# NATIONAL TALENT SEARCH EXAMINATION (NTSE-2020) STAGE -1

## STATE : TELANGANA PAPER : SAT

**Date: 03/11/2019**

**Max. Marks: 100** **SOLUTIONS** **Time allowed: 120 mins**

### *PHYSICS*

**1.** The speed of light in diamond is 1,24,000 km/sec. If the speed of light in air is 3,00,000 km/sec, then the refractive index of diamond will be .....

(1) 1.49 (2) 2.42 (3) 2.25 (4) None

**Ans. (2)**

**Sol.** $n=\frac{c}{v}=\frac{300000}{124000}=2.42$

**2.** Which of the following is Snell's law?

(1) $n_1 \sin i=\frac{\sin r}{n_2}$ (2) $\frac{n_1}{n_2}=\frac{\sin r}{\sin i}$ (3) $\frac{n_2}{n_1}=\frac{\sin r}{\sin i}$ (4) $n_2 \sin i$ = constant

**Ans. (2)**

**Sol.** $\frac{\sin i}{\sin r}=\frac{n_2}{n_1}$

**3.** A car moves with constant speed of 10 m/s in a circular path of radius 10m. If the mass of the car is 1000 kg, then the centripetal force for the car is .....

(1) $10^4$N (2) $10^6$ N (3) $10^5$ N (4) None

**Ans. (1)**

**Sol.** v = 10 m/s

r = 10 m

m = 1000 kg

$f=\frac{mv^2}{r}=\frac{1000\times100}{10}=10^4 N$

**4.** Two spherical balls of mass 10 kg each are placed with their centres 10 cm apart, then the gravitational force of attraction between them -

(1) $G\times10^2$ N (2) $G\times10^4$ N (3) $G\times10^6$N (4) None

**Ans. (2)**

**Sol.** $F=\frac{G\times10\times10}{10^{-2}}=G\times10^4 N$

**5.** If the acceleration of a moving object is constant, then the motion is said to be -

(1) Constant speed (2) Uniform acceleration

(3) Uniform velocity (4) Instantaneousn velocity

**Ans. (2)**

**Sol.** Uniform acceleration

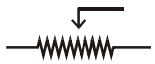
**6.** Which of the following converts Mechanical energy into Electrical energy?

(1) Motor (2) Battery (3) Generator (4) Switch

**Ans. (3)**

**Sol.** Generator converts mechanical energy into electrical energy.

**7.** Symbol for resistance

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

**Ans. (3)**

**Sol.** Option 3 is symbol of resistance.

**8.** If the bulb have 100 W and 220 V, then the resistance of the bulb is ....

(1) 284 Ω (2) 384 Ω (3) 484 Ω (4) None

**Ans. (3)**

**Sol.** $R = \frac{V^2}{P} = \frac{220 \times 220}{100} = 484\Omega$

**9.** If the focal length is +ve, then the lens is ....

(1) Concave (2) Convex (3) Plane (4) None

**Ans. (2)**

**Sol.** Convex lens has positive focal length.

**10.** Size of image formed by a convex mirror is always .....

(1) enlarged (2) diminished

(3) equal to the size of the object (4) None

**Ans. (2)**

**Sol.** Convex mirror forms diminished image.

**11.** The energy possessed by a body by virtue of its motion is called

(1) Potential energy (2) Kinetic energy (3) Gravitational energy (4) None

**Ans. (2)**

**Sol.** Kinetic energy is the energy possessed by a body by virtue of its motion.

**12.** S.I. unit of work

(1) N-m (2) Kg-m (3) N/m (4) $N\text{-}m^2$

**Ans. (1)**

**Sol.** Unit of work is N-m.

**13.** A boy pushes a book kept on a table by applying a force of 4.5 N. Find the work done by the force, if the book is displaced through 30 cm along the direction of push.

(1) 1.10 J (2) 1.25 J (3) 1.35 J (4) None

**Ans. (3)**

**Sol.** F = 4.5 N

s = 30 cm =0.30 m

W = F.s =4.5 x 0.30 = 1.35 J

## *CHEMISTRY*

**14.** Calculate the concentration in terms of mass by volume percentage of the solution containing 2.5 g Potassium chloride in 50 ml of KCl solution.

(1) 2% (2) 10% (3) 4% (4) 5%

**Ans. (4)**

**Sol.** Concentration (m/v) % = $\frac{\text{Mass of solute}}{\text{Volume of solution}} \times 100$

$= \frac{2.5}{50} \times 100$

$= 5\ \%$

**15.** If the quantity of solute is more in a solution is said to be

(1) Saturated solution (2) Dilute solution (3) Concentrated solution (4) Unsaturated solution

**Ans. (3)**

**Sol.** If the quantity of solute is more in a solution, then the solution is said to be concentrated solution.

**16.** A solution turns red litmus blue, its pH is likely to be -

(1) 1 (2) 4 (3) 5 (4) 10

**Ans. (4)**

**Sol.** Since pH = 10, it is basic in nature and hence turns red litmus blue.

**17.** The quantum number which explains about size and energy of the orbit or shell is-

(1) n (2) l (3) $m_l$ (4) $m_s$

**Ans. (1)**

**Sol.** Principle quantum number (n) explains about the size and energy of the shell.

**18.** Number of elements present in period-2 of the long form of periodic table.

(1) 2 (2) 8 (3) 18 (4) 32

**Ans. (2)**

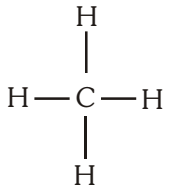
**Sol.** Period 2 comprises of 8 elements that is Li, Be, B, C, N, O, F and Ne.

