SOLUTIONS

NATIONAL TALENT SEARCH EXAMINATION 2021 STAGE-2

SCHOLASTIC APTITUDE TEST (SAT) (DATE : 24-10-21)

Max. Marks: 100 Time allowed: 120 mins

1. The plasma membrane (pm) froms the boundary of lung cells.

Which of the following statements is true for the pm?

A. pm is a semipermeable membrane.

B. Water moves across the pm by Osmosis.

C. O_2 and CO_2 can cross the pm by diffusion

D. Na^+ and K^+ ions can pass the pm by diffusion.

(1) A, B, C & D (2) A, B, & D (3) B, C & D only (4) A, B & C only

Ans. (3)

Sol. Plasma membrane is selectively permeable membrane through which water some solute move by osmosis.

2. Eukaryotic cells contain several membrane-bound subcellular structures called Organelles. The vacuole is one such organelle found in both animal and plant cells.

Which of the following statement are true for vacuoles ?

A. Contain cell sap.

B. Provide turgidity to the plant cell.

C. Plant cell vacuoles are smaller than animals cell vacuoles.

D. Vacuoles store amino acids, sugar, acids and contain protein.

(1) A, B, C & D (2) A, B & C only (3) A, B & D (4) B, C & D only

Ans. (3)

Sol. Vacuoles contain cell sap, it provide turgidity to plant cells. Plant vacuole are large in size.

3. What is the reason for the Cardiac muscles not getting fatigued ?

(1) Presence of Single nucleus in cells of Cardiac muscles

(2) Cylindrical cells protect the cardiac muscles from wear and tear.

(3) Because of branching in the cells

(4) Presence of large number of mitochondria.

Ans. (4)

Sol. Cardiac cells have large number of mitochondria which provide energy to cells.

So it never get fatigued.

SOLUTIONS

NATIONAL TALENT SEARCH EXAMINATION 2021 STAGE-2

SCHOLASTIC APTITUDE TEST (SAT) (DATE : 24-10-21)

4. Grafting is possible among dicot plants but not in monocot plants. This is due to presence of one of the following conditions in dicot plant.

(1) Presence of open vascular bundles arranged in a ring.

(2) Presence of collenchyma tissues.

(3) Presence of intercalary meristem.

(4) Larger diameter of stem.

Ans. (1)

Sol. Grafting can take place in dicot due to presence of open vascular bundle (intra facicular cambium present) which are arranged in ring.

5. Parenchyma, collenchyma and sclerenchyma are kinds of simple permanent tissues in plants. Which of the following statement is true for collenchyma ?

A. Made up of dead cells.

B. Have very little intercellular space.

C. Cells are irregularly thickened at the corners.

D. Cell wall contains lignin.

(1) A, B, C & D (2) B & C only (3) A, B & C only (4) B, C & D only

Ans. (2)

Sol. Collenchyma is living mechanical tissue which has irregular deposition of pectin at corners. It provide flexibility to plant organ.

6. Trees of the genus *Pinus* are placed in higher groups compared to those of *Marsilea* genus because of the presence of one of the following features.

(1) Differentiated plant body. (2) Presence of seed.

(3) Presence of conducting tissue. (4) Presence of flowers.

Ans. (2)

Sol. Higher plants gymnosperm (*Pinus*) and angiosperm produce seeds which are absent in lower plants like pteridophytes (*Marsilea*).

SOLUTIONS

NATIONAL TALENT SEARCH EXAMINATION 2021 STAGE-2

SCHOLASTIC APTITUDE TEST (SAT) (DATE : 24-10-21)

7. Earth has vast diversity of animals. Each animal is unique in it-self and possesses certain distinguishing features. Match the animals listed in column 'A' with their characteristic features given in column 'B' and column 'C' and identify the correct match.

Column 'A'	*Column 'B'*	*Column 'C'*
A. Pheretima	(a) Book gills	(i) Coxal gland
B. Palaemon	(b) Colleterial gland	(ii) Chloragogen cells
C. Palacmnaeus	(c) Book lungs	(iii) Green gland
D. Periplaneta	(d) Calciferous gland	(iv) Unicose glands

(1) A-(a)-(i); B-(b)-(ii); C-(c)-(iii); D-(d)-(iv) (2) B-(b)-(iii); B-(d)-(iv); C-(a)-(i); D-(c)-(ii)

(3) A-(c)-(iv); B-(a)-(i); C-(b)-(ii); D-(d)-(iii) (4) A-(d)-(ii); B-(c)-(iii); C-(a)-(iv); D-(b)-(i)

Ans. (NA)

Sol. No option correctly matching.

8. What will happen to cells of cyanobacteria if they are placed in purified water ?

(1) They will swell and burst (2) They will shrink

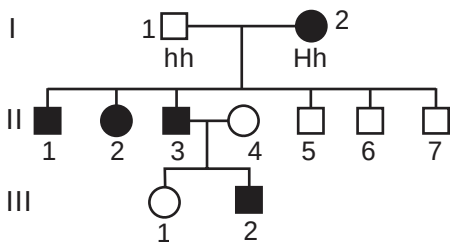
(3) They will swell but will not burst (4) They will not show any change

Ans. (3)

Sol. Cyanobacteria has cell wall so if placed in pure water it will swell but will not burst.

9. Hutington's disease is an autosomal disorder characterized by movement, cognitive and psychiatric disorders. Study the given pedigree and identify the genotype of II-3 and II-4.

[Note: Solid squares/circles represent affected individuals and empty squares/circles denote unaffected normal individuals.]



(1) II-3 : Hh; II-4 : hh (2) II-3 : HH; II-4 : Hh (3) II-3 : HH; II-4 : hh (4) II-3 : Hh; II-4 : HH

SOLUTIONS

NATIONAL TALENT SEARCH EXAMINATION 2021 STAGE-2

SCHOLASTIC APTITUDE TEST (SAT) (DATE : 24-10-21)

Ans. (1)

Sol. Huntington disease is an autosomal dominant disorder.

So diseased person can have one or both dominant allele for it.

Where as normal human will be homozygous recessive.

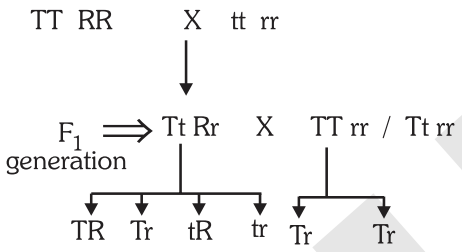
So, According to question (Pedigree chart) Progeny will be normal (homozygous recessive) or diseased (heterozygous).

10. When a tall plant with round seeds was hybridized with a dwarf plant with wrinkled seeds; all offspring in F_1 generation were tall plants that produced round seeds. As per Mendel's law of independent assortment, what percent of offspring will produce wrinkled seeds if F_1 is crossed with tall plant producing wrinkled seeds ?

(1) 10 (2) 20 (3) 50 (4) 100

Ans. (3)

Sol.



	Tr
TR	TTRr
Tr	TTrr
tR	TTRr
tr	Ttrr

50% progeny will have wrinkled seeds.

11. What would happen to earth if carbondioxide was absent from its atmosphere ?

(1) The earth would be a pleasant place.

(2) Absence of carbon dioxide would not make any difference to earth.

(3) Earth would be devoid of life.

(4) Earth would have only animal life.

SOLUTIONS

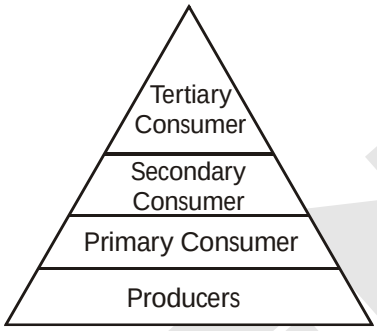
NATIONAL TALENT SEARCH EXAMINATION 2021 STAGE-2

SCHOLASTIC APTITUDE TEST (SAT) (DATE : 24-10-21)

Ans. (3)

Sol. CO_2 is required to produce food by photoautotrophs (plants) which produce oxygen in photosynthesis which is utilized in respiration. So, If CO_2 is absent, Earth would be devoid of life.

12. The following figure represents the flow of energy in a pyramid of food. If this ecosystem receives 1,00,000 kcal of sunlight energy of, the energy finally available to Tertiary Consumer (TC) is:



(1) 1000 kcal (2) 100 kcal (3) 10 kcal (4) 1 kcal

Ans. (4)

Sol. Approx 1% of energy is utilized by plants (producers) and than 10% is transferred to next trophic level in food chain.

13. Pollen grains of a fruiting plants species are deposited on the female flower by a pollinator. However, the female flower does not get fertilized. Which of the following observation is true ?

(1) Fruit will not be formed (2) Only seed set will no occur

(3) Normal fruit and seeds will be formed (4) Only fruit wall will be formed

Ans. (1)

Sol. After fertilization ovary convert to fruit and ovule to seed. So If fertilization does not takes place, fruit will not form.

14. The values of stoichiometric coefficients m, x, y and z in the following reaction after balancing are, respectively:

$$m(NH_4)_2Cr_2O_7 \xrightarrow{\Delta} xCr_2O_3 + yN_2 + zH_2O$$

(1) 2, 1, 1, 2 (2) 2, 2, 2, 4 (3) 1, 1, 1, 4 (4) 2, 2, 1, 2

SOLUTIONS

NATIONAL TALENT SEARCH EXAMINATION 2021 STAGE-2

SCHOLASTIC APTITUDE TEST (SAT) (DATE : 24-10-21)

Ans. (3)

Sol. $1(NH_4)_2Cr_2O_7 \xrightarrow{\Delta} 1Cr_2O_3 + 1N_2 + 4H_2O$

15. Identify the incorrect statement for the reaction: $2H_2S + SO_2 \rightarrow 3S + 2H_2O$ is:
(Atomic mass of S = 32).

