its energy through the process of nuclear fusion.

41. If θ is an acute angle such that $\tan \theta = \frac{2}{3}$, then evaluate $\left(\frac{1 + \tan \theta}{\sin \theta + \cos \theta}\right)\left(\frac{1 - \cot \theta}{\sec \theta + \operatorname{cosec} \theta}\right)$

(1) $-\frac{1}{5}$

(2) $\frac{-4}{\sqrt{13}}$

(3) $\frac{1}{5}$

(4) $\frac{4}{\sqrt{13}}$

41. 1

Sol. $\left(\frac{1 + \tan \theta}{\sin \theta + \cos \theta}\right)\left(\frac{1 - \cot \theta}{\sec \theta + \operatorname{cosec} \theta}\right) = -\frac{1}{5}$

42. The value of the expression $\frac{1}{\sqrt{11-2\sqrt{30}}} - \frac{3}{\sqrt{7-2\sqrt{10}}} - \frac{4}{\sqrt{8+4\sqrt{3}}}$ after simplification is

(1) $\sqrt{30}$

(2) $2\sqrt{10}$

(3) 1

(4) 0

42. 4

Sol. $\sqrt{11-2\sqrt{30}} = \sqrt{6} - \sqrt{5}$, $\sqrt{7-2\sqrt{10}} = \sqrt{5} - \sqrt{2}$ and
 $\sqrt{8+4\sqrt{3}} = \sqrt{6} + \sqrt{2}$

Simplifying we get $\frac{1}{\sqrt{11-2\sqrt{30}}} - \frac{3}{\sqrt{7-2\sqrt{10}}} - \frac{4}{\sqrt{8+4\sqrt{3}}}$
 $= \sqrt{6} + \sqrt{5} - \frac{3(\sqrt{5} + \sqrt{2})}{3} - \frac{4(\sqrt{6} - \sqrt{2})}{4} = 0$

43. The minimum value of the polynomial $p(x) = 3x^2 - 5x + 2$ is

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

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

(3) $\frac{1}{12}$

(4) $-\frac{1}{12}$

43. 4

Sol. Min. of $P(x) = \frac{4(3)(2) - (5)^2}{4(3)} = \frac{-1}{12}$

44. For the equation $|x|^2 + |x| - 6 = 0$

(1) there are for roots

(2) the sum of the roots is -1

(3) the product of the roots is -4

(4) the product of the roots is -6

44. 3

Sol. $|x|^2 + |x| - 6 = 0 \Rightarrow (|x| + 3)(|x| - 2) = 0$
 $\Rightarrow x = \pm 2$

45. In $\triangle ABC$, D is a point on BC such that $3BD = BC$. If each side of the triangle is 12 cm, then AD equals

(1) $4\sqrt{5}$ cm

(2) $4\sqrt{6}$ cm

(3) $4\sqrt{7}$ cm

(4) $4\sqrt{11}$ cm

45. 3

Sol. Draw $AM \perp BC$ then $AM = 6\sqrt{3}$ and $DM = 2$
 $\Rightarrow AD = \sqrt{112}$

46. In $\triangle ABC$, \overline{XY} is parallel to \overline{AC} and divides the triangle into the two parts of equal area.

Then the $\frac{AX}{AB}$ equals

(1) $\frac{\sqrt{2} + 1}{2}$

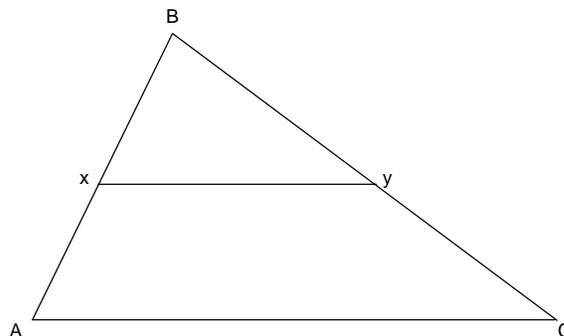
(2) $\frac{2 - \sqrt{2}}{2}$

(3) $\frac{2 + \sqrt{2}}{2}$

(4) $\frac{\sqrt{2} - 1}{2}$

46. 2

Sol. $\frac{BX^2}{AB^2} = \frac{1}{2} \Rightarrow \frac{BX}{AB} = \frac{1}{\sqrt{2}} \Rightarrow \frac{AX}{AB} = \frac{2 - \sqrt{2}}{2}$