**19.** Number of covalent bonds in Methane molecule

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

**Ans. (4)**

**Sol.** Methane consists of 4 covalent bonds.



**20.** Chemical formula for Calcium sulphate hemihydrate is -

(1) $CaSO_4$ (2) $CaSO_4.2H_2O$ (3) $CaSO_4.\frac{1}{2}H_2O$ (4) None

**Ans. (3)**

**Sol.** $CaSO_4.\ 2H_2O \xrightarrow[\text{Heat}]{373\ K} CaSO_{4.}\ \frac{1}{2}H_2O + \frac{3}{2}H_2O$

(Gypsum) (Plaster of paris)

**21.** Law of conservation of mass was proposed by -

(1) Lavoisier (2) Proust (3) Dalton (4) None

**Ans. (1)**

**Sol.** Lavoisier stated the law of conservation of mass.

**22.** Valency of Aluminium is -

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

**Ans. (3)**

**Sol.** Al belong to group 13 and Period 3. Its electronic configuration is 2,8,3. Hence its valency is 3.

**23.** The sum of the number of Protons and Neutrons in an atom is known as its -

(1) Mass number (2) Atomic number (3) Valency (4) None

**Ans. (1)**

**Sol.** Mass number = Number of protons + Number of neutrons

**24.** The valency of Neon is -

(1) 2 (2) 6 (3) 2 and 6 (4) 0

**Ans. (4)**

**Sol.** Neon is noble gas, hence it's valency is zero.

**25.** Latent heat of Vapourisation of water-

(1) 540 (2) 90 (3) 80 (4) 100

**Ans. (1)**

**Sol.** Latent heat of vaporisation of water is 540 cal/g.

**26.** Bleaching powder is represented by formula -

(1) $NaHCO_3$ (2) $Na_2CO_3$ (3) $CaOCl_2$ (4) None

**Ans. (3)**

**Sol.** $CaOCl_2$ is often named as bleaching powder.

## *BIOLOGY*

**27.** There is a very yellow dust which comes away on fingers whenever we touch the middle of the flower. These tiny yellow grains are one of the most precious substances in nature because they contain the secret of plant life. What is the dust called?

(1) Pollen (2) Sperm (3) Spore (4) Sporocyst

**Ans. (1)**

**Sol.** The tiny yellow grains which are precious substance in nature is pollen grains, which are act as male gamete in pollination.

**28.** Preparation of soil helps the soil to turn and loosen. This turning and loosening of soil is necessary as -

(1) The loose soil helps roots to breathe easily

(2) The loose soil helps in the growth of earthworms and microbes present in the soil

(3) Nutrients held in the dead organisms are released back to the soil

(4) All the above

**Ans. (4)**

**Sol.** It also called tilting & ploughing of soil,which helps in better breathing of roots with growth of earthworm & microbes which add humus to the soil & increase soil fertility.

**29.** The species of plant or animal which is found exclusively in particular area and is not found naturally anywhere else is known as -

(1) Endemic species (2) Epidemic species (3) Endomorphic species (4) Entomorphic species

**Ans. (1)**

**Sol.** Species can be endemic to large or small areas of the world,some may be endemic to the particular continent,some are endemic to part of a continent & others to a single island.

**30.** Chipko movement (1974) was started in .....

(1) Chamoli district of Uttarakhand (2) Jabalpur district of Madhya Pradesh

(3) Jorhat district of Assam (4) Kannur district of Kerala

**Ans. (1)**

**Sol.** It was started in mandal village of Chamoli district of Uttarakhand.

**31.** Which of the following matches is incorrect?

| | Organelle | Presence |
|---|---|---|
| (1) | Ribosome | Plant and Animal cell. |
| (2) | Mitochondria | Animal cell only |
| (3) | Chloroplast | Plant cell only. |
| (4) | All of the above | |

**Ans. (2)**

**Sol.** Because mitochondria is present in both plant and animal cell.

**32.** Which of the following is incorrect about Dolly, the clone?

(1) It was cloned by Ian Wilmut and his colleagues

(2) During the process of its cloning, the cell was collected from the udder of a female Finn Dorset sheep

(3) It died its natural death

(4) It was given birth by the Scottish Blackface ewe

**Ans. (3)**

**Sol.** Dolly sheep died on 14th feb.2003 due to lung disease & severe arthritis.

**33.** Read the given statements and select the correct option.

Statement - I : In humans, the gamete contributed by the male determines whether the child produced will be the male or female.

Statement - II : Sex in humans is dependant on the X-chromosome or Y-chromosome of the father.

(1) Both Statements - I and II are true and Statement - II is the correct Explanation of statement - I

(2) Both Statements - I and II are true, Statement - II is not the correct explanation of Statement - I.

(3) Statement - I is true and Statement - II is false.

(4) Both Statements - I and II are false.

**Ans. (1)**

**Sol.** Sex in human is determined by sex chromosome of the male.(male X chromosome × female X chromosome=XX) (male Y chromosome × female X chromosome=XY) In human Y chromosome is male determining factor.

