NATIONAL TALENT SEARCH EXAMINATION (NTSE-2019) STAGE -1
STATE : TELANGANA   PAPER : SAT

Date: 04/11/2018

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

1. The radius of curvature of a spherical mirror is 20 cm. What is its focal length?

    (1) 10 cm   (2) 15 cm   (3) 25 cm   (4) None

Ans. (1)

Sol. R = 20 cm

$$f = \frac{R}{2} = \frac{20}{2} = 10 \text{ cm}$$

2. There is an object infront of convex mirror at a distance of 5 cm. If its focal length is 10 cm, then its magnification is …

    (1) 0.44 cm   (2) 0.66 cm   (3) 0.88 cm   (4) None

Ans. (2)

Sol. $m = \dfrac{f}{f-u}$

$$= \frac{10}{10-(-5)}$$

$$= \frac{10}{15} = \frac{2}{3} = 0.66 \text{ cm}$$

3. The mirror used by dentists is …

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

Ans. (3)

Sol. Concave mirror

4. The lens maker's formula is …

    (1) $\dfrac{1}{n} = (f-1)\left[\dfrac{1}{R_1} - \dfrac{1}{R_2}\right]$ (2) $\dfrac{1}{R} = (n-1)\left[\dfrac{1}{f_1} - \dfrac{1}{f_2}\right]$ (3) $\dfrac{1}{f} = (n-1)\left[\dfrac{1}{R_1} - \dfrac{1}{R_2}\right]$ (4) None

Ans. (3)

Sol. Lens Maker's formula

$$\frac{1}{f} = (n-1)\left[\frac{1}{R_1} - \frac{1}{R_2}\right]$$

5. Focal length of the plano-convex lens is ..., when its radius of curvature of the surface is R and n is the refractive index of the lens.

(1) $f = R$　　　　(2) $f = \dfrac{R}{2}$　　　　(3) $f = \dfrac{R}{(n-1)}$　　　　(4) $f = \dfrac{(n-1)}{R}$

Ans. (3)

Sol. By lens maker's formula

$$\frac{1}{f} = (n-1)\left[\frac{1}{R_1} - \frac{1}{R_2}\right]$$

for plano-convex lens

　　$R_1 = R$ and $R_2 = \infty$

so $\dfrac{1}{f} = (n-1)\left[\dfrac{1}{R} - \dfrac{1}{\infty}\right]$

　　$\dfrac{1}{f} = \dfrac{n-1}{R}$

$\Rightarrow f = \dfrac{R}{(n-1)}$

6. The ray passing through the .... of the lens is not deviated.

(1) Focus　　　　(2) Optic centre　　　　(3) Centre curvature　　　　(4) None

Ans. (2)

Sol. Optic centre

7. The size of an object as perceived by an *eye* depends primarily on ....

(1) actual size of the object.　　　　(2) distance of the object from the *eye*.

(3) aperture of the pupil.　　　　(4) size of the image formed on the retina.

Ans. (2)

Sol. Distance of the object from the *eye*

8. The process of re-emission of absorbed light in all directions with different intensities by the atom or molecule is called.

(1) Scattering of light.　　(2) Dispersion of light.　　(3) Reflection of light.　　(4) Refraction of light.

Ans. (1)

Sol. Scattering of light

9. The value of 1 KWH in Joules is .....

(1) 2.6×10^6 Joules　　(2) 1.6×10^6 Joules　　(3) 3.6×10^6 Joules　　(4) None

Ans. (3)

Sol. 1KWH = 1000 W $\times$ 3600 sec

　　= 3.6×10^6 Joules

10. If the resistance of your body is 100000 Ω, what would be the current that flows in your body when you touch the terminals of 12V battery?

(1) 10×10^{-5} A   (2) 14×10^{-5} A   (3) 12×10^{-5} A   (4) None

Ans. (3)

Sol. Given, R = 1,00,000 Ω, V = 12 V

V = I R

$I = \dfrac{V}{R} = \dfrac{12}{100,000} = 12 \times 10^{-5}$ A

11. Which of the following converts electrical energy into mechanical energy?

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

Ans. (1)

Sol. Motor

12. The S.I. unit of magnetic field induction is …

(1) Weber / m^2 (2) Tesla   (3) Weber $- m^2$ (4) Weber

Ans. (2)

Sol. Tesla

13. If an object is moving with constant velocity, then the motion is

(1) Speed   (2) Uniform acceleration   (3) Uniform motion   (4) Non-uniform motion

Ans. (3)

Sol. Uniform velocity means body is moving with constant speed in a particular direction which means uniform motion.

14. Change of solid into vapour without changing into liquid is known as

(1) Evaporation   (2) Vapourisation   (3) Sublimation   (4) Boiling

Ans. (3)

Sol. When solid converts into vapours without changing into liquid, it is called sublimation.

15. If water turns into ice at a pressure of atmosphere at 0°C, then the temperature of this system in this process.

(1) Decreases.   (2) Increases.   (3) Remains same.   (4) None

Ans. (3)

Sol. During change of phase the temperature of the system remains same.

16. The physical mixtures of two substance is called

(1) Mixture   (2) Compound   (3) Colloid   (4) Suspension

Ans. (1)

Sol. When two substances are physically mixed, it is called mixture.