(1) 1 mole H_2O is produced per mole of H_2S consumed.

(2) 3g of S is produced for every gram of SO_2 consumed.

(3) Two–thirds of the S produced comes from H_2S.

(4) The number of moles of various atoms present before and after the reaction is the same.

Ans. (2)

Sol. $2H_2S + SO_2 \rightarrow 3S + 2H_2O$

$\because$ 96 g of 'S' is produced from 64 g SO_2

$\therefore$ 3 g of 'S' is produced from $\frac{64}{96} \times 3$ = 2 g of SO_2

16. You are provided with aqueous solutions of three salts A, B and C. 2–3 drops of blue litmus solution, red litmus solution and phenolphthalein were added to each of these solutions in separate experiments. The change in colours of different indicators were recorded in the following table:

Sample	*With blue litmus solution*	*With red litmus solution*	*With phenolphthalein*
A	No change	Turns blue	Turns pink
B	No change	No change	No change
C	Turns red	No change	No change

On the basis of above observations, identify A, B and C from the following options:

(1) A = NaCl, B = CH_3COONa, C = $FeCl_3$ (2) A = CH_3COONa, B = NaCl, C = $FeCl_3$

(3) A = $FeCl_3$, B = NaCl, C = CH_3COONa (4) A = $FeCl_3$, B = CH_3COONa, C = NaCl

Ans. (2)

Sol. A is basic in nature because it turns red litmus into blue.

The aq.solution of CH_3COONa is basic, due to formation of strong base in its aq.solution.

B is neutral in nature, So colorless in all indicators.

C is acidic in nature, because it turns blue litmus into red.

SOLUTIONS

NATIONAL TALENT SEARCH EXAMINATION 2021 STAGE-2

SCHOLASTIC APTITUDE TEST (SAT) (DATE : 24-10-21)

17. Which of the following are NOT correct methods for separating the components of given mixtures ?
(I) The mixture of Iodine and sodium chloride by sublimation.
(II) Plant pigments by chromatography.
(III) Mixture of acetic acid and water by separating funnel.
(IV) Oxygen, argon and nitrogen from air by fractional distillation.
(1) I only (2) III only (3) II and III (4) II, III and IV

Ans. (2)

Sol. Mixture of acetic acid and water are miscible liquids hence can not be separated by separating funnel.

18. The compound 'A' when treated with alkaline potassium permanganate gives 'B', and with conc. sulphuric acid gives 'C' and 'D'. The compounds A, B, C and D are respectively:
(1) C_2H_4, CH_3COONa, C_2H_5OH, H_2O (2) CH_3COOH, C_2H_4, CH_3OH, H_2O
(3) C_2H_5OH, CH_3COOH, C_2H_4, H_2O (4) CH_3OH, $HCOOH$, H_2O, CH_4

Ans. (3)

Sol. $C_2H_5OH \xrightarrow[KMnO_4]{\text{alkaline}} CH_3COOH$(Oxidation process)
(A) (B)

$\downarrow$ $Conc.H_2SO_4$

$CH_2=CH_2$ (C_2H_4) [Dehydration] + H_2O
(C) (D)

19. Match the chemical reaction given in the List–I with the type of chemical reactions given in the List–II and select the correct answer from the options given below:

List – I (Chemical reactions)	*List – II (Type of Chemical reactions)*
(I) $CH_3-CH_2-OH \xrightarrow{\text{acidified } K_2Cr_2O_7}$	(A) Addition
(II) $C_2H_4 + H_2 \xrightarrow{\text{Ni catalyst}}$	(B) Elimination
(III) $CH_4(g) + Cl_2(g) \xrightarrow{\text{Sunlight}}$	(C) Redox
(IV) $CH_3-CH_2-OH \xrightarrow{\text{Heat/conc.}H_2SO_4}$	(D) Substitution

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

Ans. (3)

SOLUTIONS

NATIONAL TALENT SEARCH EXAMINATION 2021 STAGE-2

SCHOLASTIC APTITUDE TEST (SAT) (DATE : 24-10-21)

Sol. (I) $CH_3 - CH_2 - OH \xrightarrow{\text{acidified } K_2Cr_2O_7} CH_3COOH$ (Redox)

(II) $C_2H_4 + H_2 \xrightarrow{\text{Ni catalyst}} C_2H_6$ (Addition)

(III) $CH_4(g) + Cl_2(g) \xrightarrow{\text{Sunlight}} CH_3Cl + HCl$ (Substitution)

(IV) $CH_3 - CH_2 - OH \xrightarrow{\text{Heat/conc.}H_2SO_4} CH_2 = CH_2 + H_2O$ (Elimination)

20. Two beakers A and B contain iron (II) sulphate solution. In the beakers A and B, small pieces of copper and zinc are placed respectively. It is found that a grey deposit forms on the zinc but not on the copper. From these observations, it can be concluded that:

(1) zinc is most active metal followed by iron and then copper.

(2) zinc is most active metal followed by copper and then iron.

(3) iron is most active metal followed by zinc and then copper.

(4) iron is most active metal followed by copper and then zinc.

Ans. (1)

Sol. As Zn is more reactive metal then Fe, So Zn will displace Fe^{2+} ions from solution.

$Zn + FeSO_4(aq.) \rightarrow ZnSO_4(aq.) + Fe(s)$

Cu is not more reactive then Fe, So no reaction will take place.

21. Sulphur powder is heated on a spatula. A piece of both, moist blue and red litmus papers are brought one by one near the gas evolved during heating. The action of gas on the moist litmus papers will be:

(1) No change in colour in both the litmus papers.

(2) Blue litmus paper becomes red.

(3) Red litmus paper becomes blue.

(4) Blue litmus paper turns black.

Ans. (2)

Sol. $S + O_2 \rightarrow SO_2$ (Acidic)

Moist blue litmus becomes red, when bring near to SO_2 gas.

SOLUTIONS

NATIONAL TALENT SEARCH EXAMINATION 2021 STAGE-2

SCHOLASTIC APTITUDE TEST (SAT) (DATE : 24-10-21)

22. Two samples A and B of a pure substance containing elements Y and Z are obtained from two different sources. 5g of sample A contains 1.25 g of Z. Sample B is made of 75% of Y by weight. This is an illustration of which of the following laws ?

(1) Law of constant proportion (2) Law of multiple proportion

(3) Law of mass conservation (4) Avagadro's law

Ans. (1)

Sol. *A* *B*

Y : Z Y : Z

3.75 1.25 75% 25%

$\frac{3.75}{5}\times 100$ $\frac{1.25}{5}\times 100$

75% 25%

$\therefore$ Law of constant proportion.

23. An element X with atomic number 13 combines with another element Y of atomic number 17. The formula of the compound formed and nature of bond will be:

(1) XY_3, ionic (2) XY_3, covalent (3) X_3Y, ionic (4) X_3Y, covalent

Ans. (2)

Sol. X + Y $\rightarrow$ XY_3

(z = 13) (z = 17) (Covalent in nature)

[2, 8, 3] [2, 8, 7]

24. Select the correct options from the following statements:

(I) $^{12}_{6}C$ and $^{14}_{6}C$ are isobars of each other.

(II) $^{12}_{6}C$ reacts with $^{16}_{8}O$ to form a product which contains ionic bonds.

(III) $^{40}_{20}Ca$ and $^{40}_{18}Ar$ are isobars of each other.

(IV) $^{40}_{20}Ca$ reacts with $^{16}_{8}O$ to form a compound whose aqueous solution is known as lime water.

(1) I and II (2) I and III (3) III and IV (4) I and IV

Ans. (3)

Sol. $^{40}_{20}Ca$ and $^{40}_{18}Ar$ are isobars of each other, as they have different atomic number but same mass number.

$$^{40}_{20}Ca + {}^{16}_{8}O \longrightarrow CaO \xrightarrow{+H_2O} \underset{\text{lime water}}{Ca(OH)_2}$$

SOLUTIONS

NATIONAL TALENT SEARCH EXAMINATION 2021 STAGE-2

SCHOLASTIC APTITUDE TEST (SAT) (DATE : 24-10-21)

25. Identify the correct order of atomic radii of following elements:

(1) Na < Li < Rb < Cs (2) Li < K < Rb < Cs

(3) Li < Na < Cs < K (4) Na < K < Cs < Rb

Ans. (2)

Sol. Order of Atomic radii is : Li < K < Rb < Cs

As moving from top to bottom in a group, 'n' increases so atomic radius will increase.

26. Which of the following statements are true ?

(I) On heating the kinetic energy of particles in solids does not change because they have a fixed position.

(II) Sublimation is the change of gaseous state directly to solid state without going through liquid state and vice versa.

(III) The movement of particles from an area of higher concentration to lower concentration is called diffusion.

(IV) The rate of evaporation is not affected by increasing the temperature.

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

Ans. (4)

Sol. Fact based.