**34.** Why will marine organisms be affected, when there is an oil spillage at Sea ?

(1) There will be a shortage of light and heat in the water.

(2) There will be a shortage of Oxygen and excessive heat will be trapped in the water.

(3) There will be a shortage of Oxygen and the chemicals in the oil will affect marine organisms.

(4) All the above are the correct reasons.

**Ans. (4)**

**Sol.** Oil spillage on sea water will severly damage the marine life by forming a thick layer of oil on water which causes shortage of light and oxygen, and heat exchange does not take place.

**35.** Which of the following describes Moulting?

(1) The Resting stage in the cycle of a Silkworm.

(2) Change in appearance during the different stages in the life cycle of a Silkworm.

(3) Spinning of Cocoon.

(4) Casting off old skin.

**Ans. (4)**

**Sol.** Moulting is a process in which an insect routinely cast off outer skin of its body. It is under the control of hormone "ecdysone".

**36.** Match column - I with column - II and select the correct option from the codes given below.

| Column - I | Column - II |
|---|---|
| (A) Ribosomes | (i) Jelly like substance |
| (B) Lysosomes | (ii) Powerhouse of the Cell |
| (C) Endoplasmic Reticulum | (iii) Site of Protein synthesis |
| (D) Cytoplasm | (iv) Transporting Tubules |
| (E) Mitochondria | (v) Suicide Bags |

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

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

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

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

**Ans. (1)**

**Sol.**

| Column - I | Column - II |
|---|---|
| (A) Ribosomes | (iii) Site of Protein synthesis |
| (B) Lysosomes | (v) Suicide Bags |
| (C) Endoplasmic Reticulum | (iv) Transporting Tubules |
| (D) Cytoplasm | (i) Jelly like substance |
| (E) Mitochondria | (ii) Powerhouse of the Cell |

**37.** Which of the following is incorrect match ?

(1) Alexander Fleming - Penicillin.
(2) Louis Pasteur - Fermentation.
(3) Edward Jenner - Vaccination
(4) Karl Landsteiner-Tissue Culture.

**Ans. (4)**

**Sol.** Karl landsteiner is known for his work on ABO blood grouping system.

**38.** Select the incorrect statement regarding AIDS. ,

(1) It is an immuno-deficiency disease.
(2) HIV virus has RNA as its genetic material.
(3) HIV positive mother can give birth to HIV positive baby.
(4) The time lag between the infection and appearance of AIDS symptoms may vary from week to month.

**Ans. (4)**

**Sol.** The time lag between the infection and appearance of AIDS symptoms take long time( in years).

**39.** Air pollutants are harmful to living things.Which of the following is/are their harmful effects?

(i) This forms acid rain
(ii) They cause breathing problems in animals.
(iii) They cause interface with photosynthesis in plants.
(iv) They cause diseases in the respiratory system of man and animal
(1) (i) only
(2) (i) and (ii) only
(3) (i),(ii) and (iii)
(4) (i),(ii) ,(iii) and (iv)

**Ans. (4)**

**Sol.** It cause acid rain,breathing problems in animals by damaging respiratory system & interface photosynthesis in plants.

**40.** Match the following

| | |
|---|---|
| (A) Oviparous | (i) Tadpole of adult |
| (B) Metamorphosis | (ii) Birds |
| (C) Embryo | (iii) Fertilization outside the body |
| (D) External Fertilization | (iv) Developed Zygote |

(1) A-(ii) ,B-(i), C-(iv), D-(iii)
(2) A-(iv) ,B-(iii),C-(ii), D-(i)
(3) A-(i) , B-(ii), C-(iii), D-(iv)
(4) A-(iii) ,B-(ii), C-(iv), D-(i)

**Ans. (1)**

**Sol.**

| | |
|---|---|
| (A) Oviparous | (ii) Birds |
| (B) Metamorphosis | (i) Tadpole of adult |
| (C) Embryo | (iv) Developed Zygote |
| (D) External Fertilization | (iii) Fertilization outside the body |

## *MATHEMATICS*

**41.** The value of 'x' satisfying the equation
$5^2.5^4.5^6..... 5^{2x} = (0.04)^{-28}$ is .....
(1) 5 (2) 10 (3) 8 (4) 7

**Ans. (4)**

**Sol.** $5^2.5^4.5^6..... 5^{2x} = (0.04)^{-28}$

$$5^{2+4+6+.....+2x} = \left(\frac{4}{100}\right)^{-28}$$

$5^{2(1+2+3+.....+x)} = (5^{-2})^{-28}$
$5^{2(1+2+3+.....+x)} = (5^2)^{28}$
By comparing the power

$\Rightarrow 1 + 2 + 3 + ... x = 28$ $\quad [1 + 2 + 3 .... n = \frac{n(n+1)}{2}]$

$\Rightarrow \boxed{x = 7}$

**42.** The value of $\text{cosec}(75 + \theta) - \sec(15 - \theta) - \tan(55 + \theta) + \cot(35 - \theta)$

(1) –1 (2) 0 (3) 1 (4) $\frac{3}{2}$

**Ans. (2)**

**Sol.** $\text{cosec}\,(75^\circ + \theta) - \sec(15^\circ - \theta) - \tan(55^\circ + \theta) + \cot(35^\circ - \theta)$
$\text{cosec}\,(75^\circ + \theta) = \sec\,[90^\circ - (75^\circ + \theta)]$
$\text{cosec}\,(75^\circ + \theta) = \sec\,(15^\circ - \theta)$
Also, $\cot\,(35^\circ - \theta) = \tan\,[90^\circ - (35^\circ - \theta)]$
$\cot\,(35^\circ - \theta) = \tan\,(55^\circ + \theta)$
$\text{cosec}\,(75^\circ + \theta) - \sec\,(15^\circ - \theta) - \tan\,(55^\circ + \theta) + \cot\,(35^\circ - \theta) = 0$