17. The phenomenon of scattering of a visible light by the particle of a colloid is known as

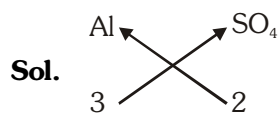(1) Tyndall effect   (2) Chromatography   (3) Sublimation   (4) Reflection

Ans. (1)

Sol. Scattering of light by particles of colloid is called tyndall effect.

18. Chemical formula of Aluminium Sulphate is

(1) Al_2SO_4 (2) $(Al_2)_2(SO_4)_3$ (3) $Al_2(SO_4)_3$ (4) $AlSO_4$

Ans. (3)

Sol.

$Al_2(SO_4)_3$ is formula of aluminium sulphate.

19. The other name of Tungsten .....

(1) Natrium   (2) Kalium   (3) Wolfram   (4) Cuprum

Ans. (3)

Sol. German name of Tungsten is wolfram.

20. Hydraulic Jack works on the principle of …

(1) Archimedes principle   (2) Buoyancy   (3) Pascal's principle   (4) Air pressure.

Ans. (3)

Sol. Hydraulic Jack works on the Pascal's principle.

21. The electronic configuration of Sodium is …

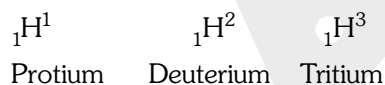(1) 2, 8   (2) 8, 2, 1   (3) 2, 1, 8   (4) 2, 8, 1

Ans. (4)

Sol. $Na = K\ L\ M$

            $2\ 8\ 1$

22. Deuterium and Tritium are the isotopes of

(1) Nitrogen   (2) Oxygen   (3) Hydrogen   (4) Helium

Ans. (3)

Sol. Deuterium and Tritium are the isotopes of Hydrogen.

$_1H^1$ $_1H^2$ $_1H^3$

Protium   Deuterium   Tritium

23. Colour of Silver bromide is ….

(1) Red   (2) Silver   (3) Light yellow   (4) Blue

Ans. (3)

Sol. Colour of Silver bromide is Light yellow.

24. Which one of the following types of medicines is used for treating indigestion?

(1) Antibiotic   (2) Analgesic   (3) Antacid   (4) Antiseptic

Ans. (3)

Sol. Antacid $(Mg(OH)_2)$ is used to treat indigestion.

25. Acid rain occurs, when pH value of rain water is less than

(1) 6.5   (2) 5.6   (3) 7.2   (4) 2.7

Ans. **(2)**

Sol. 5.6 is the pH value of acid rain water.

26. Formula of Bleaching powder

(1) $CaSO_4$ (2) Na_2CO_3 (3) $NaHCO_3$ (4) $CaOCl_2$
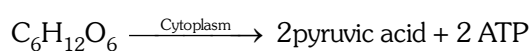
Ans. **(4)**

Sol. Formula of Bleaching powder $CaOCl_2$.

27. During the Cellular respiration one molecule of Glucose is first broken down into two moelcule of ….

(1) Acetic acid   (2) Pyruvic acid   (3) Lactic acid   (4) Sulphuric acid

Ans. **(2)**

Sol. It is a process of glycolysis

$$C_6H_{12}O_6 \xrightarrow{\text{Cytoplasm}} 2\text{pyruvic acid} + 2\text{ ATP}$$

28. When two individuals are similar in external appearance but different in their genetic makeup, these are called.

(1) Allele   (2) Dominant   (3) Homozygous   (4) Heterozygous

Ans. **(4)**

Sol. When two individuals are similar in external appearance but different in their genetic makeup are called heterozygous.

29. Villi present on the inner lining of the intestinal wall …

(1) secreted enzymes for digestion.   (2) secretes hormones.

(3) decreases the surface area for absorption.   (4) increases the surface area for absorption.

Ans. **(4)**

Sol. Villi present on the inner lining of the intestinal wall to increases the surface area for maximum absorption.

30. Which of the following are not examples of analogous structures?

(1) Wings of bat and butterfuly.   (2) Wings of bat and forelimbs of cattle.

(3) Thorn and spine.   (4) Tendril of Lathyranthus and tendril of Gloriosa.

Ans. **(2)**

Sol. Analogous structure which perform similar function but different in structure, here wing of bat and forelimbs of cattle perform different function.

31. What will be the genotypic ratio of the cross between Rr and Rr?

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

Ans. **(3)**

Sol. The genotypic ratio of the cross between Rr and Rr is 1 : 2 : 1

$1 \rightarrow RR$

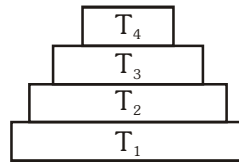$2 \rightarrow Rr$

$1 \rightarrow rr$

32. Which is the key intermediate compound linking glycolysis to Kreb's cycle?

(1) Malic acid   (2) Acetyle CoA   (3) Pyruvic acid   (4) Citric acid

Ans. **(2)**

Sol. Acetyl – COA is the key intermediate compound linking glycolysis to Kreb's cycle.

33. In the given figure, various trophic levels are shown in a pyramid. At which trophic level is maximum energy available?

