NATIONAL TALENT SEARCH EXAMINATION (NTSE-2017) STAGE -1
BIHAR STATE : SAT

Date: 13/11/2016

Max. Marks: 100 **Time allowed: 90 mins**

SOLUTIONS

1. A metallic conductor carries 800 mA current from left to right. It means that

(1) 5×10^{18} protons are flowing per sec from left to right.

(2) 5×10^{18} electrons are flowing per sec from right to left.

(3) 8×10^{2} electrons are flowing per per sec from right to left.

(4) 5×10^{18} protons are flowing per per sec from left to right and 5×10^{18} electrons are flowing per sec from right to left.

Ans. (2)

Sol. $I = 800mA = 800 \times 10^{-3}A$

$e = 1.6 \times 10^{-19}C$

$Q = ne$

$$I = \frac{Q}{t}$$

$Q = It = 800 \times 10^{-3}\ C$

$$n = \frac{800 \times 10^{-3}}{1.6 \times 10^{-19}} = 5 \times 10^{18}$$ electrons are flowing per second from right to left.

2. Ohm's law (I = V/R) is applicable for

(1) All types of conductors of electricity

(2) Only metallic conductors of electricity

(3) Only semi conductors of electricity

(4) Only for metallic and ionic conductors of electricity

Ans. (2)

Sol. Ohm's law is applicable for only metallic conductors of electricity

3. A copper wire has a resistance of 8 ohm. The wire is stretched to double of its original length. Its new resistance will be

(1) 8 ohm (2) 16 ohm (3) 32 ohm (4) 64 ohm

Ans. (3)

Sol. $$R = \frac{\rho \ell}{A} = 8\ \Omega$$

$\ell = 2\ell$

lnitial volume = final volume

$A\ell = A' \times \ell'$

$A \times \ell = 2 \times A'$

$$A' = \frac{A}{2}$$

$$R' = \rho \frac{\ell'}{A'} = \frac{\rho \times 2\ell}{A/2} = 4\frac{\rho \ell}{A} = 4R = 32\ \Omega$$

4. A beam of light traveling in air enters into a liquid. Its speed reduces by 30%. The refractive index of liquid with respect to air is

(1) 10/7 (2) 10/3 (3) 7/5 (4) 4/3

Ans. ***(1)***

Sol. Speed of light in air = v

Speed of light in liquid = v – 0.3 v = 0.7 v

Refractive index (μ) = $\frac{v_1}{v_2} = \frac{v}{0.7v} = \frac{10}{7}$

5. The refractive index of a liquid is 5/3. A ray of light travelling in this liquid falls at interface of liquid and air. At what angle of incidence should it fall on liquid air interface so that it suffers total internal reflection ?

(1) 53° (2) 24° (3) 15° (4) 17°

Ans. ***(1)***

Sol. $n_{21} = \frac{\sin i_c}{\sin r}$

$\frac{1}{5/3} = \frac{\sin i_c}{\sin 90°}$

$\sin i_c \geq \frac{3}{5}$ (Angle of incidence should be greater than critical angle)

$i_c = 53°$

6. A beam of light in air is incident upon the smooth plane surface of a piece of flint glass making an angle of 30° with its plane. If the reflected beam and refracted beam are perpendicular to each other, what is the index of refraction of flint glass with respect to air ?

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

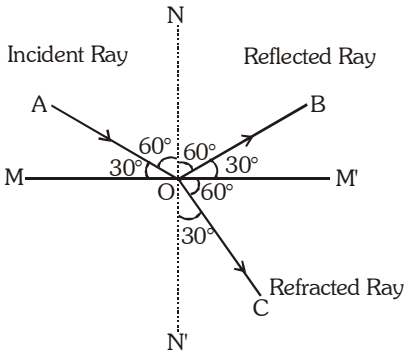
Ans. ***(4)***

Sol. Angle i = 60°

Angle r = 60° [Law of reflection]

From the figure it is clear that

Angle of refraction = 30°



$\frac{\sin i}{\sin r} = \frac{n_2}{n_1}$

$\frac{\sqrt{3}/2}{1/2} = n_{21}$

$\sqrt{3} = n_{21}$

7. The image created by a converging lens is projected on a screen that is 60 cm away from the lens. If the height of the image is one fourth the height of the object, what is focal length of the lens ?