**43.** The average age of three girls is 15 years. If their ages are in the ratio 3 : 5 : 7, then the age of the youngest girl among them is ....
(1) 12 years (2) 10 years (3) 9 years (4) 8 years

**Ans. (3)**

**Sol.** Let age of Girl (1) = 3x
age of Girl (2) = 5x
age of Girl (3) = 7x

$$\Rightarrow \bar{x} = 15 = \frac{3x + 5x + 7x}{3}$$

$\Rightarrow 45 = 15x$
$\Rightarrow x = 3$
age of yougest girl
$\Rightarrow 3x = 9$ years

**44.** If $a + b + c = 0$, $a^2 + b^2 + c^2 = 10$, then the value of $a^4 + b^4 + c^4$ is .....

(1) 50 (2) 25 (3) 75 (4) 100

**Ans. (1)**

**Sol.** $a + b + c = 0$, $a^2 + b^2 + c^2 = 10$

$(a + b + c)^2 = a^2 + b^2 + c^2 + 2(ab + bc + ca)$

$0 = 10 + 2(ab + bc + ca)$

$\Rightarrow (ab + bc + ca) = -5$

$(ab + bc + ca)^2 = (-5)^2$

$\Rightarrow a^2b^2 + b^2c^2 + c^2a^2 + 2ab^2c + 2abc^2 + 2a^2bc = 25$

$\Rightarrow a^2b^2 + b^2c^2 + c^2a^2 + 2abc\,(b + c + a) = 25$

$\Rightarrow a^2b^2 + b^2c^2 + c^2a^2 = 25$

$\Rightarrow (a^2 + b^2 + c^2)^2 = a^4 + b^4 + c^4 + 2(a^2b^2 + b^2c^2 + c^2a^2) = (10)^2$

$\Rightarrow a^4 + b^4 + c^4 + 2\,(25) = 100$

$\Rightarrow a^4 + b^4 + c^4 = 100 - 50$

$\Rightarrow a^4 + b^4 + c^4 = 50$

**45.** A ball of diameter 13 cm is floating in a pond. If the top of the ball is 4 cm above the surface of the pond, then the radius of the circle formed by the contract of water surface with the ball is ....

(1) 13 cm (2) 6.5 cm (3) 6 cm (4) 9 cm

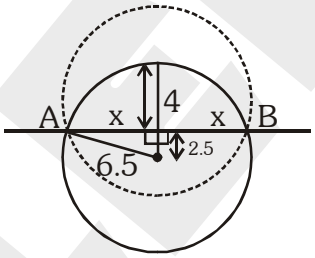
**Ans. (3)**

**Sol.** Let radius of circle formed

by contact of water surface = 'x' cm

By pythogorus theorm

$x = \sqrt{(6.5)^2 - (2.5)^2} = 6$ cm




**46.** If $\sqrt{1 + \frac{x}{289}} = 1\frac{1}{17}$, then the value of 'x' is

(1) 1 (2) 13 (3) 15 (4) 35

**Ans. (4)**

**Sol.** $\sqrt{1 + \frac{x}{289}} = 1\frac{1}{17}$

$1 + \frac{x}{289} = \left(\frac{18}{17}\right)^2$

$\frac{x}{289} = \frac{324}{289} - 1$

$\frac{x}{289} = \frac{324 - 289}{289}$

$x = 35$

**47.** If $3 \sin\theta + 5 \cos\theta = 5$, then the value of $5 \sin\theta - 3 \cos\theta$ is ....

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

**Ans. (1)**

**Sol.** $3 \sin\theta + 5 \cos\theta = 5$ ... (1)

$5 \sin\theta - 3 \cos\theta = x$ (let) ... (2)

Squaring & Adding

$(3 \sin\theta + 5 \cos\theta)^2 + (5 \sin\theta - 3 \cos\theta)^2 = 25 + x^2$

$9 \sin^2\theta + 25 \cos^2\theta + 30 \sin\theta \cos\theta + 25 \sin^2\theta + 9 \cos^2\theta - 30 \sin\theta \cos\theta = 25 + x^2$

$9(\sin^2\theta + \cos^2\theta) + 25 (\sin^2\theta + \cos^2\theta) = 25 + x^2$

$9 + 25 = 25 + x^2$

$34 - 25 = x^2$

$x^2 = 9$

$x = 3$

**48.** 'M' is mid-point of line segment AB of length 8 units. $S_1$, $S_2$ are two circles with AM and BM as diameters respectively. The tangent at B meets the tangent from A to circle $S_2$ at C. If $BC = K\sqrt{2}$, then the value of 'K' is