27. A train moving at uniform 90 km/h is approaching a flag station whose platform is 500 m long. Station master is standing at the centre of the platform. Train starts blowing whistle when engine is 1 km away from near end of the platform and continues blowing whistle till engine crosses of the platform without stopping. If the speed of the sound is assumed to be 300 m/s, then the duration for which station master hears the whistle is ?

(1) 55.80 sec (2) 56.67 sec (3) 60.00 sec (4) 60.30 sec

Ans. (2)

Sol. Speed of the train = 90 km/hr = $90 \times \frac{5}{18}$ m/sec = 25 m/sec.

The train will take $\frac{(1000+500)}{25} = 60\,\text{sec}.$ to cross two point.

First sound produced will be heard after T_1.

SOLUTIONS

NATIONAL TALENT SEARCH EXAMINATION 2021 STAGE-2

SCHOLASTIC APTITUDE TEST (SAT) (DATE : 24-10-21)

$$T_1 = \frac{1000 + 250}{300} = \frac{1250}{300}$$

Last sound produced will be heard after T_2.

$$T_2 = 60 + \frac{250}{300}$$

$$\text{Time difference} = 60 + \frac{250}{300} - \frac{1250}{300} = 56.67\,\text{sec}.$$

28. A swimmer can swim in still water at a speed of 15 km/h. A river is flowing at 5 km/h. The swimmer starts from a point and swim 1 km upstream and then returns by swimming downstream back to original position. During this, the average speed of his/her swimming is :

(1) 20/3 km/h (2) 10 km/h (3) 40/3 km/h (4) 20 km/h

Ans. (3)

Sol. As we know,

$$\text{Average speed} = \frac{\text{total distance}}{\text{total time}}$$

$$\Rightarrow \text{Average speed} = \frac{2}{\frac{1}{10} + \frac{1}{20}} = \frac{40}{3}\,\text{km / hr}$$

29. A car P is moving with a uniform speed of 72 km/h towards another car Q at rest on a straight level road. At a particular instant when the distance between P and Q is 525 m the car Q started accelerating at 2 m/s^2 towards P. Find the distance travelled by Q, when both the cars meet.

(1) 300 m (2) 225 m (3) 100 m (4) 4) 30 m

Ans. (2)

Sol. Let they meet after time 't' then we have,

$$\left(72 \times \frac{8}{18}\right) t + \frac{1}{2} \times 2 \times t^2 = 525$$

$\Rightarrow t = 15s$

Now, distance travelled by Q is ,

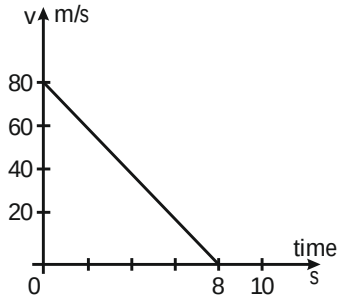
$$S_Q = \frac{1}{2} \times 2 \times 15^2 = 225\text{m}$$

SOLUTIONS

NATIONAL TALENT SEARCH EXAMINATION 2021 STAGE-2

SCHOLASTIC APTITUDE TEST (SAT) (DATE : 24-10-21)

30. Figure shows the velocity versus time graph for a block of mass 50 g sliding on a rough floor. The average rate at which energy dissipates (in J/s) due to the force of friction is :



(1) 5.0 J/s (2) 10.0 J/s (3) 20.0 J/s (4) 40.0 J/s

Ans. (3)

Sol. As per question,

Average rate of energy dissipation = $\frac{\Delta KE}{\Delta t} = \frac{\frac{1}{2} \times \frac{50}{1000} \times 80^2}{8} = 20 J / s$

31. A ball of mass 100 g is dropped from a height of 1 m. It loses 10% of its energy every time when it bounces off the floor. After 3 bounces, it can reach the half-way to maximum height, its kinetic energy (upto two decimal points) would be (take g = 10 m/s^2).

(1) 0.35 J (2) 0.36 J (3) 0.70 J (4) 0.73 J

Ans. (2)

Sol. K.E. of ball after 3rd collision = $\left(\frac{100}{1000} \times 10 \times 1\right) \times \frac{9}{10} \times \frac{9}{10} \times \frac{9}{10} = 0.729 J$.

It reaches half the height so K.E. = $\frac{0.729}{2} \cong 0.36$ Joule

So K.E. = 0.36 Joule

32. A block of mass 3 kg and density ρ, suspended from a spring balance is immersed in a liquid of density $\rho/3$. Then the balance would read weight as :

(1) 0 (2) 2/3 kg (3) 1 kg (4) 2 kg

Ans. (4)

Sol. As we know,

Reading of spring balance = Apparent weight = Actual weight – Upthrust

$\Rightarrow$ Reading of spring balance = $3 - \frac{\rho}{3} \times \frac{3}{\rho} = 2kg$

SOLUTIONS
NATIONAL TALENT SEARCH EXAMINATION 2021 STAGE-2
SCHOLASTIC APTITUDE TEST (SAT) (DATE : 24-10-21)

33. Cost of coal is Rs. 5 per kg and can produce energy of 20 MJ/kg. If a power station uses coal to produce electricity with 25% efficiency, then the cost of coal for producing 1 unit (1 kw/h) of electricity in Rs. :

(1) 0.9 (2) 3.6 (3) 9.0 (4) 36.0

Ans. (2)

Sol. As per question we have,

Cost of coal for producing 1 kwh energy = $\frac{100}{25} \times \frac{3.6 \times 10^6}{20 \times 10^6} \times 5 = 3.6$ Rs.

34. Two different instruments (say, guitar and harmonium), playing same music, their sound appears different through they play same frequency, because :

(1) they have different loudness

(2) they are played by different persons and hence difference in tuning

(3) they have different quality

(4) they create different pitch

Ans. (3)

Sol. Quality of sound helps us to distinguish between two sound waves having same frequency.

35. Sound travels at a speed of 1450 ms^{-1} through water. A submarine detects objects around it by sending sound waves and detecting echo (reflected sound) heard after 4 seconds. Then the ojbect must be at a distance of :

(1) 1.450 km (2) 2.900 km (3) 4.350 km (4) 5.800 km

Ans. (2)

Sol. Distance of object = 1450 × 2 = 2900 m or 2.9 km

36. A small pencil of length 10 cm is kept along the axis of a concave mirror of radius of curvature 40 cm with its tip touching the mirror. The size of pencil's image would appears to be :

(1) 5 cm (2) 10 cm (3) 20 cm (4) infinite

Ans. (3)

Sol. Image of tip will be formed at pole itself and for image of other end we have,

u = –10 cm

f = –20 cm

$\Rightarrow v = \frac{uf}{u - f} = 20cm$

$\Rightarrow$ Length of pencils image = 20 cm

SOLUTIONS
NATIONAL TALENT SEARCH EXAMINATION 2021 STAGE-2
SCHOLASTIC APTITUDE TEST (SAT) (DATE : 24-10-21)

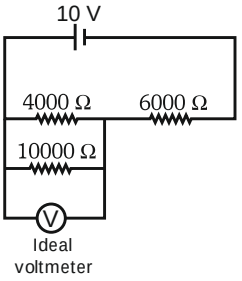
37. A 10 V battery is connected to a series combination of two resistance of 4000 Ω and 6000 Ω. A non-ideal voltmeter of resistance 10000 Ω connected across 4000 Ω reads 3.226 V. What would be the value if the same voltmeter connected across 6000 Ω ?

(1) 3.326 V (2) 4.326 V (3) 3.238 V (4) 4.838 V

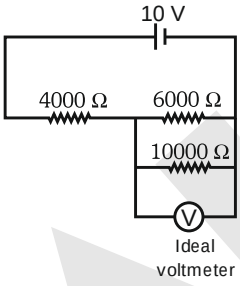
Ans. (4)

Sol. When non-ideal voltmeter is connected then reading of voltmeter.

Case - I:



Case - II :



Parallel of 6000 Ω and 10000 Ω $= \frac{6000 \times 10000}{16000} = 3750\,\Omega$

Voltage across $3750\Omega = \frac{3750}{3750 + 4000} \times 10 = 4.838$ volts

38. Consider two circuits :

(i) A : in which N identical bulbs are connected in series across a battery of emf E.

(ii) B : in which N bulbs identical to those in A connected in parallel across similar battery of emf E.

P_A : Power dissipating in each bulb in A.

P_B : Power dissipating in each bulb in B.

P_{AT} : Total power delivered by battery in circuit A.

SOLUTIONS

NATIONAL TALENT SEARCH EXAMINATION 2021 STAGE-2

SCHOLASTIC APTITUDE TEST (SAT) (DATE : 24-10-21)

P_{BT} : Total power deliverd by battery in circuit B.

Choose the correct option :

(1) $P_A = N P_{BT}$ (2) $P_{BT} = N^2 P_A$ (3) $P_{BT} = N P_{AT}$ (4) $P_B = N^2 P_A$

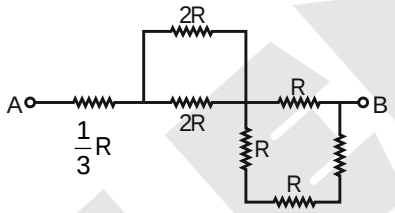
Ans. (4)

Sol. Let the rated power of each bulb = P, then we have

$$P_A = \frac{P}{N^2}; P_B = P; P_{AT} = \frac{P}{N}; P_{BT} = NP$$

$$\Rightarrow P_B = N^2 P_A$$

39. Six resistances, each of value given R value are connected between two points A and B as shown in the figure :

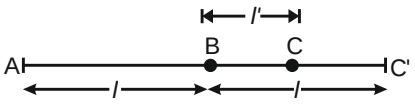


The combination value of resistance between points A and B is :

(1) 2R (2) R (3) $\frac{4}{3}R$ (4) $\frac{5}{3}R$

Ans. (Bonus)

40. A body travels the distance AB = *l* with a speed 2 m/s. Thereafter, it travels BC = *l'* with speed 1.5 m/s and the remaining CC' = (*l* – *l'*) with 0.5 m/s. Calculate the average speed for this journey assuming that the body takes same time in travelling distance BC a CC'.