(1) 36 cm (2) 45 cm (3) 80 cm (4) 48 cm

Ans. ***(3)***

Sol. $m = \frac{h_2}{h_1} = \frac{1}{4}$, v = 60 cm

$m = \frac{f - v}{f} \Rightarrow mf = f - v$

$v = f(1 - m) \Rightarrow f = \frac{v}{1 - m}$

$f = \frac{60}{3/4} = 80$ cm

8. An electric bulb is marked (60 W, 120 V). What is the resistance of filament of bulb ?

(1) 2 Ω (2) 30 Ω (3) 240 Ω (4) 720 Ω

Ans. ***(3)***

Sol. P = 60 W, V = 120 V

$$P = P = \frac{V^2}{R} \Rightarrow R = \frac{V^2}{P}$$

$$R = \frac{120 \times 120}{60} = 240\ \Omega$$

9. A battery whose emf is 40 V has an internal resistance 5 Ω. If this battery is connected across a 15 Ω resistor (R) what will be voltage drop across resistor (R) ?

(1) 10 V (2) 30 V (3) 40 V (4) 50 V

Ans. ***(2)***

Sol. ε = 40 V, r = 5 Ω, R = 15 Ω

$$I = \frac{E}{r+R} = \frac{40}{20} = 2\ A$$

$V = E - I\,r = 40 - (2 \times 5)$

$= 30\ V$

10. Three identical bulbs B_1, B_2 & B_3 are connected in parallel across terminals of an ideal source of emf. What will happen if bulb B_2 burns out ?

(1) Bulb B_1 and B_3 will also burn out (2) Bulb B_1 and B_3 will give less light

(3) Bulb B_1 and B_2 will give more light (4) Bulb B_1 and B_3 will give same light

Ans. ***(4)***

Sol. Bulb B_1 and B_3 will give same light as they are connected in parallel.

11. A bar magnet is cut into two equal parts by cutting it very slowly perpendicular to its length. Which of the following is true ?

(1) Each part will be a bar magnet having two equal and opposite poles same as original magnet.

(2) One part will have a N-pole and other part will have a S-pole of same strength as original magnet.

(3) Each part will be a bar magnet having two equal and opposite poles of strength half of original magnet.

(4) None of two parts will be a magnet.

Ans. ***(3)***

Sol. Each part will be a bar magnet having two equal and opposite pole of strength half of original magnet.

12. Which of the following can not form a real image for a divergent beam of light ?

(1) Plane mirror only (2) Convex mirror only

(3) Concave lens only (4) All of above

Ans. ***(4)***

Sol. Plane mirror, convex mirror and concave lens all can not form a real image for a divergent beam of light.

13. Three resistors of resistance $\frac{1}{60}\ \Omega$, $\frac{1}{30}\ \Omega$ and $\frac{1}{20}\ \Omega$ are joined in parallel. The equivalent resistance of combination will be

(1) $\frac{1}{110}\ \Omega$ (2) $\frac{1}{10}\ \Omega$ (3) 110 Ω (4) 10 Ω

Ans. ***(1)***

Sol. $$\frac{1}{R_a} = \frac{R}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

$$= \frac{60}{1} + \frac{30}{1} + \frac{30}{1} = \frac{110}{1}$$

$$R_a = \frac{1}{110}\ \Omega$$

14. The spectrum of He^+ is expected to be similar to that of

(1) H (2) Li (3) Na (4) He

Ans. ***(1)***

Sol. He^+ has only one electron in its shell so it shows same spectrum as hydrogen.

15. Which of the following oxoacids of phosphorus as used in the preparation of Graham's salt ?

(1) H_3PO_3 (2) $H_4P_2O_7$ (3) HPO_3 (4) $H_2P_2O_5$

Ans. ***(3)***

Sol. Meta phosphoric acid is used in preparation of Graham's salt. Meta phosphoric acid is $H_3P_3O_9$ thus in the given option correct answer is HPO_3.