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

**Ans. (2)**

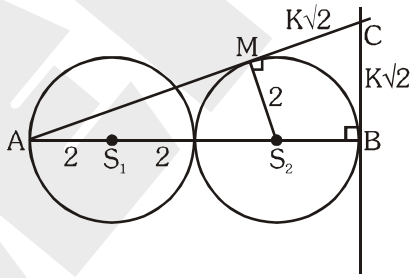
**Sol.** In $\Delta AS_2M$

$AM = \sqrt{6^2 - 2^2}$

$= \sqrt{36 - 4}$

$= \sqrt{32}$

$= 4\sqrt{2}$




In, $\Delta ABC$

$AC^2 = AB^2 + BC^2$

$(4\sqrt{2} + K\sqrt{2})^2 = 8^2 + (K\sqrt{2})^2$

$\Rightarrow (4 + K)^2.2 = 64 + 2K^2$

$\Rightarrow 32 + 2K^2 + 16K = 64 + 2K^2$

$\Rightarrow 16K = 32$

$\Rightarrow K = 2$

**49.** If 'A' is the area of triangle with sides 25, 25 and 30 units and 'B' is the area of triangle with sides 25, 25 and 40 units, then ....

(1) A = B (2) A < B (3) A = 3B (4) A = 2B

**Ans. (1)**

**Sol.** For triangle with area A

$S_1 = \frac{25 + 25 + 30}{2}$

$S_1 = 40$

$A = \sqrt{40(40 - 25)(40 - 25)(40 - 30)}$

$A = \sqrt{40 \times 15 \times 15 \times 10}$

$= 15 \times 10 \times 2 = 300 \text{ unit}^2$ .....(1)

For triangle with area B

$S_2 = \frac{25+25+40}{2} = 45$

$B = \sqrt{45(45-25)(45-25)(45-40)}$

$\Rightarrow \sqrt{45 \times 20 \times 20 \times 5}$

$\Rightarrow 20 \times 5 \times 3 = 300 \text{ unit}^2$ .....(2)

From equation (1) & (2)

$\Rightarrow A = B$

**50.** If P(x) is a quadratic polynomial with P(0) = 6, P(1) = 1 and P(2) = 0, then the value of P(3) is .....

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

**Ans. (3)**

**Sol.** P(0) = 6

P(1) = 1

P(2) = 0

P(3) = ?

Let $p(x) = ax^2 + bx + c$

p(0) = c

c = 6

1 = a + b + 6

a + b = – 5 ... (1)

0 = 4a + 2b + 6

4a + 2b = – 6

Subtracting equation (1) from (2)

2a + b = –3

a + b = –5

———————

a = 2

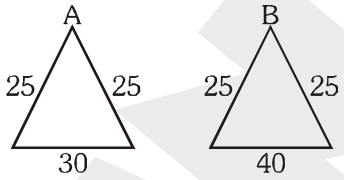
b = –7

$\therefore \quad p(x) = 2x^2 - 7x + 6$

$\Rightarrow p(3) = 2.3^2 - 7.3 + 6$

$\Rightarrow 18 - 21 + 6$

$\Rightarrow 24 - 21 = 3$




**51.** If a polygon has 44 diagonals, then its number of sides is .....

(1) 10 (2) 11 (3) 8 (4) 9

**Ans. (2)**

**Sol.** $\frac{n(n-3)}{2} = 44$

$\Rightarrow n(n-3) = 88$

$\Rightarrow n(n-3) = 11 \times 8$

By comparing

$\Rightarrow n = 11$

**52.** If $x = \frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$, $y = \frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}$, then the value of $x^2 + xy + y^2$ is .....

(1) 49 (2) 78 (3) 98 (4) 99

**Ans. (4)**

**Sol.** $x = \frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}} \times \frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}-\sqrt{2}} = 3 + 2 - 2\sqrt{6} = 5 - 2\sqrt{6}$

$\Rightarrow xy = 1$

$\Rightarrow y = \frac{1}{5-2\sqrt{6}} = 5 + 2\sqrt{6}$

$\Rightarrow x + y = (5-2\sqrt{6}) + (5+2\sqrt{6}) = 10$

$\Rightarrow x^2 + y^2 + xy = (x + y)^2 - xy$

$\Rightarrow (10)^2 - 1 = 99$

**53.** If a sphere is exactly fitted in a cube, then the ratio of the volume of cube to volume of the sphere is ....

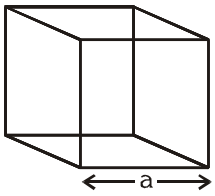
(1) 9 : π (2) 6 : π (3) 3 : π (4) 2 : π

**Ans. (2)**

**Sol.** Let side of cube = a

$a = 2r$

$V_{cube} = a^3 = 8r^3$




$V_{sphere} = \frac{4}{3}\pi r^3$

$\frac{V_{cube}}{V_{sphere}} = \frac{8r^3}{4\pi r^3} \times 3 = \frac{6}{\pi}$

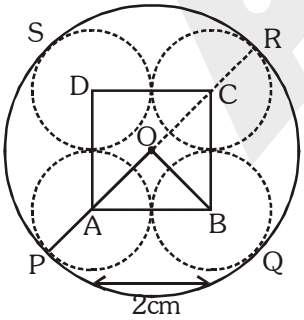
**54.** ABCD is a square of side 2 cm. It each vertex as centre and 1 cm as radius, four circles are drawn, then the radius of the circle which touches these four circles externally is .....