(1) T_4 (2) T_2 (3) T_1 (4) T_3

Ans. (3)

Sol. At T_1 trophic level highest amount of energy is available according to ten percent law.

34. The part of the human body which is called as Second Brain, is …

(1) Small intestine   (2) Large intestine   (3) Stomach   (4) Mouth

Ans. (N.A.)

Sol.

35. Stock and Scion are attached, which type of characters will come into the offspring?

(1) Characters of Scion.   (2) Characters of Stock.

(3) Special desired characters.   (4) Cannot expect.

Ans. (1)

Sol. If stock and scion are attached then characters of scion will come into the offspring.

36. Which of the following is not a part of female reproductive system in human beings ?

(1) Ovary   (2) Uterus   (3) Vas deferens   (4) Fallopian Tube

Ans. (3)

Sol. Vas deferens is the part of male reproductive system.

37. The best way to dispose waste is…

(1) Making a paste of all domestic waste and putting them in a river.

(2) Separating bio-degradable and non bio-degradable waste in bins before disposing.

(3) Throw the waste on roadside.

(4) Dumping all domestic waste in litter bin.

Ans. (2)

Sol. Separating bio-degrodable and non bio-degradable waste in bins before disposing is the best way to dispose waste.

38. What of the following is the correct sequence of events of sexual reproduction in a flower?

(1) Pollination, Fertilization, Seedling, Embryo.

(2) Seedling, Embryo, Fertilization, Pollination.

(3) Pollination, Fertilization, Embryo, Seedling.

(4) Embryo, Seedling, Pollination, Fertilization,

Ans. (3)

Sol. The correct sequence of events of sexual reproduction in a flower is

Pollination, Fertilization, Embryo, Seedling

39. Conservation of wildlife includes …

(1) Preventing poaching of animals.   (2) Construction of National Parks, Sanctuaries.

(3) Ban on trading endangered species.   (4) All of the above.

Ans. (4)

Sol. Preventing poaching of animals, construction of national parks, Sanctuaries and ban on trading endangered species are the process of conservation of wildlife.

40. What is the breath rate in human beings ?

(1) 5 - 6 times / minute.   (2) 15 - 18 times / rninute.

(3) 40 - 45 times / minute.   (4) 70 - 80 times / minute.

Ans. (2)

Sol. 15–18 times / minute is the breathing rate in human beings.

41. Let x be real number such that $x^3 + 4x = 8$, then the value of $x^7 + 64x^2$ is …

(1) 136   (2) 146   (3) 128   (4) 156

Ans. (3)

Sol. $x^3 = 8 - 4x$

squaring both sides

$x^6 = 64 + 16x^2 - 64x$

$(x^6 + 64x = 16x^2 + 64) \times x$

$x^7 + 64x^2 = 16x^3 + 64x$

$\qquad\qquad = 16x\ (x^2 + 4)$

$\qquad\qquad = 16 \times 8 \qquad$ As, $x(x^2 + 4) = 8$

$\qquad\qquad = 128$

42. If $10^{2017} - 2017$ is expressed as integer, what is the sum of its digits?

(1) 18, 144   (2) 17, 468   (3) 16, 466   (4) 18, 564

Ans. (1)

Sol. $10^{2017} - 2017$

$= \underbrace{(1000....)}_{\text{No. of digits 2018}} - 2017$

$= \underbrace{9999....}_{2013 \text{ times}} 7983$

$= 9 \times 2013 + 7 + 9 + 8 + 3 = 18117 + 27 = 18144$

43. If $P(x) = x^4 + ax^3 + bx^2 + cx + d$, a, b, c, d $\in$ Z and

$P(1) = P(2) = P(3) = 0$,

then the value of $P(4) + P(0)$ will be….

(1) –12   (2) 24   (3) 16   (4) 18

Ans. (2)

Sol. $P(1) = 0$

$0 = a + b + c + d + 1$ ...(1)

$P(2) = 0$

$0 = 16 + 8a + 4b + 2c + d$ ...(2)

$P(3) = 0$

$0 = 81 + 27a + 9b + 3c + d$ ...(3)

Now,   (1) + (3) − (2)

$$27a + 9b + 3c + d = -81$$
$$a + b + c + d = -1$$
$$-(8a + 4b + 2c + d = -16)$$

$$\overline{}$$

$$20a + 6b + 2c + d = -66$$
$$2c + d = -66 - 20a - 6b$$

Now, $P(4) + P(0)$

$\quad = 256 + 64a + 16b + 4c + d + d$

$\quad = 2(128 + 32a + 8b + 2c + d)$

$\quad = 2(128 + 32a + 8b - 66 - 20a - 6b)$

$P(4) + P(0) = 2[62 + 12a + 2b]$ ...(4)

Puting value of $2c + d$ in eq^n (2), we get

$8a + 4b + (-66 - 20a - 6b) = -16$

$-12a - 2b = 50$

$12a + 2b = -50$

keeping value in (4),

$p(4) + p(0) = 2[62 - 50] = 24$

44. If $3^9 + 3^{12} + 3^{15} + 3^n$ is a perfect cube (of an integer) where $n \in N$, then find the value of n.

(1) 18   (2) 14   (3) 16   (4) 17

Ans. (2)

Sol. $3^9 + 3^{12} + 3^{15} + 3^n$ should be a perfect cube

$\quad = 3^9 (1 + 3^3 + 3^6 + 3^{n-9})$ ...(1)

To be a perfect cube $= 3^9 [1 + 3^2]^3$

$\qquad\qquad\qquad\quad = 3^9 (1 + 3^6 + 3^3 + 3^5)$ ...(2)

By comparing (1) and (2), we get

$\quad 3^{n-9} = 3^5$

$\boxed{n = 14}$

45. If $a + b + c = 1$, $a^2 + b^2 + c^2 = 9$ and $a^3 + b^3 + c^3 = 1$, then the value of $\dfrac{1}{a} + \dfrac{1}{b} + \dfrac{1}{c}$ is.....