47. P is a point in the interior of an equilateral triangle with side a units. If p_1, p_2 and p_3 are the distances of P from the three sides of the triangle, then $p_1 + p_2 + p_3$

(1) equals $\frac{2a}{3}$ units

(2) equals $\frac{a\sqrt{3}}{2}$ units

(3) is more than a units

(4) cannot be determined unless the location of P is specified

47. 2

Sol. $P_1 + P_2 + P_3 = \text{height of Equilateral } \Delta = \frac{\sqrt{3}a}{2}$

48. In how many ways can a given square be cut into two congruent trapeziums?

(1) Exactly 4

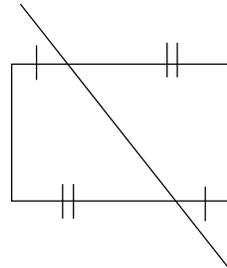
(2) Exactly 8

(3) Exactly 12

(4) More than 12

48. 4

Sol. Whenever line dividing the square passes through its centre it divides square into two trapezium. As there are infinitely such lines. There will be infinitely many possibility



49. In how many ways can you partition 6 into ordered summands? (For example, 3 can be partitioned in 3 ways as : 1 + 2, 2 + 1, 1 + 1 + 1)

(1) 27

(2) 29

(3) 31

(4) 33

49. 3

Sol. Total number of partitions = ${}^5C_1 + {}^5C_2 + {}^5C_3 + {}^5C_4 + 1 = 31$

50. The number of integers n (< 20) for which $n^2 - 3n + 3$ is a perfect square is

(1) 0

(2) 1

(3) 2

(4) 3

50. 3

Sol. Let $n^2 - 3n + 3 = k^2 \Rightarrow n^2 - 3n + 3 - k^2 = 0$

For k to be an integer $(-3)^2 - 4(3 - k^2)$ is a perfect square.

Let $9 - 12 + 4x^2 = p^2 \Rightarrow (2k + p)(2k - p) = 3$

$\Rightarrow k = 1$ hence $n^2 - 3n + 2 = 0 \Rightarrow n = 1, 2$

51. For positive x and y, the LCM is 225 and HCF is 15. There

(1) is exactly one such pair

(2) are exactly two such pairs

(3) are exactly three such pairs

(4) are exactly four such pairs

51. 2

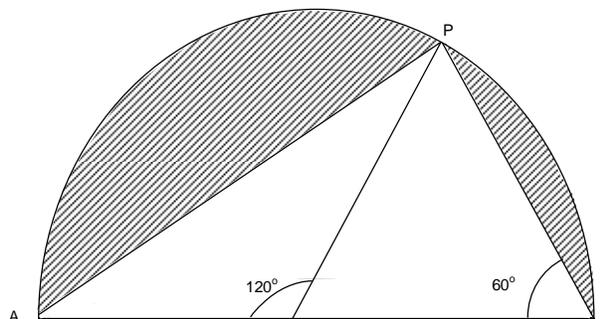
Sol. Let numbers are 15x and 15y

Then $15xy = 225 \Rightarrow xy = 15$ either $x = 15, y = 1$ Or $x = 1, y = 15$

Hence $(x, y) = (1, 15)$ or $(15, 1)$

52. In the figure, a semi-circle with centre O is drawn on AB. The ratio of the larger shaded area to the smaller shaded area is