(1) 2 m/s (2) 1.33 m/s (3) 0.66 m/s (4) 0.8 m/s

Ans. (2)

Sol. As we know,

Let time taken form B to C = 2t

$\Rightarrow 1.5 \times t + 0.5 \times t = \ell$

$$\Rightarrow t = \frac{\ell}{2}$$

SOLUTIONS

NATIONAL TALENT SEARCH EXAMINATION 2021 STAGE-2

SCHOLASTIC APTITUDE TEST (SAT) (DATE : 24-10-21)

$$\text{Average speed} = \frac{\text{total distance}}{\text{total time}}$$

$$\Rightarrow \text{Average speed} = \frac{2\ell}{\frac{\ell}{2} + 2t} = \frac{2\ell}{\frac{\ell}{2} + 2\left(\frac{\ell}{2}\right)} = 1.33 \text{ m/s}$$

41. For real numbers p, q and a, if the polynomial $x^3 - 3px + 2q$ is divisible by the polynomial $x^2 + 2ax + a^2$, then which of the following is correct ?

(1) $3p = 2q$ (2) $p^2 = q^3$ (3) $p^3 = q^2$ (4) $27p^3 = 4q^2$

Ans. (3)

Sol. $x^2 + 2ax + a^2 \overline{)\, x^3 - 3px + 2q \,(\, x - 2a}$

$x^3 + 2ax^2 + a^2x$

$-2ax^2 - x(3p + a^2) + 2q$

$-2ax^2 - 4a^2x - 2a^3$

$-x(3p + a^2 - 4a^2) + (2q + 2a^3) = 0$

$a^2 = p, q = -a^3$

$\boxed{p^3 = q^2}$

42. The value of $(3^{1/2} - 1)(3^{1/2} + 3^{1/4} + 1)(3^{1/2} - 3^{1/4} + 1)$ is :

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

Ans. (3)

Sol. $(3^{1/2} - 1)(3^{1/2} + 3^{1/4} + 1)(3^{1/2} - 3^{1/4} + 1)$

Let $3^{1/2} = x$

$(x - 1)(x + \sqrt{x} + 1)(x - \sqrt{x} + 1)$

$(x - 1)((x + 1)^2 - x)$

$(x - 1)(x^2 + 1 + x)$

$x^3 - 1$

Given expression = $3\sqrt{3} - 1$

SOLUTIONS

NATIONAL TALENT SEARCH EXAMINATION 2021 STAGE-2

SCHOLASTIC APTITUDE TEST (SAT) (DATE : 24-10-21)

43. Given that the system of equation mx + 2y = 10; 3x – 2y = 0 have the integer solution. Then the possible value of m are :

(1) 2 and 8 (2) 2 and –8 (3) –2 and –8 (4) –2 and 8

Ans. (2,3)

Sol. mx + 2y = 10, 3x – 2y = 0

$$x = \frac{2y}{3}$$

$$m.\frac{2y}{3} + 2y = 10$$

$$y\left(\frac{2m+6}{3}\right) = 10$$

$$y = \frac{15}{m+3}$$

For integer solution

$y = \pm 3$ and $y = \pm 15$

$m + 3 = \pm 5$ $m + 3 = \pm 1$

m = 2, –8 m = –2, –4

44. Consider the arithmetic progression with n terms. If the common difference is increased by 1, then n^{th} term increases by 19. If the 5^{th} term of the progression is 28 and the average of the first and last terms is 61, then the 10^{th} term of the progression is :

(1) 54 (2) 56 (3) 58 (4) 60

Ans. (3)

Sol. a, a + d, a + 2d , ... a + (n – 1) d

$T_5 = a + 4d = 28$

ATQ

[a + (n – 1) (d + 1)] – [a + (n – 1) d] = 19

n = 20

2a + 19d = 122

2a + 8d = 56

11d = 66

d = 6

a = 28 – 24 = 4

$T_{10} = 4 + 54 = 58$

SOLUTIONS
NATIONAL TALENT SEARCH EXAMINATION 2021 STAGE-2
SCHOLASTIC APTITUDE TEST (SAT) (DATE : 24-10-21)

45. The ages of the members of a club are in arithmetic progression with common difference 3 months. The sum of ages of all the members is 300 years and the youngest member is a child of age 9 years. Then, the age of the eldest member is :

(1) 16 years (2) 15 years (3) 14 years (4) 16 years

Ans. (2)

Sol. First term a = 9

Common difference $d = \frac{1}{4}$

$$\frac{n}{2}\left[18 + \frac{1}{4}(n-1)\right] = 300$$

$n(n + 71) = 2400$

$n^2 + 71n - 2400 = 0$

$n = 25$

Eldest member = $9 + 24 \times \frac{1}{4}$

$= 9 + 6 = 15$ years

46. A sum of Rs. 27000 was divided equally among a certain number of persons. Had there been 20 more persons, each would have got Rs. 480 less. The number of persons, initially, was :

(1) 24 (2) 25 (3) 45 (4) 48

Ans. (2)

Sol. Let number of person = x

$$\frac{27000}{x} - \frac{27000}{x+20} = 480$$

$$27000\left[\frac{20}{x(x+20)}\right] = 480$$

$x(x + 20) = 1125$

$x^2 + 20x - 1125 = 0$

$(x + 45)(x - 25) = 0$

$x = 25$

Number of person = 25

SOLUTIONS

NATIONAL TALENT SEARCH EXAMINATION 2021 STAGE-2

SCHOLASTIC APTITUDE TEST (SAT) (DATE : 24-10-21)

47. In ΔABC, A is (0, 0), B is (18, 21) and C has integer co-ordinates. The minimum non-zero area of ΔABC, in square units, is :

(1) 3/2 (2) 5/2 (3) 7/2 (4) 9/2

Ans. (1)

Sol. Let c be (x, y)

Area = $\frac{1}{2}|0(21-y)+18(y)+x(0-21)|$

$=\frac{1}{2}|18y-21x|$

For, x = 1, and y = 1

Minimum area = $\frac{3}{2}$ sq. units

48. If $\frac{1-\cos\theta}{\sin\theta}=\frac{1}{5}$, $0^o \le \theta \le 90^o$, then the value of $1+\tan\theta$ is.

(1) $\frac{17}{13}$ (2) $\frac{17}{12}$ (3) $\frac{15}{13}$ (4) $\frac{15}{12}$

Ans. (2)

Sol. $\text{cosec}\,\theta - \cot\theta = \frac{1}{5}$ —(1)

$\text{cosec}\,\theta + \cot\theta = 5$ —(2)

On simiplify (1) and (2)

$\Rightarrow \cot\theta = \frac{12}{5}$

$\therefore \tan\theta = \frac{5}{12}$

$1+\tan\theta = 1+\frac{5}{12}=\frac{17}{12}$

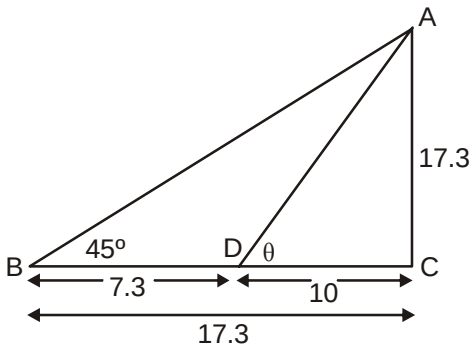
SOLUTIONS
NATIONAL TALENT SEARCH EXAMINATION 2021 STAGE-2
SCHOLASTIC APTITUDE TEST (SAT) (DATE : 24-10-21)

49. The angle of elevation of the top of a ladder leaning against a wall measured from a distance of 7.3 metres from the foot of the ladder is 45º. Suppose that the vertical height of the top of the ladder is 17.3 metres. Then, the best approximation of the angle of inclination of the ladder with the wall is.

(1) 15º (2) 30º (3) 45º (4) 60º

Ans. (2)

Sol.



$\tan\theta = \frac{17.3}{10} = 1.73 \Rightarrow \theta = 60^\circ$

Angle of inclination of the ladder with the wall = $90^\circ - \theta = 30^\circ$

50. If both the roots of the equation $x^2 - 2mx + m^2 - 1 = 0$ are greater than –2 but less than 4, then

(1) $-1 < m < 3$ (2) $1 < m < 4$ (3) $-2 < m < 0$ (4) $1 < m < 3$

Ans. (1)

Sol. $x^2 - 2mx + m^2 - 1 = [x - (m - 1)]\,[x - (m + 1)]$

For zeroes

$[x - (m - 1)]\,[x - (m + 1)] = 0$

$\Rightarrow$ $x = m - 1, m + 1$

$\Rightarrow$ $-2 < m - 1, m + 1 < 4$

So, $-1 < m < 3$

51. Consider the collection of points (a, b) in the coordinate plane such that a and b are integers such that $-5 \le a \le 5$ and $-5 \le b \le 5$. A point is selected at random from the collection. What is the probability that the selected point is at a distance of atmost 2 units from the origin ?