16. In the reaction

$$Cr_2O_7^{2-} + 14H^+ + 6e \rightarrow 2Cr^{3+} + 7H_2O$$

The equivalent weight of $K_2Cr_2O_7$ in acidic medium will be

(M = molecular weight of $K_2Cr_2O_7$)

(1) M/3 (2) M/9 (3) M/12 (4) M/6

Ans. ***(4)***

Sol. $$\text{Equivalent weight} = \frac{\text{molecular weight}}{\text{number of electrons transfered in redox reaction}}$$

$$Cr_2O_7^{2-} + 14H^{\oplus} + 6e^- \rightarrow 2Cr^{3+} + 7H_2O$$

Oxidaton number of Cr in $Cr_2O_7 = +6$

Oxidaton number of Cr in $Cr^{3+} = +3$

Change in electrons $= 6 - 3 \Rightarrow 3$/mole

Equivalent weight = M/6.

17. For the reaction $A_2 + 2B \rightarrow 2AB$, the following data were collected.

[A]	***[B]***	***Rate (mol $L^{-1}s^{-1}$)***
0.1	0.01	1.5×10^{-3}
0.1	0.04	6.0×10^{-3}
0.2	0.01	3.0×10^{-3}

The total order of the reaction is

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

Ans. ***(2)***

Sol. According to data

On increasing the concentration of reactant B four time rate of reaction will be four times.

Rate of reaction α [B].

On increasing the concentration of reactant A double time rate of reaction will be double.

Rate of reaction α [A].

total order of reaction $[A]^1$ $[B]^1$.

Thus it is second order of reaction.

18. The correct relationship between the free-energy change in reaction and the corresponding equilibrium constant K_c is

(1) $\Delta G = RT \ell n K_C$ (2) $\Delta G = RT \ell n K_C$ (3) $\Delta G^0 = RT \ell n K_p$ (4) $-\Delta G^0 = RT \ell n K_p$

Ans. ***(NA)***

Sol. The correct relationship between the free energy change in a reaction and the corresponding equilibrium constant K_c is $\rightarrow \Delta G = \Delta G° + RT \log K_C$, $\Delta G = O$ at equilibrium.

$-\Delta G° = RT \log K_C$

No such option is correct.

19. The general experssion for the solubility product of A_xB_y will be

(1) $K_{sp} = x^2y^2S^{xy}$ (2) $K_{sp} = (xy)^{x+y}S^{x+y}$ (3) $K_{sp} = (x^xy^y)S^{x+y}$ (4) $K_{sp} = x^y y^xS^{x+y}$

Ans. ***(2)***

Sol. $A_xB_y \rightleftharpoons yA^+ + xB^-$

Solubility at equilibrium: yS xS

$K_{sp} = (ys)^y (xs)^x = (xy)^{x+y}(S)^{x+y}$.

20. In a glavanic cell

(1) Electrical energy is converted into chemical energy

(2) Chemical energy is converted into electrical energy

(3) The anode is the negative and the cathode is the positive

(4) Redox reaction does not occur automatically

Ans. ***(2)***

Sol. In a galvanic all chemical energy is converted into electrical energy. It is a electrochemical cell.

21. The chemical formula of borax is

(1) $Na_2B_4O_7.10H_2O$ (2) $Na_2B_4O_7.18H_2O$ (3) $Na_2B_4O_7.18H_2O$ (4) $Na_2B_4O_7.6H_2O$

Ans. ***(1)***

Sol. Chemical formula of borax = $Na_2B_4O_7 . 10H_2O$

22. Match the List-I and List-II and select the correct answer using the code given below the Lists.

List-I (conversion)	***List-II (Name of process)***
(I) NaCl to Na	(i) Castner-Kellner Process
(II) NaCl to Na_2SO_4	(ii) Spring Reaction
(III) NaCl to NaOH	(iii) Down Process
(IV) Na_2SO_3 to $Na_2S_2O_3$	(iv) H_2SO_4

Which of the following is correcly matched ?