(1) 4   (2) $\dfrac{1}{2}$ (3) 1   (4) $\dfrac{1}{4}$

Ans. (3)

Sol. $a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ac)$ ...(1)

Squaring, $a + b + c = 1$

$(a + b + c) = (1)^2$

$a^2 + b^2 + c^2 + 2(ab + bc + ac) = 1$

$9 + 2(ab + bc + ac) = 1$

$2(ab + bc + ac) = -8$

$ab + bc + ac = -4$

Now from (1), $1 - 3abc = 1(9 + 4)$

$\qquad 1 - 13 = 3abc$

$abc = \dfrac{-12}{3} - 4$

So, $\dfrac{ab + bc + ac}{abc} = \dfrac{-4}{-4} = 1$

46. A finite sequence of 16 numbers such that ....

(i) it reads the same from left to right as right to left.

(ii) the sum of any 7 consecutive terms is -1.

(iii) the sum of any 11 consecutive terms is $+1$, then the sum of 16 numbers in the sequence is....

(1) 142   (2) 56   (3) 24   (4) 8

Ans. (4)

Sol. The given series is

$a_1, a_2, a_3, a_4, a_5, a_6, a_7, a_8, a_8, a_7, a_6, a_5, a_4, a_3, a_2, a_1$

Now $a_1 + a_2 + \ldots + a_6 + a_7 = a_2 + a_3 \ldots + a_7 + a_8$

$\qquad \Rightarrow a_1 = a_8$

Similarly $a_1 = a_8$

$\qquad\qquad\qquad\qquad\quad a_2 = a_7$

$\qquad\qquad\qquad\qquad\quad a_3 = a_6$

$\qquad\qquad\qquad\qquad\quad a_4 = a_5$

Also $a_1 + a_2 \ldots a_7 + a_8 + a_8 + a_7 + a_6 = 1$ ...(1)

$\qquad a_5 + a_6 + a_7 + a_8 + a_8 + a_7 + a_6 = -1$ ...(2)

Subtracting eq. (2) from eq. (1) we get

$a_1 + a_2 + a_3 + a_4 = 2$

So   sum is $4 \times (a_1 + a_2 + a_3 + a_4) = 8$

47. Compute

$$\frac{\text{L.C.M. of } (1, 2, 3,\ldots\ldots,200)}{\text{L.C.M. of } (102, 103, 104,\ldots\ldots, 200)}$$

(1) 101   (2) 106   (3) 184   (4) 176

Ans. **(1)**

Sol. 101 is the only prime number whose multiple does not exist till 200.

So, $\dfrac{\text{LCM of } (1, 2, 3\ldots\ldots, 200)}{\text{LCM of } (102, 103, 104,\ldots\ldots200)} = 101$

48. If $x + \dfrac{1}{x} = 5$, then $\dfrac{2x}{3x^2 - 5x + 3}$ is equal to ....

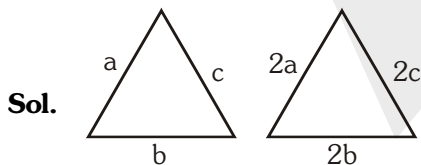(1) 5   (2) $\dfrac{1}{5}$ (3) 3   (4) $\dfrac{1}{3}$

Ans. **(2)**

Sol. $x + \dfrac{1}{x} = 5$

$$= \frac{\dfrac{2x}{x}}{\dfrac{3x^2 - 5x + 3}{x}} = \frac{2}{3x + \dfrac{3}{x} - 5}$$

$$= \frac{2}{3\left(x + \dfrac{1}{x}\right) - 5} = \frac{2}{3 \times 5 - 5} = \frac{2}{10} = \frac{1}{5}$$

49. If every side of a triangle is doubled, then increase in the area of the triangle is.....

(1) $100\sqrt{2}\%$ (2) 200 %   (3) 300 %   (4) 400 %

Ans. **(3)**

Sol.