(1) $\frac{11}{100}$ (2) $\frac{13}{100}$ (3) $\frac{11}{121}$ (4) $\frac{13}{121}$

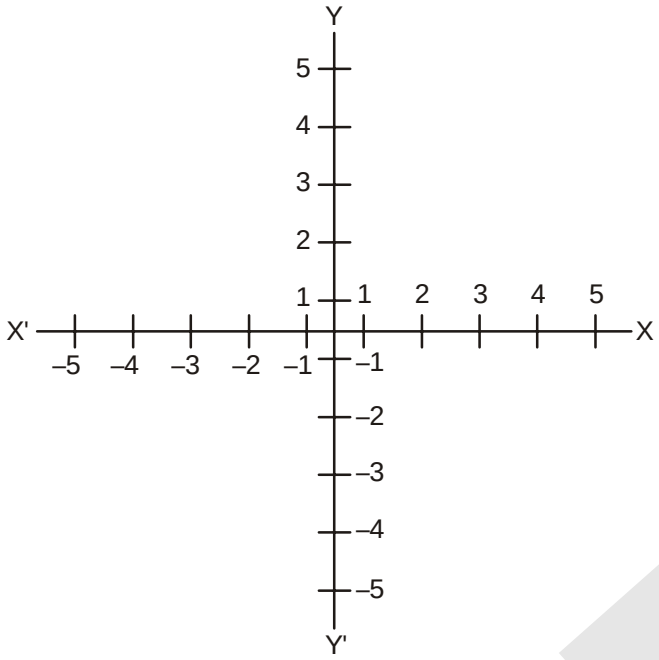
SOLUTIONS

NATIONAL TALENT SEARCH EXAMINATION 2021 STAGE-2

SCHOLASTIC APTITUDE TEST (SAT) (DATE : 24-10-21)

Ans. (4)

Sol.



Total possible point = 11 × 11 = 121

Favourable point =

(0, 0), (0, 1), (0, 2), (1, 0), (2, 0), (1, 1), (0, –1), (0, –2), (–1, 0), (–2, 0), (–1, –1), (–1, 1), (1, –1)

Total favourable points = 13

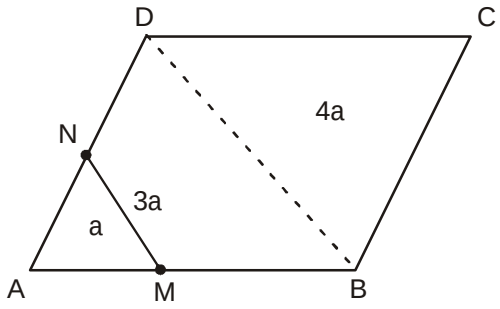
probability $\frac{13}{121}$

52. In the parallelogram ABCD, M and N are respectively the midpoints of AB and AD. The points M and N are joined to form the triangle AMN. The area of the triangle AMN and the area of the parallelogram ABCD are in the ratio :

(1) 1 : 4 (2) 1 : 6 (3) 1 : 8 (4) 1 : 9

Ans. (3)

Sol.



SOLUTIONS

NATIONAL TALENT SEARCH EXAMINATION 2021 STAGE-2

SCHOLASTIC APTITUDE TEST (SAT) (DATE : 24-10-21)

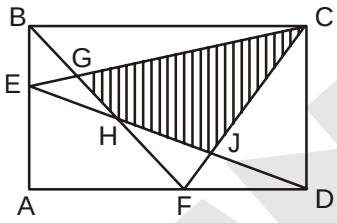
Let area of Δ AMN = a

therefore area of $\square$ MBDN = 3a (since M and N are mid points)

ΔAMN and the area of the parallelogram ABCD

$$\frac{\text{Area } \Delta AMN}{\text{Area } \square ABCD} = \frac{a}{8a} = \frac{1}{8}$$

53. In the adjoining figure, ABCD is a rectangle. The area of ΔBEG = 503 cm^2, the area of ΔJFD = 408 cm^2 and the area of quadrilaterla EHFA = 1113 cm^2. The area (in cm^2) of the shaded region is.



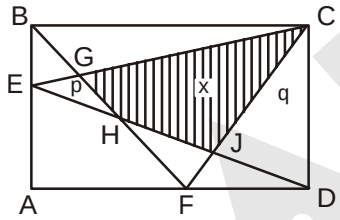
(1) 2021 (2) 2019 (3) 1208 (4) 1018

Ans. (NA)

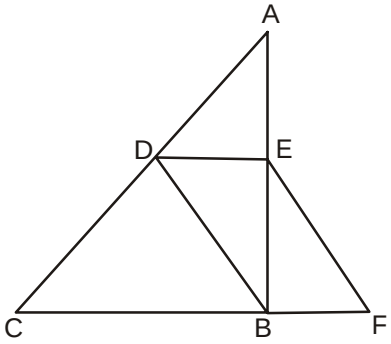
Sol. Area of ΔABF + Area of ΔFCD = Area of ΔDEC

1113 + p + 503 + 408 + q = p + x + q

x = 2024



54. In the adjoining figure, ABC is right angled at B. The point D is on AC such that BD = BC and BDEF is a parallelogram. If $\angle$BEF = 10º, then $\angle$ADE is equal to.



(1) 50º (2) 40º (3) 25º (4) 20º

SOLUTIONS

NATIONAL TALENT SEARCH EXAMINATION 2021 STAGE-2

SCHOLASTIC APTITUDE TEST (SAT) (DATE : 24-10-21)

Ans. (1)

Sol. $\angle DBE = \angle BEF = 10^o$ (alt. int. angle)

So, $\angle DBC = 90 - 10 = 80^o$

Since, BD = BC

$\angle BDC = \angle BCD = 50^o$

Since, DE||CF

$\angle DEB = 90^o$

$\angle BDE = 80^o$

So, $\angle ADE = 180 - (80 + 50) = 50^o$

55. ABCD is a quadrilateral in which AB = AC, AD = CD = 13 cm, $\angle BAC = 20^o$ and $\angle ADC = 100^o$. If BC = 12 cm, then AB is equal to :

(1) 20 cm (2) 25 cm (3) 23 cm (4) 21 cm

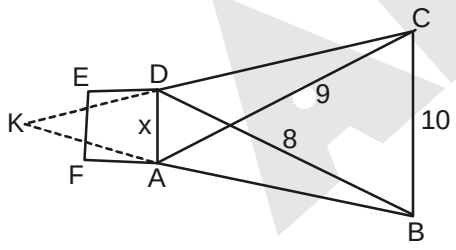
Ans. (NA)

56. In quadrilaterla ABCD, $\angle ABC + \angle DCB = 90^o$ and ADEF is a square constructed on side AD in the exterior of the quadrilaterla ABCD. If BC = 10 cm, AC = 9 cm and BD = 8 cm, then the area (in cm^2) of the square ADEF lies between.

(1) 70 and 80 (2) 60 and 70 (3) 50 and 60 (4) 40 and 50

Ans. (4)

Sol.



$\angle AKD = 90°$

So, $KD^2 + AK^2 = AD^2 = x^2$ .... (i)

$AK^2 + KC^2 = AC^2$ .... (ii)

$KD^2 + KB^2 = BD^2$ .... (iii)

From (i), (ii) and (iii)

$x^2 + 10^2 = 9^2 + 8^2$

$x^2 = 45$

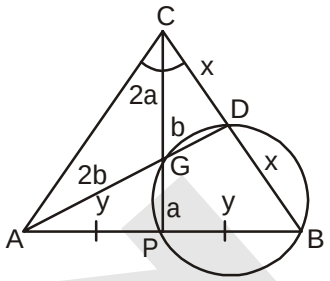
SOLUTIONS
NATIONAL TALENT SEARCH EXAMINATION 2021 STAGE-2
SCHOLASTIC APTITUDE TEST (SAT) (DATE : 24-10-21)

57. Let G be the centroid of ΔABC in which the angle C is obtuse. Let AD and CF are the medians from A and C on the sides BC and AB respectively. If the four points B, D, G and F are concyclie, then $\frac{BC}{AC}$.