- (1) $\frac{4\pi - 2\sqrt{3}}{2\pi - 2\sqrt{3}}$
 (2) $\frac{4\pi - 3\sqrt{3}}{3\pi - 3\sqrt{3}}$
 (3) $\frac{4\pi - 3\sqrt{3}}{2\pi - 3\sqrt{3}}$
 (4) $\frac{3\pi - 2\sqrt{3}}{2\pi - 2\sqrt{3}}$



52. 3

Sol. Ratio = $\frac{\frac{120^\circ}{360^\circ} \pi r^2 - \frac{1}{2} r^2 \frac{\sqrt{3}}{2}}{\frac{60^\circ}{360^\circ} \pi r^2 - \frac{1}{2} r^2 \frac{\sqrt{3}}{2}} = \frac{4\pi - 3\sqrt{3}}{2\pi - 3\sqrt{3}}$

53. In $\triangle ABC$, angle B is obtuse. The smallest circle which covers the triangle is the
 (1) Circumcircle (2) Circle with AB as diameter
 (3) Circle with BC as diameter (4) Circle with AC as diameter

53. 1

Sol. Circumcircle

54. Which of the numbers can be expressed as the sum of squares of two positive integers, as well three positive integers?

- (1) 75 (2) 192
 (3) 250 (4) 100

54. 3

Sol. $x^2 + y^2 + z^2 = m^2 + n^2$
 $15^2 + 4^2 + 3^2 = 15^2 + 5^2$

55. If P is a point inside the scalene triangle ABC such that $\triangle APB$, $\triangle BPC$ and $\triangle CPA$ have the same area, then P must be

- (1) In centre of $\triangle ABC$ (2) Circum centre of $\triangle ABC$
 (3) Centroid of $\triangle ABC$ (4) Ortho centre of $\triangle ABC$

55. 3

Sol. Centroid divides a \triangle into three equal areas

56. If the line segments joining the midpoints of the consecutive side of a quadrilateral ABCD form a rectangle then $\square ABCD$ must be

- (1) Rhombus (2) Square
 (3) Kite (4) All of the above

56. 1

Sol. Rhombus

57. C_1 and C_2 are two circles in a plane. If N is the total number of common tangents, then which of the following is wrong?

- (1) $N = 2$ when C_1 and C_2 intersect but do not touch
 (2) $N = 4$ when C_1 and C_2 are disjoint
 (3) When C_1 and C_2 touch then N must be 3
 (4) N can never be more than 4

57. 3

Sol. If circles touch internally then no of common tangent in 1

58. The sides of a triangle are of lengths 20, 21 and 29 units. The sum of the lengths of altitudes will be

(1) $\frac{1609}{29}$ units (2) 49 units

(3) $\frac{1609}{21}$ units (4) 70 units

58. 1

Sol. Sum of altitudes = $20 + 21 + \frac{420}{29} = \frac{1609}{29}$ units

59. If a, b, c be the 4th, 7th and 10th term of an AP respectively, then the sum of the roots of the equation $ax^2 - 2bx + c = 0$

(1) is $-\frac{b}{a}$

(2) is $-\frac{2b}{a}$

(3) is $\frac{c+a}{a}$

(4) cannot be determined unless some more information is given about the AP

59. 3

Sol. $2b = c + a$, sum of roots = $-\frac{2b}{a} = -\frac{c+a}{a}$

60. PQRS is the smallest square whose vertices are on the respective sides of the square ABCD. The ratio of the areas of \square PQRS to \square ABCD is

(1) 1 : 2 (2) $1 : \sqrt{2}$

(3) 1 : 3 (4) 2 : 3

60. 1

Sol. $\frac{\text{Ar PQRS}}{\text{Ar ABCD}} = \frac{\left(\frac{a}{\sqrt{2}}\right)^2}{a^2} = \frac{1}{2}$

61. Consider the following events related to the French Revolution and identify the correct chronological response from the options given thereafter:

(a) Convocation of Estates General (b) Storming of the Bastille

(c) Peasant revolts in the countryside (d) Third Estate forms National Assembly

(1) a, c, d, b (2) d, b, c, a

(3) a, d, b, c (4) b, a, c, d

61. 3

62. Consider the following statements and identify the correct response from the options given thereafter:

(a) The colonies in the Caribbean were important suppliers of tobacco, indigo, sugar and coffee.