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

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

**Ans. (2)**

**Sol.** $\therefore r = 1$ cm



$2(OA)^2 = (AB)^2$

$2(OA)^2 = 4$

$OA = \sqrt{2}$

then radius of circle touches externally

$= OA + PA$

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

**55.** If $A = \log_2\log_2\log_4 256 + 2\log_{\sqrt{2}} 2$, then the value of A is .....

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

**Ans.** **(4)**

**Sol.** $A = \log_2 \log_2 \log_4 256 + 2 \log_{\sqrt{2}}2$

$= \log_2 \log_2 4 + 4$

$= \log_2 2 + 4$

$= 1 + 4 = 5$

**56.** $15^3 - 8^3 - 7^3$ is completely divisible by .....

(1) 32 (2) 49 (3) 56 (4) 25

**Ans.** **(3)**

**Sol.** $(a^3 + b^3 + c^3 = 3abc$, if $a + b + c = 0)$

$15 + (-8) + (-7) = 0$, then

$15^3 - 8^3 - 7^3 = 3(15)(-8)(-7)$

$= 3 \times 15 \times 8 \times 7$

$\Rightarrow 45 \times 56$

Therefore is divisible by 56

**57.** If the length of each side of a triangle is increased by 20%, then the percentage increase in its area is ....

(1) 60% (2) 120% (3) 80% (4) 44%

**Ans.** **(4)**

**Sol.** % increaxe in area $= x + y + \frac{xy}{100}$

$= 20 + 20 + \frac{20 \times 20}{100}$

$= 40 + 4 = 44\%$

**58.** $a_1, a_2, a_3, .....a_{24}$ are in Arithmetic progression. If $a_1 + a_5 + a_{10} + a_{20} + a_{24} = 225$, then the sum of its first 24 terms is ...

(1) 360 (2) 900 (3) 1800 (4) 2700

**Ans.** **(2)**

**Sol.** $a_1 + a_{24} = a_5 + a_{20} = a_{10} + a_{15}$

$\therefore \quad a_1 + a_5 + a_{10} + a_{15} + a_{20} + a_{25} = 225$

$3(a_1 + a_{24}) = 225$

$a_1 + a_{24} = \frac{225}{3} = 75$

$S_{24} = \frac{24}{2}[a_1 + a_{24}] = 12 \times 75 = 900$

**59.** In $\Delta ABC$, medians BE and CF measure 9 cm and 12 cm respectively. If $BE \perp CF$, then area of triangle ABC is ....

(1) 24 $cm^2$ (2) 54 $cm^2$ (3) 72 $cm^2$ (4) 108 $cm^2$

**Ans. (3)**

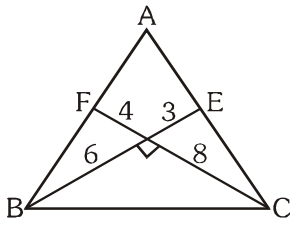
**Sol.** BE = 9

CF = 12

CG = 8, GF = 4

BG = 6, GE = 3

Where G is centroid




$Ar(\Delta BGC) = \frac{1}{2} \times 8 \times 6 = 24\ cm^2$

$Ar(\Delta ABC) = 3Ar(\Delta BGC) = 3 \times 24 = 72\ cm^2$

**60.** If the number $(33333)^2 + 22222$ is expressed as a single decimal number, then the sum of its digits is .....

(1) 10 (2) 15 (3) 20 (4) 25

**Ans. (1)**

**Sol.** $(33333)^2 + 22222$

$(3 \times 11111)^2 + 11111 \times 2$

$9 \times (11111)^2 + 11111 \times 2$

$11111\ (9 \times 11111 + 2)$

$11111\ (99999 + 2)$

$11111\ (100000 + 1)$

$1111100000 + 11111$

$1111111111$

$\therefore$ Sum = 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 = 10

## *HISTORY*

**61.** Find out the wrong statement about Montesquieu.

(1) He wrote the book "The spirits of the laws".

(2) He proposed a division of power within the government between the legislative, the executive and the judiciary.

(3) He introduced the division of powers type of Government in United States of America

(4) None of the above.

**Ans. (4)**

**Sol.** 1, 2 & 3 are representing correct statement about Montesquieu.

**62.** Period of Reign of Terror in France.

(1) 1793 to 1794 (2) 1789 to 1791 (3) 1799 to 1805 (4) 1813 to 1817

**Ans. (1)**

**Sol.** Period of Reign of Terror in France is from 1793 to 1794.

**63.** The European country which supported the Monroe Doctrine formulated by James Monroe, the President of America.

(1) Russia (2) Britain (3) Poland (4) Turkey

**Ans. (2)**

**Sol.** Britain supported the Monroe Doctrine formulated by James Monroe, President of America.

**64.** Find out the person who is not related to the unification of Italy.

(1) Victor Emmanuel II (2) Giuseppe Garibaldi (3) Count of Cavour (4) Frederick William IV

**Ans. (4)**

**Sol.** Frederick William IV is not related to the unification of Italy.

**65.** Who introduced opium into China in the early sixteenth century?
(1) French (2) Portuguese (3) Dutch (4) Italians

**Ans. (2)**

**Sol.** Portuguese introduced opium into China in the early 16th Century.

**66.** Consider the following statements about Cricket.
(a) The first written "laws of Cricket" were drawn up in 1744.
(b) The world's first Cricket Club was formed in Manchester in 1760's.
(c) The parsis founded the first Indian Cricket Club and The Oriental Cricket Club in Bombay in 1848.
(d) India entered the world of Test Cricket in 1932.
Which of the following statements given above is/are correct?
(1) a only (2) a and d (3) a, c, d (4) a, b, c, d