(1) $> \frac{1}{2}$ (2) $< \frac{1}{\sqrt{2}}$ (3) $> \frac{1}{\sqrt{2}}$ (4) $< \frac{1}{2}$

Ans. (2)

Sol. $6b^2 = 2y^2$



$$\frac{b^2}{y^2} = \frac{1}{3} \quad \text{—(A)}$$

$$\frac{a^2}{x^2} = \frac{1}{3} \quad \text{—(B)}$$

$4y^2 + AC^2 = 2(9b^2 + x^2)$ —(C)

$4x^2 + AC^2 = 2(9a^2 + y^2)$ —(D)

From (A), (B), (C) and (D) :

$AC^2 = 2(x^2 + y^2)$ —(i)

Angle C is of obtuse $4y^2 > 4x^2 + AC^2$ —(ii)

From (i) and (ii) :

$$\frac{8x^2}{AC^2} + 1 < 2$$

So, $\frac{4x^2}{AC^2} < \frac{1}{2} \Rightarrow \frac{BC}{AC} < \frac{1}{\sqrt{2}}$

58. For the distinct real numbers a, b, c and $a \neq 0$, consider the quadratic equation $ax^2 + bx + c = 0$. If $a + b + c = 0$; then the solutions of the quadratic equation are :

(1) $\frac{a}{b}$ and $\frac{b}{a}$ (2) $\frac{a}{b}$ and $\frac{b}{c}$ (3) 1 and $\frac{b}{a}$ (4) 1 and $\frac{c}{a}$

Ans. (4)

Sol. $a + b + c = 0$, therefore $-b = a + c$

SOLUTIONS

NATIONAL TALENT SEARCH EXAMINATION 2021 STAGE-2

SCHOLASTIC APTITUDE TEST (SAT) (DATE : 24-10-21)

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{(a+c) \pm \sqrt{(a+c)^2 - 4ac}}{2a}$$

$$x = \frac{(a+c) \pm (a-c)}{2a}$$

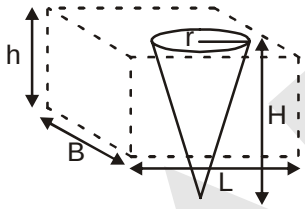
$\therefore x = 1, \; x = \frac{c}{a}$

59. A rectangular plot is of length 28m and width 14m. A conical pit of diameter 7m and depth 3m with its flat surface upward and vertex downward is dug at one corner of the plot. The soil dug out is spread uniformly over the remaining area of the plot. The best approximation value of the increment in the level of the remaining plot is (take $\pi = \frac{22}{7}$)

(1) 10.5 cm (2) 10.9 cm (3) 9.9 cm (4) 9.5 cm

Ans. (2)

Sol.



Volume of cone = Volume of soil spread evenly over Rectangular plot.

$$\frac{1}{3}\pi r^2 H = h(L \times B - \pi r^2)$$

$$\frac{1}{3} \times \frac{22}{7} \times \left(\frac{7}{2}\right)^2 \times 3 = h\left(28 \times 14 - \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2}\right)$$

h = 0.109 m = 10.9 cm.

60. The sum of deviations from 50 of n values $x_1, x_2, ...x_n$ is –10 and the sum of deviations from 46 of $x_1, x_2,.. x_n$ is 70. Then the deviation of the mean of the given values from 48 is.

(1) 1.5 (2) –1.5 (3) 2 (4) –2.5

Ans. (1)

SOLUTIONS

NATIONAL TALENT SEARCH EXAMINATION 2021 STAGE-2

SCHOLASTIC APTITUDE TEST (SAT) (DATE : 24-10-21)

Sol. $(x_1 + x_2 ..... x_n) - 50n = -10$

$(x_1 + x_2 ..... x_n) = 50n - 10$ —(1)

and $(x_1 + x_2 ..... x_n) - 46n = 70$

$x_1 + x_2 ..... x_n) = 46n + 70$ —(2)

From (1) and (2)

$n = 20$

So, $x_1 + ...x_n = 990$

Mean = 49.5

Deviation = 49.5 – 48 = 1.5

61. In the modern democracies, political power is distributed. The power-sharing arrangements can take many forms. In the context of India, which of the following statement/s is/are not true ?

(I) Arrangement of distribution of power between different organs of the government.

(II) Arrangement of sharing of power among two or more political parties.

(III) Arrangement of the division of power between different religious communities.

(IV) Arrangement of the division of power between different levels of the government.

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

Ans. (4)

Sol. In the context of India only (III) statement is incorrect as the power sharing between different religious communities is not applicable.

62. When no party or coalition gets a majority in the Lok Sabha, the President exercises his/her discretion in the appointment of the Prime Minister. Which of the following statement conveys the correct use of discretion of the President under constitutional provisions ?

(1) The President may appoint the leader of largest majority party in the Lok Sabha as Prime Minister.

(2) The President appoints a leader who in his/her opinion can muster majority support in the Lok Sabha and can prove majority support in the Lok Sabha.

(3) The President may appoint the senior-most member of Lok Sabha as Prime Minister.

(4) The President may appoint the leader of largest majority party in the Rajya Sabha as Prime Minister.

Ans. (2)

Sol. Under the discretionery power of President, only (2) statement is correct.

SOLUTIONS

NATIONAL TALENT SEARCH EXAMINATION 2021 STAGE-2

SCHOLASTIC APTITUDE TEST (SAT) (DATE : 24-10-21)

63. Which two among the following are not presenting true picture of the implementation of Panchayati Raj system in India.

(A) Panchayati Raj has increased women's representation and voice in India democracy ;

(B) State government have transferred significant powers to Panchayati Raj institutions ;

(C) Panchayati Raj institutions have been given adequate resources ;

(D) Panchayati Raj has helped to deepen democracy in our country.

(1) (A) and (B) (2) (B) and (C) (3) (C) and (D) (4) (D) and (A)

Ans. (2)

Sol. In Panchayati Raj system in India only (B) and (C) does not give the true picture of the implementation.

64. Case in politics have both positive and negative aspects. Which among the following is negative effect of caste in Indian Democracy ?

(1) caste politics has helped people from Dalits and OBC castes to gain better access to decision making ;

(2) each caste group tries to become bigger by incorporating within it neighbouring castes or sub-castes which were earlier excluded from it ;

(3) some marginal caste groups have come up in the political arena ;

(4) in some cases caste division leads to tensions, conflict and even violence.

Ans. (4)

Sol. Only (4) is the negative effect of caste in Indian democracy.

65. Michelle Bachelet, who was elected as President in 2006, became the first woman to be a Defence Minister in Latin American country Chile. Before being appointed as Defence Minister, she was –

(1) a member of the Solidarity Party of Poland ; *(Out of syllabus)*

(2) a cabinet minister in Pinochet Dictatorship ;

(3) an air force officer during President Pinochet's Military rule ;

(4) a political prisoner during Pinochet Dictatorhip.

Ans. (4)

Sol. Before being appointed as Defence Minister, Michelle Bachelet was a political prisoner during the dictatorship of Pinochet.

SOLUTIONS
NATIONAL TALENT SEARCH EXAMINATION 2021 STAGE-2
SCHOLASTIC APTITUDE TEST (SAT) (DATE : 24-10-21)

66. Freedom means absence of constraints. Practical life it means absence of interference in our affairs by other - be it other individuals or the government. Under the Indian Constitution citizens do not have one of the following freedoms.

(1) Freedom of speech and expression;

(2) Freedom to move freely throughout the country

(3) Freedom of assembly in a peaceful manner

(4) Freedom to acquire, hold and dispose any property anywhere in the country

Ans. (4)

Sol. Under the Indian Constitution, the citizens do not have the freedom to acquire, hold and dispose any property anywhere in the country.

67. There are serious challenges that democracy faces throughout the world. Given below are some of the major challenges in Group -I and the respective implications in Group-II in a jumbled up manner. Correctly match the challenges and their implications.

Group - I	*Group - II*
A. Foundational challenge	E. Strengthening of the institutions
B. Challenge of expansion	F. Free and fair election
C. Challenge of deepening of democracy	G. Establishing a sovereign and functional state
D. Procedural challenges	H. Ensuring greater power to local government

(1) (A-E), (B-F), (C-G), (D-H) (2) (A-G), (B-H), (C-E), (D-F)

(3) (A-H), (B-G), (C-F), (D-E) (4) (A-F), (B-G), (C-E), (D-H)

Ans. (2)

Sol.

A. Foundational challenge	-	Establishing a sovereign and functional state
B. Challenge of expansion	-	Ensuring greater power to local government
C. Challenge of deepening of democracy	-	Strengthening of the institutions
D. Procedural challenges	-	Free and fair election

68. Constitution is the supreme law that determines the relationship among people living in a territory (Called citizens) and also the relationship between the people and government. Which of the following statement is correct?

(1) It lays down limits on the powers of the government and tells us what the rights of the citizens are

(2) It generates a degree of conflict and diversity that is necessary for different kind of people to live together

(3) It does not specify formation of the government and decision making process

(4) It will not provide an opportunity to express the aspiration of the people about creating a good society

Ans. (1)

SOLUTIONS
NATIONAL TALENT SEARCH EXAMINATION 2021 STAGE-2
SCHOLASTIC APTITUDE TEST (SAT) (DATE : 24-10-21)

Sol. The Constitution of India lays down limits on the powers of the government and tells us what the rights of the citizens are.

69. Hannah is attaining the voting age and is happy that she can vote. In her country, citizens can elect representatives but cannot share any observations about the leader of the country. Which of the following democratic right is restricted for Hannah?

(1) Right to equality (2) Right to be treated fairly

(3) Right to freedom (4) Right to information

Ans. (3)

Sol. The Right to Freedom of Hannah is restricted.

70. Which of the following sets of items are included in the Concurrent List of the Indian Constitution?

A. Forest, trade unions, marriage, adoption and succession;

B. Foreign affairs, banking, communications and currency;

C. Census, railways and space research;

D. Population control, labour welfare and protection of wild animals

(1) A and B (2) A and C (3) A and D (4) B and D

Ans. (3)

Sol. Under the Concurrent List of the Indian Constitution, only (A) and (D) are included.

71. A family of four members in Delhi was settled in a slum and earning enough income to lead a subsistence life. They were migrants from a Bihar village in search of employment. During to COVID lockdown, they managed to be in Delhi with the support of Philanthropists and local government. However, they decided to go back to Bihar. They had enough money to buy food for another 10 days. The family decided to travel to Bihar by walk or through whatever transport service they could get. During that travel the family had to stop in various towns and villages for food and shelter. The family could not get enough food in most of the places because

(a) restaurants were closed, (b) in some places the distribution of food was made only for the local residents, (c) after nearly 10 days of travel, the family did not have enough money to pay for food. How do you classify these reasons as food insecurity?