(b) The slave trade began in the 15th century.

(c) French port cities like Bordeaux and Nantes owed their economic prosperity to the flourishing slave trade.

(d) Slavery was finally abolished in the French colonies in 1848.

(1) a, c, d (2) a, b, d

(3) b, c, d (4) b, c, a

62. 1

63. Match the List-I with List-II and select the correct response from the options given thereafter:

List – I		List – II	
I.	Liberals	a.	Government to be based on the majority of country's population
II.	Radicals	b.	The past has to be respected and change has to be brought about through a slow process
III.	Conservatives	c.	Property to be controlled by society as a whole
IV.	Socialists	d.	Men of property mainly should have the right to vote

(1) I-c, II-b, III-a, IV-d

(2) I-b, II-d, III-a, IV-c

(3) I-a, II-b, III-c, IV-d

(4) I-d, II-a, III-b, IV-c

63

4

64. Consider the following statements and identify the correct response from the options given thereafter:

Statement I: Nazism became a mass movement after the Great Depression.

Statement II: After 1929, banks collapsed and businesses shut down, workers lost their jobs and the middle classes were threatened with destitution.

(1) Statement I is false and Statement II is true

(2) Statement I is true and Statement II is false

(3) Both Statement I and Statement II are true and Statement II is the correct explanation of Statement I

(4) Both Statement I and Statement II are true but Statement II is not the correct explanation of Statement I

64.

3

65. Consider the following statements and identify the correct response from the options given thereafter:

Statement I: According to the Criminal Tribes Act of 1871, nomadic pastoralists were forced to live only in notified village settlements.

Statement II: Colonial state wanted to transform all grazing lands into cultivated farms.

(1) Statement I is false and Statement II is true

(2) Statement I is true and Statement II is false

(3) Both Statement I and Statement II are true and Statement II is the correct explanation of Statement I

(4) Both Statement I and Statement II are true but Statement II is not the correct explanation of Statement I

65.

3

66. Match the List-I with List-II and select the correct response from the options given thereafter:

List – I		List – II	
a.	The British government established monopoly in opium trade in Bengal	1.	1780 s
b.	The British government exported 50,000 chests of opium from Bengal annually.	2.	1820 s
c.	Opium production in British occupied territories declined rapidly.	3.	1870
d.	Village headmen started paying peasants for producing opium in advance.	4.	1773

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

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

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

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

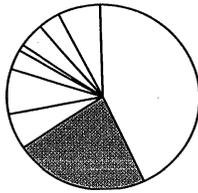
66.

2

67. Consider the following statements and identify the correct response from the options given thereafter:

(a) Cricket, in Victorian England, was an all season leisure game for aristocrats.