$S = \dfrac{a + b + c}{2}$

Initial area = $\sqrt{s(s - a)(s - b)(s - c)}$ = A

New Area $\to S^1 = 2s$

$= \sqrt{2s(2s - 2a)(2s - 2b)(2s - 2c)}$

$= 4A$

Increase in Area = $\dfrac{\text{Final} - \text{Initial}}{\text{Initial}} \times 100$

$\qquad = \dfrac{4A - A}{A} \times 100$

$\qquad = 300\%$

50. When $x^3 + 3x^2 - kx + 4$ is divided by $x - 2$ remainder is 2k, then the value of k is

(1) 6   (2) –6   (3) 2   (4) –2

Ans. (1)

Sol. $f(x) = x^3 + 3x^2 - kx + 4$

$f(2) = 2k$

$(2)^3 + 3(2)^2 - 2k + 4 = 2k$

$8 + 12 + 4 = 4\,k$

$4k = 24$

$k = 6$

51. Numbers 50, 42, 35, 2x + 10, 2x – 8, 12, 11, 8 are written in descending order and their median is 25 find x.

(1) 20   (2) 25   (3) 12   (4) 11

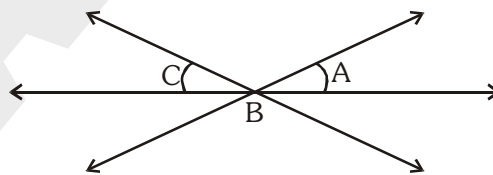**Ans. (3)**

Sol. 50, 42, 35, 2x + 10, 2x – 8, 12, 11, 8]

Median = $\dfrac{2x + 10 + 2x - 8}{2} = 25$

$\Rightarrow 4x + 2 = 50$

$\qquad 4x = 48$

$\qquad x = 12$

52. The value of angle B will be in the given figure, if $\angle A = 50°$, $\angle C = 60°$.

(1) 60°   (2) 50°   (3) 70°   (4) 80°

Ans. (3)

Sol. $\angle A = x = 50°$

$\angle C = y = 60°$

$\angle B = 180° - (60° + 50°)$

$\qquad = 180° - 110°$

$\qquad = 70°$

53. In $\sin^3\theta + \cos^3\theta = 0$, then θ will be ...

(1) 60° (2) 45° (3) 0 (4) –45°

Sol. $\sin^3\theta + \cos^3\theta = (\sin\theta + \cos\theta)(\sin^2\theta + \cos^2\theta - \sin\theta\cos\theta) = 0$

$\sin\theta + \cos\theta = 0$

$\sin\theta = -\cos\theta$

$\theta = -45°$

54. The measures of the perpendiculars drawn from a point situated inside an equilateral triangles are 6 cm, 8 cm and 10 cm. The area of the triangle will be ....

(1) $256\sqrt{3}$ (2) $192\sqrt{3}$ (3) $64\sqrt{3}$ (4) $3\sqrt{3}$

Ans. (2)

Sol. $\dfrac{\sqrt{3}}{4}a^2 = \dfrac{1}{2}[6a + 8a + 10a]$

$\dfrac{\sqrt{3}}{4}a^2 = \dfrac{1}{2} \times 24a$

$\dfrac{\sqrt{3}}{4}a = 24\,cm$

$a = \dfrac{48}{\sqrt{3}} \times \dfrac{\sqrt{3}}{\sqrt{3}}\,cm$

$= 16\sqrt{3}\,cm$

Area $= \dfrac{\sqrt{3}}{4} \times (side)^2$

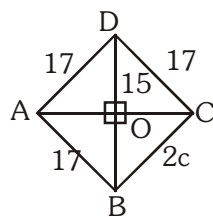$= \dfrac{\sqrt{3}}{4} \times 16\sqrt{3} \times 16\sqrt{3}\ cm^2$

$= 192\sqrt{3}\,cm^2$

55. There is a rhombus of one side 17 cm and one diagonal 30 cm. The area of the rhombus will be ....

(1) 60 cm^2 (2) 240 cm^2 (3) 305 cm^2 (4) 750 cm^2

Ans. (2)

Sol.

By pythogorous theorem

$\triangle$ AOD

$OA^2 = 17^2 - 15^2$

$= (17 - 15)(17 + 15)$

$OA^2 = 64$

$\therefore$ $\boxed{OA = 8}$

area (rhombus) $\Rightarrow \dfrac{1}{2} \times d_1 \times d_2$

$= \dfrac{1}{2} \times 16 \times 30 \ cm^2$

$= 240 \ cm^2$

56. The points A, B and C be on a circle in such a way that $\angle ABC = 52°$ and $\angle ACB = 78°$. The measure of the angle subtended at the centre by the arc BC will be ....

(1) 26°　　　　(2) 50°　　　　(3) 100°　　　　(4) 115°

Ans. (3)

Sol. $\angle A = 180° - [52° + 78°]$

$= 50°$

$\therefore$ $\angle BOC = 2\angle A$

$= 100°$

57. If $x = 7 - 4\sqrt{3}$, the value of $x^2 + \dfrac{1}{x^2}$ will be ....

(1) 146　　　　(2) 148　　　　(3) 194　　　　(4) 196

Ans. (2)

Sol. $x = 7 - 4\sqrt{3}$

$\therefore \dfrac{1}{x} = \dfrac{1}{7 - 4\sqrt{3}} = 7 + 4\sqrt{3}$

$\therefore x^2 + \dfrac{1}{x^2} = \left(x + \dfrac{1}{x}\right)^2 - 2 \times x \times \dfrac{1}{x}$

$\Rightarrow \left(7 - 4\sqrt{3} + 7 + 4\sqrt{3}\right)^2 - 2$

$\Rightarrow (14)^2 - 2 = 194$

58. If θ is in the first Quadrant and $\cos \theta = \dfrac{3}{5}$, then the value of $\dfrac{5\tan\theta - 4\ cosec\ \theta}{5\sec\theta - 4\cot\theta}$ will be ...