(1) (a) inaccessibility, (b) non-availability, (c) non-affordability

(2) (a) non-affordability , (b) non - availability, (c) inaccessibility

(3) (a) non-availability, (b) inaccessibility, (c) non-affordability

(4) (a) non-availability, (b) non-affordability, (c) inaccessibility

Ans. (3)

Sol. The given condition in the question refers to (a) non-availability, (b) inaccessibility, (c) non-affordability.

SOLUTIONS
NATIONAL TALENT SEARCH EXAMINATION 2021 STAGE-2
SCHOLASTIC APTITUDE TEST (SAT) (DATE : 24-10-21)

72. I purchased gold jewellery weighing 8 grams from a jeweller. He offered to reduce GST on the jewel it I did not insist of a bill and that I should pay in cash. I agreed. After one year, when I wanted to sell the jewel, at that time, I found that the jewel was not made of 22 carat gold. Which of the following conclusions are correct?

A. I have no proof of purchase; hence I may not get my grievance addressed.
B. My statement that I purchased the jewel from a particular seller is enough to get my grievance addressed in a consumer court.
C. I should not have avoided payment of GST and I should have insisted on getting a bill
D. I have facilitated the jeweller to indulge in a series of tax avoidance such as non-payment of input tax and income tax.

(1) A, B and C (2) A, C and D (3) B and D only (4) A and B only

Ans. (2)

Sol. From the given condition in the question, (A), (C) and (D) are correct. Based on concept.

73. We have given some effects of globalization on developing countries. Classify the positive effects.

(a) Consumers have more choice of commodities, as imports from other countries are easy to access.
(b) Access to foreign direct investment increases economic activities in sectors wherein the investment flows.
(c) The unrestricted exposure to western culture is a threat to maintain our cultural objects.
(d) The native cultures and cuisines are taken to other parts of the world, so our culture spreads to other countries easily
(e) We have easy access to foreign markets to market our products.
(f) Cheap labour in developing countries attracts foreign companies to start production in developing countries.
(g) Some domestic industries are adversely affected as they could not meet the competition from foreign companies and imported products.

(1) (c), (d), (e), (g) (2) (a), (b), (g), (c) (3) (a), (c), (d), (e), (f) (4) (a), (b), (d), (e), (f)

Ans. (4)

Sol. The positive effects of globalisation are classified in statement (a), (b), (d), (e) and (f).

74. There are two statements given below market as Assertion (A) and Reason (R). Read the statements and choose the correct option.

Assertion (A): Terms of credit vary substantially from one credit arrangement to another.
Reasoning (R): Terms of credit vary depending on the nature of lender and the borrower.

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

Ans. (1)

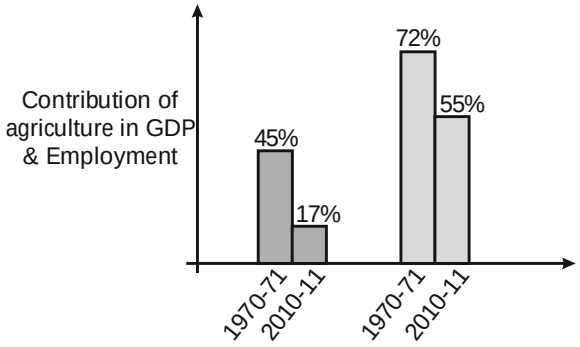
Sol. Both (A) and (R) are true and (R) is the correct explanations of (A).

SOLUTIONS

NATIONAL TALENT SEARCH EXAMINATION 2021 STAGE-2

SCHOLASTIC APTITUDE TEST (SAT) (DATE : 24-10-21)

75.



The above graph shows falling share of agricultural sector towards both GDP and employment. Which one is the correct alternative?

(1) Fall in productivity of the agricultural workers

(2) Rise in Productivity of the agricultural workers

(3) No change in productivity of the agricultural workers

(4) None of the above

Ans. *(1)*

Sol. According to the given graph in the question, only option (1) is correct alternative.

76. Sustainable development can be promoted if :

(1) Rate of extraction of renewable resources is less than rate of its regeneration

(2) Rate of extraction of non-renewable resources is less than rate of creation of its substitutes.

(3) Rate of extraction of renewable resource is less than rate of extraction of non-renewable resources

(4) Rate of extraction of all resources is less than rate of its regeneration and creation

Ans. *(4)*

Sol. Sustainable development can be promoted if rate of extraction of all resources is less than rate of its regeneration and creation.

77. Arrange the following persons in terms of ascending order of vulnerability to poverty that is from the least vulnerable to the most vulnerable.

(a) Rahul completed 8th standard, and is working as a bus driver in private bus transport company with proper employment order and labour security cover.

(b) Rithish is graduate and a musician. He earns living through concert in larger towns and cities all over the country.

(c) Ramu is an illiterate and agricultural labourer in a village with only dry lands.

(d) Ramesh can read and write and he is a construction worker employed on daily wage basis by a contractor in a big town.

(1) Rahul, Ramu, Ramesh, Rithish

(2) Rithish, Rahul, Ramesh, Ramu

(3) Ramu, Ramesh, Rahul, Rithish

(4) Ramu, Ramesh, Rithish, Rahul

SOLUTIONS

NATIONAL TALENT SEARCH EXAMINATION 2021 STAGE-2

SCHOLASTIC APTITUDE TEST (SAT) (DATE : 24-10-21)

Ans. (2)

Sol. In terms of ascending order of vulnerability to poverty, the correct sequence is Rithish, Rahul, Ramesh, Ramu .

78. A carpenter has a workshop near a market place in a small town. He employed two persons A and B on a daily wage. The carpenter is not happy with these two workers. A is irregular, mostly either he comes late or goes home early for some reason, but completes his assigned jobs on time. B is regular but takes double the time as A to complete the job. The carpenter pays same daily wage rate to both. Which of the following suggestion you would recommend to be carpenter?

(1) Let the carpenter pay the worker based on the price job

(2) Let the carpenter pay on the basis of hours of work so that he can make person A more regular

(3) Let the carpenter pay only half the salary to person B as he is not as efficient as person A

(4) Let the carpenter suspend person B and keep person A

Ans. (1)

Sol. I would recommend the carpenter to pay the worker based on the piece job.

79. In a farmer's household in West Bengal, all the adult members were involved in the activities of the household's own farm. The household could earn enough of income to lead a life with basic necessities of life and a little savings to meet emergency expenditures. Last year, the eldest son, aged 40 years, was bed - ridden for almost a year due to a serious illness. Hence he could not participate in the household's farming activities. However, the income of the household from agriculture did not decline. How do you call generally the employment of the eldest son on the household's farm:

(1) Seasonal - unemployment (2) Under - employment

(3) Disguised unemployment (4) Gainful employment

Ans. (3)

Sol. The above condition in the question is related to disguised unemployment.

80. When a mobile service customer wants to port out from operator X to operator Y and the former denies permission, then which right is violated ?

(1) Right to safety (2) Right to choose (3) Right to inform (4) Right to seek redressal

Ans. (2)

Sol. For a mobile service customer, the right to choose is violated.

SOLUTIONS
NATIONAL TALENT SEARCH EXAMINATION 2021 STAGE-2
SCHOLASTIC APTITUDE TEST (SAT) (DATE : 24-10-21)

81. Chhattisgarh shares boundaries with six states of India. Which one of the following is correct sequence of the bordering states in clock wise direction starting from Jharkhand ?
(1) Jharkhand - Odisha - Telangana - Andhra Pradesh - Maharashtra - Madhya Pradesh
(2) Jharkhand - Bihar - Madhya Pradesh - Maharashtra - Odisha - Telangana
(3) Jharkhand - Odisha - Andhra Pradesh - Telangana - Maharashtra - Madhya Pradesh
(4) Jharkhand - Odisha - Telangana - Maharashtra - Madhya Pradesh - Uttar Pradesh

Ans. (3)

Sol. As per clock wise direction, the correct sequence of bordering states for Chhattisgarh is Jharkhand - Odisha - Andhra Pradesh - Telangana - Maharashtra - Madhya Pradesh.

82. If you are travelling along 80°E longitude from Uttar Pradesh to Tamil Nadu. You will come across many river basins on your way which one of following is the proper sequence of river basins?
(1) Ganga - Narmada - Mahanadi - Godavari - Krishna - Palar
(2) Ganga - Mahanadi - Narmada - Godavari - Kaveri - Penneru
(3) Ganga - Narmada - Mahanadi - Krishna - Penneru - Palar
(4) Ganga - Narmada - Godavari - Krishna - Penneru - Palar

Ans. (4)

Sol. From Uttar Pradesh to Tamil Nadu, the proper sequence of river basins is Ganga - Narmada - Godavari - Krishna - Penneru - Palar.

83. Which one of the following is NOT true about understanding the Indian Monsoon ?
(1) Low pressure over the Indian land mass and relatively high pressure over the sea
(2) Shift of Monsoon trough during summer
(3) Formation of high pressure over Tibetan Plateau
(4) The presence of easterly jet stream over Indian Peninsula

Ans. (3)

Sol. For understanding the Indian Monsoon, formation of high pressure over Tibetan Plateau is incorrect.