- (3) Both Statement I and Statement II are true and Statement II is the correct explanation of Statement I
 (4) Both Statement I and Statement II are true but Statement II is not the correct explanation of Statement I
71. 1
72. Consider the following statements and identify the correct response from the option given thereafter:
 Statement I : In the 19th century, London was a colossal city.
 Statement II : London had many large factories.
 (1) Statement I is false and Statement II is true
 (2) Statement I is true and Statement II is false
 (3) Both Statement I and Statement II are true and Statement II is the correct explanation of Statement I
 (4) Both Statement I and Statement II are true but Statement II is not the correct explanation of Statement I
72. 2
73. Consider the statement given below and select the correct explanation from the responses given thereafter:
 People of depressed classes found it difficult to find housing in Bombay during the late nineteenth century.
 (1) Bombay had a mere 9.5 square yards average space per person.
 (2) Wages of depressed classes were usually less than that of others.
 (3) Most people of depressed classes were kept out of chawls.
 (4) People belonging to the depressed classes had fixed space allotted per family.
73. 3
74. Consider the statement given below and select the correct explanation from the responses given thereafter:
 In 1878 the Vernacular Press Act was passed.
 (1) Englishmen criticized the printed matter objectionable to the Government.
 (2) After the Revolt of 1857 the British wanted to clamp down the Indian press.
 (3) British rule needed to be celebrated by journals and papers.
 (4) Nationalist newspapers grew in numbers and needed to be controlled.
74. 2
75. By the 18th century, which of the following commodities were produced on large plantations in America by slave labour and exported to other countries.
 (1) Grains such as wheat and barley
 (2) Tropical fruits such as bananas and oranges
 (3) Animal products such as wool and beef
 (4) Cash crops such as sugar and cotton
75. 1
76. May stems are succulent, my leaves are mostly thick
 In which category of the following vegetation type I am largely found?
 (1) Tropical deciduous forest (2) Montane forest
 (3) Tropical thorn forest and scrubs (4) Mangrove forest
76. 1
77. The following diagram shows the general land use category in India. Identify the shaded category.



- (1) Net sown area
(3) Current Fallow

- (2) Forest
(4) Barren and waste land

77.

2

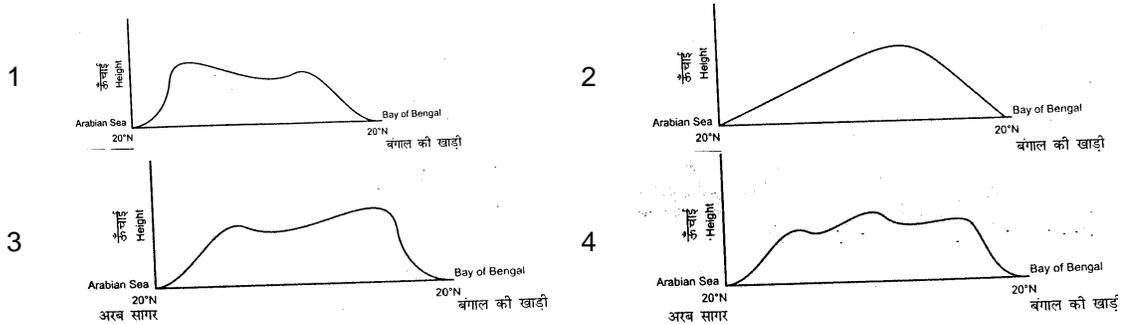
78. Assertion (A) : Since 1981, growth rate of population in India has started declining gradually
Reason (R) : Birth rate is declining Select the correct option from the given alternatives.

- (1) Both A and R are true but R is not the correct explanation of A.
(2) Both A and R are false.
(3) A is false and R is true
(4) Both A and R are true and R is the correct explanation of A.

78.

4

79. Which of the following diagram shows the approximate relief of India around, 20°N latitude from Daman to Bhubaneswar?



79.

1

80. Identify the right pair from the following :

- | | |
|----------------|-------------------|
| A. Enhore | 1. Nuclear |
| B. Rawat Bhata | 2. Thermal |
| C. Kopili | 3. Hydro electric |
| D. Nagarcoil | 4. Wind |

(1) A-4, B-2, C-3, D-1

(2) A-1, B-3, C-3, D-1

(3) A-2, B-3, C-2, D-4

(4) A-2, B-1, C-4, D-3

80.

3

81. The peninsular part of India experiences peak summers earlier than northern India

- (1) Due to apparent northward movement of the sun, the global heat belts shift northwards.
(2) Cold waves from central Asia sweeps through the northern plains during that time.
(3) There is less rainfall in the peninsular India during that time.
(4) Clouds do not form in those months.

81.

1

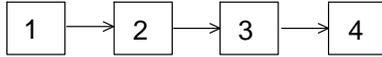
82. National Highway-7 is the longest national highway in India, which traverses between Varanasi and Kanya Kumari. Identify the places on route from North to South.