(1) $\dfrac{5}{16}$　　　　(2) $\dfrac{5}{34}$　　　　(3) $-\dfrac{5}{34}$　　　　(4) $-\dfrac{5}{16}$

Ans. **(1)**

Sol. for a given triangle

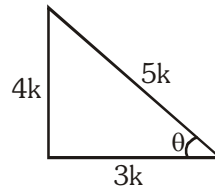$\theta \in$ Quadrant 1

$\therefore$ All trigonometric functions are positive

$B = \sqrt{H^2 - P^2} = 4k$

$\therefore \dfrac{5\tan\theta - 4\,\mathrm{cosec}\,\theta}{5\sec\theta - 4\cot\theta}$

$\Rightarrow \dfrac{5\left[\dfrac{4}{3}\right] - 4\left[\dfrac{5}{4}\right]}{5\left[\dfrac{5}{3}\right] - 4\left[\dfrac{3}{4}\right]}$

$\Rightarrow \dfrac{20}{3} - 5$

$= \dfrac{\dfrac{20}{3} - 5}{\dfrac{25}{3} - 3} = \dfrac{\dfrac{5}{3}}{\dfrac{16}{3}} = \dfrac{5}{16}$

59. If $\log_4 7 = x$, then the value of $\log_7 16$ will be .....

(1) x^2 (2) $2x$ (3) x (4) $\dfrac{2}{x}$

Ans. **(4)**

Sol. $\log_4 7 = x$

$7 = 4^x$ .....(1)

$\log_7 16$

$\Rightarrow \log_{4^x} 4^2 = \dfrac{2}{x}$

60. The sum of the integers from 1 to 100 that are divisible by 2 or 5 is ....

(1) 2550 (2) 3050 (3) 3550 (4) 3600

Ans. **(2)**

Sol. Divisible by 2

$S_1 = 2 + 4 + 6 + 8 + ... + 100$

$= 2[1 + 2 + 3 + 4 + ... + 50]$

$$= 2(50)\left(\frac{50+1}{2}\right)$$

$$= 50 \times 51 = 2550$$

Divisible by 5

$S_2 = 5 + 10 + 15 + 20 + \ldots + 100$

$= 5 [1 + 2 + 3 + \ldots + 20]$

$$= 5 \times \frac{20 \times 21}{2}$$

$= 50 \times 21 = 1050$

Divisible by both 2 and 5 (i.e. 10)

$S_3 = 10 + 20 + 30 + \ldots + 100$

$= 10[1 + 2 + 3 + 4 + \ldots + 10]$

$$= 10 \times \frac{10 \times 11}{2} = 550$$

$S = S_1 + S_2 - S_3$
$S = 2550 + 1050 - 550$
$S = 3050$

61. Find the wrong one about hockey.

(1) Modern hockey evolved from traditional games once current in Britain.

(2) The first hockey club in India was started in Calcutta in 1885-1886.

(3) Between 1928 and 1956, India won gold medals in six consecutive Olympic Games.

(4) None of the above.

Ans. (4)

Sol. All the 3 options are correct hence option 4 is the correct answer.

62. In which princely state, women of the shanar caste were attacked by upper caste nairs for wearing a cloth across their upper bodies ?

(1) Jammu & Kashmir

(2) Rajaputana

(3) Mysore

(4) Travancore

Ans. (4)

Sol. The women of shanar caste were attacked in the princely state of Travancore.

63. Which U.S. president called upon farmers "plant more wheat, wheat will win the war" ?

(1) Woodrow Wilson

(2) Franklin Roosevelt

(3) James Munroe

(4) Harry S. Truman .

Ans. (1)

Sol. Woodrow Wilson said these lines.

	Pastoralista		State
(1)	Monpas	(i)	Gujarat
(2)	Dhangars	(ii)	Rajasthan
(3)	Raikas	(iii)	Maharashtra
(4)	Maldharis	(iv)	Arunachal Pradesh,

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

Ans. **(3)**

Sol. Monpas - Arunachal

Dhangars - Maharashtra

Raikas - Rajasthan

Maldharis - Gujarat

65. Which treaty recognised the independence of thirteen colonies ?

(1) Treaty of Paris, 1783.

(2) Treaty of Philadelphia, 1788.

(3) Treaty of Rome, 1791.

(4) Treaty of Vienna, 1803.

Ans. **(1)**

Sol. The Treaty of Paris, 1783 recognised the independence of thirteen colonies.

66. Find out the incident that is related to the unification Germany.

(1) Formation of Zollverein.

(2) The Schleswig-Holstein question.

(3) Civil war

(4) Ems Telegram

Ans. **(4)**

Sol. Ems Telegram is not associated with unification of Germany.

67. Who are known as "Boers" ?

(1) Dutch farmers settled in South Africa.

(2) Norwegian farmers settled in China.

(3) Spanish farmers settled in Chile.

(4) Portuguese farmers settled in Mexico.