**Ans. (3)**

**Sol.** The world's first cricket club was formed in Hambledon in the 1760s.

**67.** Who was the viceroy of India during Civil Disobedience movement ?
(1) Lord Irwin (2) Lord Chelmsford (3) Lord Reading (4) Lord Curzoni

**Ans. (1)**

**Sol.** Lord Irwin was the Viceroy of India during Civil Disobedience Movement.

**68.** Who wrote several volumes on the London labour and compiled long lists of those who made a living from crime in the mid-nineteenth century?
(1) Andrew Mearns (2) Charles Dickens (3) C.G. Agarkar (4) Henry Mayhew

**Ans. (4)**

**Sol.** In the mid-nineteenth century, Henry Mayhew wrote several volumes on the London labour, and compiled long lists of those who made a living from crime.

**69.** The protestant reformer who said "Printing is the ultimate gift of God and greatest one" is -
(1) John Calvin (2) William Farel (3) Zwingli (4) Martin Luther

**Ans. (4)**

**Sol.** Luther said, 'Printing is the ultimate gift of God and the greatest one.'

**70.** Find out the wrongly matched.
(1) Gulamgiri - Jyotiba Phule. (2) Aamar Jiban - Rassundari Devi.
(3) Chote aur Bade ka sawal - Kashi Baba (4) None of the above.

**Ans. (4)**

**Sol.** 1, 2 & 3 are representing correct matches of books & authors.

**71.** Find out the wrong statement about religious reformation movement.
(1) A German monk callled Martin Luther started the movement
(2) This movement is also called as Protestant Reformation movement.
(3) The Protestant Reformer has greater popular appeal in rural areas, while in towns the Catholic Church managed to retain its influence.
(4) None of the above

**Ans. (3)**

**Sol.** Protestant Reformers were very popular in towns.

**72.** Which of the following is a part of "April Theses", declared by Lenin ?
(1) Banks be nationalised.
(2) Land be transferred to the peasants.
(3) The war to be brought to a close,
(4) All the above.

**Ans. (4)**

**Sol.** 1, 2 & 3 are parts of April Thesis declared by Lenin.

**73.** "Tebhaga movement" 'took place in this state.

(1) Bengal (2) Punjab (3) Maharashtra (4) Kerala

**Ans. (1)**

**Sol.** Tebhaga Movement took place in Bengal.

**74.** Which among the following is not a demand of the Indian Navy Mutiny that took place in 1946 ?

(1) Equal pay for white and Indian soldiers.

(2) Withdrawal of Indian troops from Indonesia.

(3) Separate nation for muslims.

(4) None of the above.

**Ans. (3)**

**Sol.** Separate nation for Muslims is not the demand of Indian Navy Mutiny that took place in 1946.

**75.** Find out the wrongly matched about the formation of parties India.

(1) Indian National Congress - 1885

(2) Muslim League - 1906

(3) Hindu Maha Sabha - 1910

(4) Communist Party of India - 1925

**Ans. (3)**

**Sol.** Hindu Mahasabha was not formed in 1910.

## *GEOGRAPHY*

**76.** Find out the wrong statement about western cyclonic disturbances.

(1) These originate from the Mediterranean sea.

(2) They usually influence the weather of the North and North western regions of India.

(3) The rainfall received from these disturbances is called as Mahawat. It is a boon for the Kabi crop.

(4) None of the above.

**Ans. (4)**

**Sol.** 1, 2 & 3 are representing correct statement about Western Cyclonic Disturbances.

**77.** Match the following.

| (A) | (B) |
|---|---|
| (a) Tropical Deciduous forests | (i) Grows in Delta region |
| (b) Tropical Evergreen forests | (ii) Grows upto a height of 60 mts. |
| (c) Mangrove forests | (iii) These are the most widespread forests of India |
| (d) Thorn forests | (iv) These are found in North-western part of India |

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

**Ans. (4)**

**Sol.** 4 represents correct matches.

**78.** Find out the highest and least Sex Ratio recorded decades.

(1) 1901,1991 (2) 1901,2001 (3) 1921,1981 (4) 1911,2011

**Ans. (2)**

**Sol.** The highest decadal sex ratio was recorded in 1901 & lowest was recorded in 1991.

**79.** Which.of the following lake is the result of Tectonic activity ?

(1) Chilka lake (2) Sambhar lake (3) Pulicat lake (4) Wular lake

**Ans. (4)**

**Sol.** Wular Lake is lake formed by tectonic activity.

**80.** Which one of the following drainage patterns develop when streams flow in different directions from a central peak or dome like structure ?

(1) Dendritic (2) Trellis (3) Radial (4) Pinnate

**Ans. (3)**

**Sol.** Radial drainage pattern develops when streams flow indifferent direction from a central peak or dome like structure.

**81.** Find out the highest peak among the following.

(1) Makalu (2) Kamet (3) Kanchenjunga (4) NandaDevi

**Ans. (3)**

**Sol.** Among the given Answers Kanchenjunga is a highest peak in India.

**82.** Which among the following reports introduced the concept of "Sustainable Development" and advocated it as a means for resource conservation ?