- (1) Nagpur – Jabalpur – Bangalore – Hyderabad – Madurai
(2) Jabalpur – Nagpur – Hyderabad – Bangalore – Madurai
(3) Jabalpur – Nagpur – Bangalore – Hyderabad – Madurai
(4) Nagpur – Jabalpur – Hyderabad – Bangalore – Madurai

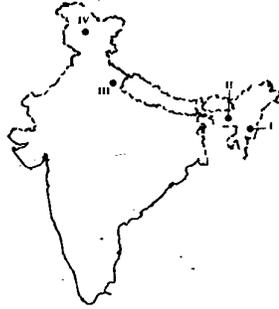
82.

2

83. The process of manufacturing of cotton garment is depicted in the following flow diagram. Identify the correct sequence.



- a. Dyeing and finishing
 b. Fiber production
 c. Garment manufacture
 d. Weaving
- (1) 1b, 2a, 3c, 4d
 (2) 1b, 2d, 3c, 4a
 (3) 1b, 2d, 3a, 4c
 (4) 1b, 2a, 3d, 4c
83. 3
84. Match the fresh water lakes on the map of India (I, II, III, IV) with their respective names.
 A. Bhimtal
 B. Loktak
 C. Barapani
 D. Dal lake

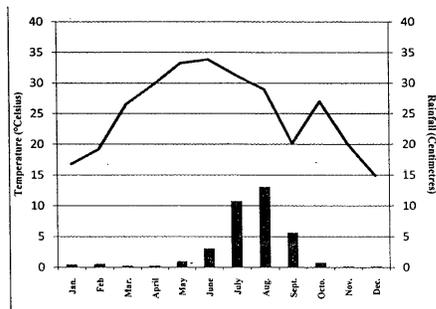


- (1) A-III, B-II, C-I, D-IV
 (2) A-IV, B-III, C-II, D-I
 (3) A-III, B-I, C-II, D-IV
 (4) A-IV, B-III, C-I, D-II
84. 3

85. A major line of latitude that passes through Mizoram also passes through which one of the following state _____.
- (1) Nagaland
 (2) Odisha
 (3) Bihar
 (4) Jharkhand

85. 4

86. Observe the following graph of a particular place. It is situated at an altitude of 224 meters above Mean Sea Level and at latitude 26°18'N



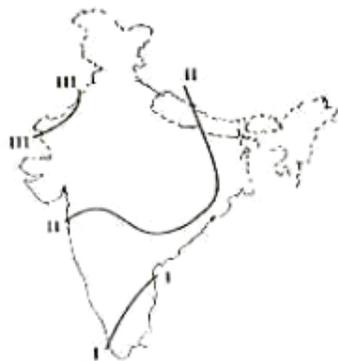
- Identify the type of natural vegetation most likely to be found in this place
- (1) Montane forest
 (2) Mangrove forest
 (3) Tropical thorn forest
 (4) Tropical evergreen forest

86. 1

87. Identify the state from given names which has all the following characteristics
- A. Its annual rainfall is 200–400 cm
 B. Most of the area is covered under with alluvial soil
 C. Rice is the predominant crop of this state
- (1) Punjab
 (2) Assam
 (3) Odhisha
 (4) Tamil Nadu

87. 2

88. With the help of given map identify the dates of advancing Monsoon in India.



- (1) I – 1 June; II – 10 June; III – 15 July (2) I – 1 June; II – 10 June; III – 1 July
 (3) I – 15 June; II – 15 July; III – 15 August (4) I – 15 July; II – 10 June; III – 1 June
88. 1

89. Match the places with altitude

	Column – I (Altitude in meters above Mean Sea Level)		Column – II (Place)
I	1461	A.	Nagpur
II	6	B.	Shillong
III	224	C.	Jodhpur
IV	312	D.	Kolkata

- (1) I–D, II–A, III–C, IV–B (2) I–C, II–A, III–B, IV–D
 (3) I–B, II–D, III–C, IV–A (4) I–B, II–A, III–C, IV–D
89. 3

90. What was the local time in Tokyo situated at 139°45' East longitude, when the President of India was hosting the Indian National Flag in the presence of Japanese Prime Minister at 10 a.m. in New Delhi? The viewer in Japan 'were watching live telecast of this event.