Ans. **(1)**

Sol. Dutch farmers settled in Africa were called Boers

68. "That Smallpox signalled God's blessings for the colonist, the natives were near all dead of small pox, so as the lord had cleared our tittle to what we possess." Which Massachusetts Bay colony Governor wrote this to the England Government ?

(1) George Popham (2) Ralegh Gilbert (3) John Winthorp (4) William Bradfort

Ans. **(3)**

Sol. John Winthrop wrote the given lines.

69. The main reason for Gandhiji calling off Disobedience Movement is…

(1) Chauri chaura incident. (2) Poona pact

(3) Gandhi - Irwin pact, (4) Arrival of Simon Commission.

Ans. **(3)**

Sol. Gandhiji called off the civil disobedience movement due to the Gandhi Irwin Pact

70. Which among the following is a main draw back in formation of Simon Commission ?

(1) The Commission did not have a single Indian member.

(2) The Commission constituted of Military officers.

(3) It was more expensive.

(4) All the above.

Ans. **(1)**

Sol. The Simon Commission did not have a single Indian member.

71. The Royal Indian Navy Revolt took place in the year …

(1) 1942 (2) 1944 (3) 1946 (4) 1940

Ans. **(3)**

Sol. The Royal Indian Navy Revolt took place in the year 1946

72. We consider it natural that these two worlds remain distinct what the man gives in courage on the battle field, the gives in eternal self sacrifice, in eternal pain and suffering. Every child that women bring to the world is a battle, a battle waged for the existence of her people." Who said this addressing women ?

(1) Otto von Bismarck (2) Adolf Hitler (3) Benito Mussolini (4) General Franco

Ans. **(2)**

Sol. Adolf Hitler said the given lines.

73. Who founded the Vietnamese Communist party ?

(1) Chinh Phu Ngam (2) Gia Huan Ca (3) Ho Chi Minh (4) Bao Dai

Ans. **(2)**

Sol. Ho Chi Minh was the founder of Vietnamese Communist Party.

74. Name the England poet, who organised funds and later went to fight the war for the independence of Greece, which was a part of Ottoman empire ?

(1) Emily Bronte (2) Lord Byron (3) John Clare (4) Rudyard Kipling

Ans. **(2)**

Sol. Lord Byron is related to the given information.

75. Match the following.

(A)	(B)
(1) Mechanical Repair	(i) James Hargreaves
(2) Spinning Jenney	(ii) Cyrus Mc Cormick
(3) First modern Roads	(iii) Brindley
(4) Modern Canals	(iv) John Loudon Mc Adam

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

Ans. **(4)**

Sol. Mechanical Reaper - Cyrus McCormick

Spinning Jenny - James Hargreaves

First Modern Roads - John Loudon McAdam

Modern Canals - Brindley

76. In which island of Lakshadweep, a bird sanctuary is located ?

(1) Andrott island   (2) Pitti island   (3) Minicoy island   (4) Agatti island

Ans. **(2)**

Sol. A bird sanctuary is situated in Pitti Island, Lakshdweep.

77. In which plain region, Dudhwa National Park is located ?

(1) Bhabar   (2) Bhangar   (3) Khader   (4) Terai

Ans. **(4)**

Sol. Dudhwa National Park is located in Terai region.

78. Match the following.

A		B	
(a) Lake Sambhar		(i) Largest fresh water lake in India.	
(b) Lake Wular		(ii) Back waters of Bhakra Nangal Project	
(c) Guru Gobind Sagar		(iii) Water is used for producing salt	
(d) Ox-bow Lakes		(iv) Formed by Meandering river.	

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

Ans. **(4)**

Sol. Lake Sambhar - Water is used for producing salt

Lake Wular - Largest fresh water lake in India

Guru Gobind Sagar - Backwaters of Bhakra Nangal Project

Ox-Bow lakes - Formed by meandering river

79. Arrange the onset of south west monsoons in an order, where they appear first ?

(1) Mangalore, Daman, Surat, Vadodara.   (2) Daman, Surat, Mangalore, Vadodara.

(3) Mangalore, Surat, Daman, Vadodara.   (4) Vadodara, Daman, Mangalore, Surat.

Ans. **(1)**

Sol. South West Mon soon appears first in Mangalore, Daman, Surat and Vadodara.

80. The roots of which plants are submerged under water ?

(1) Tropical evergreen forests.   (2) Deciduous forests.

(3) Thorny forests.   (4) Wangroove forests.

Ans. **(4)**

Sol. The roots of Mangroove forests are submerged under water

81. In India, most migrations have been from rural to urban areas because of the push factor in rural areas. Which among these is not a push factor ?

(1) Unemployment.   (2) Adverse conditions of poverty.

(3) Seasonal employment.   (4) Better living conditions.

Ans. **(4)**

Sol. Better living conditions are not a push factor for migration.

82. Consider the following statements about population.

(a) Internal migration does not change the size of the population.

(b) Migration among women is mainly due to marriages.

(c) The government of India initiated the comprehensive family planning programme in 1952.

(d) The highest annual growth rate was recorded in the decade 1981.

Which of the statements given above is / are correct.

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

Ans. **(4)**

Sol. All the given statements are correct

83. Coriolis force is maximum at…

(1) the Equator.   (2) the Tropics.   (3) Arctic and Antarctic Circles.   (4) the Poles.