84. Cement industry uses raw materials like limestone, coal and gypsum. Which one of the following states provides suitable environment due to availability of these raw materials along with sufficient electricity for the production of cement ?
(1) Mizoram (2) Meghalaya (3) Manipur (4) Nagaland

Ans. (2)

Sol. Meghalaya has the suitable environment due to availability of limestone, coal and gypsum along with sufficient electricity for the production of cement.

SOLUTIONS
NATIONAL TALENT SEARCH EXAMINATION 2021 STAGE-2
SCHOLASTIC APTITUDE TEST (SAT) (DATE : 24-10-21)

85. Red the given statements and select the correct answer.

Statement 1 : Laterite soils are formed under the environmental condition of high temperature and heavy rainfall.

Statement 2 : Intense leaching results into loss of humus content and lesser presence of micro-organisms in the soil.

(1) Statement 1 is true, statement 2 is false.

(2) Statement 1 is false, statement 2 is true.

(3) Both statements are true and statement 1 provides explanations for statement 2.

(4) Both statements are true and statement 1 does not provide explanations for statement 2.

Ans. (3)

Sol. Both statements are true and statement 1 provides explanations for statement 2.

86. Which of the following is *NOT* true about sea ports of India?

(1) Vishakhapatnam is the deepest land locked and well developed port.

(2) Chennai is an inland riverine port

(3) Mumbai is the biggest port with spacious natural and well developed harbour.

(4) Tuticorin port in Tamil Nadu has a natural harbour and rich hinterland

Ans. (2)

Sol. Only option (2) is incorrect regarding sea ports of India.

87. If the opening time for the central school in India is 7:30 am IST, what will be local time at Ziro 94° East Longitude and Sihor at 72° East Longitude, respectively.

(1) 8:26 am– 6:54 am (2) 8:20 am– 6:50 am

(3) 8:16 am– 6:48 am (4) 8:10 am– 6:40 am

Ans. (3)

Sol. $94 - 82^{1/2} = 11^{1/2}$.

$11^{1/2} = \frac{23}{2} \times 4 = 46$

7 : 30 + 46 mins. = 8 : 16 am.

Similarly after calculation the local time of Sihor is 6 : 48 am. (Based on the same calculation).

88. Read the given statements and select the correct answer :

Statement 1 : Expansion of railways, plantation agriculture, commercial and scientific forestry and mining activities were largely responsible for the depletion of forests and wildlife during colonial period.

Statement 2 : Unequal access, inequitable, consumption of resources and differential sharing of responsibilities for environmental wellbeing are the cause for the depletion of biodiversity.

SOLUTIONS

NATIONAL TALENT SEARCH EXAMINATION 2021 STAGE-2

SCHOLASTIC APTITUDE TEST (SAT) (DATE : 24-10-21)

1. Staement 1 is true, statement 2 is false.
2. Statement 1 is false, statement 2 is true.
3. Both statemetns are true and statement 2,provide explanation for statement 1.
4. Both statement are True and statement 2 does not provide explanation for statement 1.

Ans. (4)

Sol. Both statement are True and statement 2 does not provide explanation for statement 1.

89. What is common factor among Wular Lake, Harike, Sambhar Lake and Keibul Lamjao?

(1) Wild life sanctuary (2) Wetlands

(3) National Park (4) Biosphere reserves

Ans. (2)

Sol. The common factor among Wular Lake, Harike, Sambhar Lake and Keibul Lamjao is wetlands.

90. Column-I in the following table indicates the states of India and Column-II the sex ratio (female/per 1000 males) inthe 2011 census. Which one of the following is proper combination?

Column I	*Column II*
(States)	*Sex Ratio 2011*
A. Tamil Nadu	1. 950
B. West Bengal	2. 931
C. Maharashtra	3. 996
D. Madhya Pradesh	4. 929

(1) A2, B4, C1, D3 (2) A1, B3, C2, D4 (3) A4, B2, C3, D1 (4) A3, B1, C4, D2

Ans. (4)

Sol. A. Tamil Nadu - 996
B. West Bengal - 950
C. Maharashtra - 929
D. Madhya Pradesh - 931

91. Which of the following changes were brought about by the Bolsheviks immediately after the October Revolution?

I. Most industries and banks were nationalized in November 1917

II. Land was declared social property and peasants were allowed to seize the land of the nobility.

III. In villages, Bolsheviks enforced the integration of large houses with no regard for family requirement.

IV. New uniforms were designed for the army and officials.

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

Ans. (4)

Sol. Statements (I), (II) and (IV) were the changes brought about by the Bolsheviks immediately after the October Revolution.

SOLUTIONS
NATIONAL TALENT SEARCH EXAMINATION 2021 STAGE-2
SCHOLASTIC APTITUDE TEST (SAT) (DATE : 24-10-21)

92. Which of the following statements is incorrect about the portrayal of Marianne and Germania?

I. France's female allegory, Marianne, underlined the idea of a people's nation

II. Marianne's characteristics were drawn from those of Liberty and the Republic-the red cap, the tricolour, the cockade,

III. Germania became the allegory of the German nation.

IV. Germania wears a dress of oak leaves, as these leaves stand for peace.

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

Ans. (4)

Sol. Statement - (IV) is incorrect about the portrayal of Marianne and Germania.

93. From the following, identify the correct statement relating to indentured labour migration from India.

I. In the nineteenth century, thousands of Indian labourers went to work in plantations, mines, and road and railway construction projects around the world.

II. Most of the indentured labour came from present day regions of northern and western India such as Punjab, Haryana, Gujarat and Rajasthan.

IIII. The Indentured network which has often been described as a 'new system of slavery' for the labourers found the most pathetic and terrible conditions of living and working on their arrival in places like the Caribbean Islands, Mauritius, Fiji, Ceylon, and Malaya.

IV. Some indentured labourers found innovative ways of expressing themselves by blending their own cultural ethos with that of the new place.

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

Ans. (3)

Sol. Relating to indentured labour migration from India, statement I, III and IV are correct.

94. Which of the following statements about the lives of workers in early nineteenth century England are true?

I. Not all of them had access to jobs in the city as urban employment still depended on social and familiar connections.

II. Work was largely seasonal which meant the poor had to return to the streets or to the coutryside, whenever the busy season was over.

III. They welcomed the introduction of new technology such as the Spinning Jenny as they thought that their work would become easier with the new device.

IV. Even as daily wages increased the impact was mitigated on account of small number of days for which most of them were employed

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

Ans. (4)

Sol. Regarding the lives of workers in early nineteenth century England, statements I, II and IV are correct.

SOLUTIONS
NATIONAL TALENT SEARCH EXAMINATION 2021 STAGE-2
SCHOLASTIC APTITUDE TEST (SAT) (DATE : 24-10-21)

95. With regard to the relationship between print culture and the French Revolution, which of the following statements are true?

I. Print culture caused the ideas of the Enlightenment-reason and rationality– to reach a large number of people which weakened the authority of the Church and the power of the state.

II. By the 1780s, there was an outpouring of literature that mocked the royalty and criticized their morality

III. Print created a new culture of dialogue and debate that made people re-evaluate their long-held views, beliefs and assumptions.

IV. Print culture spread in a ways that it did not at all become the means for the expression of monarchical and Church propaganda.

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

Ans. (2)

Sol. With regard to the relationship between print culture and the French Revolution, statement I, II and III are correct.

96. Which of the following were associated with the Non-cooperation Movement?

I. It was the first movement started by Mahatma Gandhi

II. Indian institutions were created to replace British administration

III. It called for total boycott of all arms of British administration by the Indians.

IV. Khilafat movement also began with this movement.

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

Ans. (BONUS)

Sol. None of the given options are correct.

97. *Assertion (A)* : Civil Disobedience Movement could not get the support of all sections of the society.
Reason (R) 'Untouchables' were not moved by the concept of Swaraj

(1) A is true, R is false

(2) A is false, R is true

(3) Both A and R are true, but R is not the correct explanation of A.

(4) Both A and R are true, and R is the correct explanation of A.

Ans. (4)

Sol. Both A and R are true, and R is the correct explanation of A.

98. The first world war was an unusual war because :

I. It involved the world's leading industrial nations.

II. Weapons of mass destruction were used at a large scale.

III. British policies were responsible for the outbreak of the war.

IV. The world was divided into two power blocks.

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

Ans. (4)

SOLUTIONS
NATIONAL TALENT SEARCH EXAMINATION 2021 STAGE-2
SCHOLASTIC APTITUDE TEST (SAT) (DATE : 24-10-21)

Sol. The first world war was an unusual war because it involved the world's leading industrial nations; weapons of mass destruction were used at a large scale; and the world was divided into two power blocks.

99. The concept of 'Lebensraum' propounded by Nazism was related to :

I. Enunciation of the principle of social superiority of the Aryans.

II. Throwing away of the undesirable children out of schools.

III. Treating mothers as the most important citizens.

IV. Acquiring new territories to enhance the area of the mother country

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

Ans. (4)

Sol. The concept of 'Lebensraum' propounded by Nazism was related to acquiring new territories to enhance the area of the mother country.

100. Which of the following statements related to the ideas of Liberalism in nineteenth century Europe are correct

I. Freedom for the individual and equality of all before the law.

II. Concept of Government by consent

III. Universal suffrage.

IV. Freedom of markets

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

Ans. (2)

Sol. According to the ideas of Liberalism in nineteenth century Europe, I, II and IV are correct.

* * * * * * *