- (1) 6.11 a.m. (2) 1.49 a.m.
 (3) 2.49 a.m. (4) 1.49 p.m.
90. 4

91. The following statements are about democracy in the contemporary world.

- A. Democracy expanded throughout the 20th century
 B. Democracy did not spread evenly throughout the world
 C. All the member states of the International Monetary Fund (IMF) are democracies
 D. All the permanent members of the United Nations Security Council are democracies

- (1) A and B (2) A, B and C
 (3) A B and D (4) B, C and D
91. 1

92. Match the following

A.	Abraham Lincoln	(i)	How long shall we continue to deny equality in our social and economic life? If we continue to deny it for long, we will do so only by putting our political democracy in peril.
B.	Mahatma Gandhi	(ii)	Democracy is 'government of the people, by the people and for the people'.
C.	Dr. B.R. Ambedkar	(iii)	The service of India means the service of the millions who suffer. It means the ending of poverty and ignorance and disease and inequality of opportunity.

D.	Jawaharlal Nehru	(iv)	I shall work for an India in which ... all communities shall live in perfect harmony. There can be no room in such an India for the curse of untouchability.
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- (1) A–II, B–I, C–IV, D–III (2) A–II, B–IV, C–I, D–III
(3) A–I, B–III, C–IV, D–II (4) A–I, B–II, C–III, D–IV
92. 2
93. Parliament of India consists of
(1) Rajya Sabha and Lok Sabha
(2) President, Rajya Sabha and Lok Sabha
(3) Election Commission, Rajya Sabha and Lok Sabha
(4) President, Election Commission, Rajya Sabha and Lok Sabha
93. 2
94. Which of the following is **not** a feature of a democratic form of government?
(1) Majority rule (2) Rights of minorities
(3) Universal adult franchise (4) Majoritarianism
94. 4
95. Which of the following institutions have reserved seats for women?
A. Lok Sabha B. Rajya Sabha
C. Legislative Assemblies D. Municipalities
E. Panchayats
(1) A, C, D, E (2) B, C, D, E
(3) D and E (4) E only
95. 3
96. The following are major changes that occurred in agriculture in the post-Independent India.
A. Use of high yielding variety (HYV) seeds
B. Introduction of Genetically modified (GM) crops
C. Application of chemical fertilizers and pesticides
D. Organic farming
Which of the above signifies Green Revolution of late 1960s and 1970s?
(1) A and B (2) B and C
(3) A and C (4) B and D
96. 3
97. Information relating to which of the following aspects are used to determine the human development in a country?
(1) Health, education and poverty (2) Inequality, health and education
(3) Health, education and income (4) Women's health, education and income
97. 3
98. A father in a farm produces 100 kg of paddy in one acre of land, during every season. One year, his son joined him in farming. Which of the following definitely indicates discussed unemployment?
(1) Output remains at 100 kilograms (2) Output increased to 150 kilograms
(3) Output increased to 200 kilograms (4) Output increased to 250 kilograms
98. 1
99. How membership in a Self Help Group helps a poor rural woman?
(1) Facilitates her how to help herself in daily work
(2) To work together in factories and get regular employment
(3) To overcome the problem of lack of collateral as borrowing is based on the group
(4) To get free money from the government

99. 3

100. Though consumers in India has the right to information about the product he/she purchases, which of the following aspects of a product, the producer need not inform the consumer?

(1) Date of production

(2) Date of expiry

(3) Address of the producer

(4) The production process

100. 4