Ans. **(4)**

Sol. Coriolis force is maximum at the poles

84. North South Corridor Project does not pass through …

(1) Jhansi   (2) Nizamabad   (3) Bangalore   (4) Indore

Ans. **(4)**

Sol. Indore is not a part of the North South Corridor

85. Which of these minerals is used in hardening of steel ?

(1) Cooking coal   (2) Lime stone   (3) Manganese   (4) Mica

Ans. **(3)**

Sol. Manganese is used in the hardening of steel

86. Find the wrong one about maize crop.

(1) Maize is a Kharif crop but some states like Bihar grow it in Rabi also.

(2) It is used both as food and fodder.

(3) Major maize producing states are Karnataka and Uttar Pradesh.

(4) Maize is the third most important food crop with respect to area and production.

Ans. (4)

Sol. Maize is not the third most important food crop with respect to area and production.

87. Salal Project is located on river

(1) Chenab   (2) Jhelum   (3) Beas   (4) Ghagra

Ans. (1)

Sol. Salal Dam is located on Chenab river.

88. In which of the following states is / are black soil found ?

(1) Maharashtra   (2) Madhya Pradesh   (3) Telangana   (4) All of the above.

Ans. (4)

Sol. Black Soil is found in all the given states.

89. Find out the writings which is not related to conservation of resources.

(1) Small is beautiful.   (2) Our common future.   (3) The silent spring.   (4) None of the above.

Ans. (3)

Sol. The silent spring is not related to conservation of resources.

90. Find -out the wrong one about Tiger Reserves of India.

(1) Manas Tiger Reserve - Assam   (2) Bandhavgarh National Park - Maharashtra

(3) Periyar National Park - Kerala   (4) Corbett National Park - Uttaranchal.

Ans. (2)

Sol. Bandhavgarh National Park is situated in Madhya Pradesh.

91. Which of the following statements is wrong about today's world ?

(1) The relationship between different countries has become more democratic than ever before.

(2) In more and more countries, rulers are being elected by the people.

(3) There are no military rulers in the world.

(4) None of the above.

Ans. (3)

Sol. There are military rulers in the world even today.

92. Which of the following statements is not a character of democratic elections ?

(1) Everyone should have one vote and every Vote should have equal value.

(2) Elections must be held regularly after every few years.

(3) The candidate preferred by the people should get elected.

(4) he contestant can canvas on the grounds of caste.

Ans. (4)

Sol. The contestants cannot canvas on the grounds of caste as per the rules of model code of conduct.

93. Match the following-

A		B	
(a)	Founder of Republican party of India.	(i)	Shy am Prasad Mukherjee.
(b)	Founder president of Bharatiya Jana Sangh.	(ii)	Jaipal Singh
(c)	Founder of the Swatantra party.	(iii)	B. R. Ambedkar
(d)	Founder of Jharkhand party.	(iv)	K.M. Munshi

Codes

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

Ans. (4)

Sol. Founder of Republican Party of India - B.R Ambedkar

Founder President of Bhartiya Jansangh - Shyama Prasad Mukherjee

Founder of Swatantra Party - K.M Munshi

Founder of Jharkhand Party - Jaipal Singh

94. Who was the president of Constituent Assembly ?

(1) Pt. Jawaharlal Nehru   (2) Dr. Rajendra Prasad   (3) Dr. BR Ambedkar   (4) K.M. Munshi

Ans. (2)

Sol. Dr. Rajendra Prasad was the president of Constituent Assembly

95. The Rajya Sabha can have a maximum strengt h of …

(1) 250   (2) 275   (3) 300   (4) 325

Ans. (1)

Sol. The Rajya Sabha can have a maximum strength of 250

96. Largest income under indirect taxes is obtained from……….

(1) Sales Tax   (2) Excise Tax   (3) Customs Duty   (4) Service Tax

Ans. (2)

Sol. Largest income under indirect taxes is obtained under excise duty.

97. Which of the following statements is wrong about food grains in India ?

(1) The production of the food grains has increased five times over the last five decades.

(2) Today a farmer is able to produce nearly 800 kgs of food grains per acre of cultivable land.

(3) A large stock of food grains has also built up with the government through Central Warehousing Corporation.

(4) None of the above.

Ans. (3)

Sol. A large stock of food grains has also built up with the Food Corporation of India.

98. A person is said to be over weight if the body mass index is more than …

(1) 18   (2) 22   (3) 16   (4) 25

Ans. (4)

Sol. A person is said to be overweight if his/her BMI is above 25.

99. Which of the following neighbouring countries has better performance in terms of expected years of schooling than India ?

(1) Bangladesh   (2) Srilanka   (3) Pakistan   (4) All the above

Ans. **(2)**

Sol. Sri Lanka has better performance than India in terms of expected years of schooling

100. Find out the wrong statement.

(1) Employment in the service sector has not increased the same extent of production.

(2) Most of the workers in the organised sector enjoy the job security.

(3) The activities in primary secondary and tertiary sectors are interdependent

(4) None of the above.

Ans. **(4)**

Sol. The options 1, 2, 3 all are correct, hence the correct answer is option 4.