(1) Leopold report, 1969. (2) Brundtland report, 1987.

(3) Sunita Narayan report, 2012. (4) Rome report, 1968.

**Ans. (2)**

**Sol.** Brundtland Commission Report 1987 talks about sustainable development.

**83.** Consider the following statements about soils.

(a) Red laterite soils in Tamilnadu, Andhra Pradesh and Kerala are more suitable for cashew nut crop.

(b) Arid soils are generally sandy in texture and saline in nature.

(c) Red soil develops on crystalline igneous rocks in areas of low rainfall.

(d) Alluvial soils are found in interior part of Deccan plateau.

Which of the statement/s given above is / are correct ?

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

**Ans. (3)**

**Sol.** a, b, c are correct

**84.** What causes rainfall on the Coromandel coast in the beginning of winters ?

(1) Western cyclonic disturbances. (2) North-west monsoons.

(3) South-west monsoons. (4) North-east monsoons.

**Ans. (4)**

**Sol.** North-East monsoon bring rainfall in winters at coromandal coast.

**85.** Salal project is built on this river -

(1) Chenab (2) Chambal (3) Damodar (4) Periyar

**Ans. (1)**

**Sol.** Salal Project is build on Chenab River

**86.** The Balaghat mines in Madhya Pradesh are famous for -

(1) Bauxite (2) Copper (3) Manganese (4) Gold

**Ans. (2)**

**Sol.** The Balaghat mines in MP are famous for Copper Production.

**87.** National waterway No-2 joins these two cities.

(1) Allahabad and Haldia. (2) Kolkata and Cuttack.

(3) Sadiya and Dhubri. (4) Kocchi and Kollam.

**Ans. (3)**

**Sol.** Sadiya and Dubri are joned by National Waterway 2.

**88.** India's highest population growth rate is recorded during this decade

(1) 1951-1961 (2) 1961-1971 (3) 1971-1981 (4) 1981-1991

**Ans. (3)**

**Sol.** The highest growth rate is recorded between 1971-1981

**89.** Thal ghat and Bhor ghat passes are in these mountains

(1) Eastern ghats (2) Aravail mountains (3) Satpura mountains (4) Western ghats

**Ans. (4)**

**Sol.** Thal and Bhor Ghat passes are in Western Ghats.

**90.** Which one of the following is the most wide spread and most productive category of soil in India?

(1) Forest soil (2) Laterite soil (3) Alluvial soil (4) Arid soil

**Ans. (3)**

**Sol.** The most widely spread soil in India is Alluvial Soil.

**91.** Which fo the following does nto influence the making of Indian Constitution ?

(1) Ideals of French revolution. (2) Practice of Parliamentary democracy in Britain.

(3) Bill of Rights in U.S. (4) Armed struggle in China

**Ans. (4)**

**Sol.** Armed struggle in China has no role in making of the Indian Constitution.

**92.** Every person who wishes to contest in election has to make a legal declaration, giving full details of .....

(1) Eductional qualifications of the candidate

(2) Details of the assets and liabilities of the candidate and his or her family.

(3) Serious criminal cases pending against the candidate.

(4) All the above.

**Ans. (4)**

**Sol.** All the given Answers are correct

**93.** Which of the following statements about the judiciary is false ?

(1) Every law passed by the Parliament needs approval of the Supreme court.

(2) Judiciary is independent of the executive.

(3) Any citizen can approach the court if his/her rights are violated.

(4) Judiciary can strike down a law if it goes against the spirit of the Constitution.

**Ans. (1)**

**Sol.** Every law passed by the Parliament need approval of the Supreme court.

**94.** Find out the topic which is not in the state list.

(1) Trade (2) Agriculture (3) Police (4) Communication

**Ans. (4)**

**Sol.** Communication is in Union List

**95.** Which of the following countries consists of two party system ?

(1) India (2) China

(3) United States of America (4) All the above.

**Ans. (3)**

**Sol.** USA has two party system.

**96.** A sweet seller purchased sugar. It is a..... type of capital.

(1) Fixed capital (2) Working capital

(3) Human capital (4) None of the above

**Ans. (2)**

**Sol.** Sweet Seller purchased sugar for raw material hence its working capital

**97.** Which of the following factors contribute Globalisation ?

(1) Technology. (2) Economical liberalisation.

(3) International organisations. (4) All the above.

**Ans. (4)**

**Sol.** All the given factors contribute towards Globalisation.

**98.** Find out the wrong statement.

(1) The consumption of calories has gone down between 1983 and 2004.

(2) Person availability of food grains has gone down between 1991 and 2001.

(3) Agricultural diversification affect the production of food grains.

(4) Availability of per capita food grains in India is more than in Europe.

**Ans. (4)**

**Sol.** Availability of food grains in India is less than in Europe.

**99.** Chipko movement was started in this part of Himalayas.

(1) Nepal Himalayas (2) Garhwal Himalayas (3) Purvanchal Himalayas (4) Sikkim Himalayas

**Ans. (2)**

**Sol.** Chipko movement was started in Garhwal Himalayas.

**100.** Antyodaya Anna Yojana was started in the year.

(1) 2000 (2) 2004 (3) 2007 (4) 2011

**Ans. (1)**

**Sol.** AAY started in the year 2000.