(1) I-iii, II-iv, III-i, IV-ii (2) I-iv, II-ii, III-i, IV-iii

(3) I-i, II-ii, III-iii, IV-iv (4) I-ii, II-iii, III-iv, IV-i

Ans. ***(1)***

Sol. I. NaCl to Na $\rightarrow$ electrolysis process of NaCl is known as down process

II. NaCl to NaOH $\rightarrow$ electrolysis of brine is known as castner - kellner process.

23. NaOH reacts with CO at 200°C and 5 atmospheric pressure to give

(1) CH_3CH_2COONa (2) C_6H_5COONa (3) HCOONa (4) CH_3COONa

Ans. ***(3)***

Sol. $NaOH + CO \xrightarrow[5\,atm]{200^\circ C} \underset{\text{Sodium formate}}{HCOONa}$

24. The general electronic configuration of the transition elements is

(1) $(n-1)d^{10}(n+1)s^2$ (2) $(n-1)d^{1-10}(n+1)s^{1-2}$

(3) $(n-1)d^{1-10}np^6ns^2$ (4) $(n-1)d^{1-10}ns^{0-2}$

Ans. ***(4)***

Sol. The general electronic configuration of transition elements is $(n-1)d^{1-10}ns^{0-2}$ as transition elements are elements in which last electron lies in d-shell.

25. Which of the following is the strongest acid ?

(1) $F_2CHCOOH$ (2) $ClCH_2COOH$ (3) FCH_2COOH (4) $Cl_2CHCOOH$

Ans. (1)

Sol. Due to–I effect of fluorine – COOH group can easily remove H^+ ions. So it is strongest acid.

26. Nitrobenzene can be prepared by heating benzene with a mixture, concentrated HNO_3 and concentrated H_2SO_4. In this nitrating mixture, HNO_3 acts as

(1) A base (2) An acid (3) A catalyst (4) A reducing agent

Ans. (1)

Sol. In nitration of benzene ring HNO_3 acts as base due to accepting the proton.

27. Match the items in column-I with those in column-II and Select the correct choice

Column-I	***Column-II***
(A) Autotrophic	(I) Kidney
(B) Conducting tissue	(II) Protein
(C) Excretory organ	(III) Green plants
(D) Pepsin	(IV) Xylem

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

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

Ans. (2)

Sol. (A) Autotrophic → (III) Green plants

(B) Conducting tissue → (IV) Xylem

(C) Excretary organ → (I) Kidney

(D) Pepsin → (II) Protein

28. Which one of the following is insectivorous plant ?

(1) Drosera (2) Nepenthes (3) Both (1) and (2) (4) Hydrilla

Ans. (3)

Sol. Drosera and Nepenthes both are insectivorous plants.

29. In human blood group AB

(1) Antibodies are present (2) Antibodies are absent

(3) Antibody a is present (4) Antibody b is present

Ans. (2)

Sol. In human blood group AB, both antigens A and B are present so both the antibodies remain absent.

30. Honey is made by

(1) Male honey bee (2) Queen honey bee (3) Worker honey bee (4) Both (1) and (2)

Ans. (3)

Sol. Honey is made by worker honey bee.

31. In Mendel's Monohybrid cross, the F_2 phenotypic ratio is

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

Ans. (1)

Sol. Phenotypic ratio of f_2 generation of Mendel's monohybrid cross is 3 : 1 i.e. 3 tall : 1 dwarf.

32. Sexually transmitted disease is

(1) Measles (2) T.B (3) Gonorrhoea (4) Typhoid

Ans. (3)

Sol. Sexually transmitted disease is Gonorrhoea.

33. In ecosystem the flow of energy is

(1) Unidirectional (2) Bidirectional (3) Multidirectional (4) All of these

Ans. ***(1)***

Sol. Flow of energy in an ecosystem occur in one direction only.

34. Regulation of Spermetogensis is done by

(1) Oestrogen (2) L.H (3) Androgen (4) None of these

Ans. ***(3)***

Sol. Spermetogenesis regulated by hormone androgen i.e. testosterone.

35. Which of the following is renewable resource ?

(1) Solar energy (2) Air (3) Petroleum (4) Water

Ans. ***(1), (2), (4)***

Sol. Solar energy, air and water are renewable resources.

36. Which vitamin is present in Golden rice ?

(1) Vitamin A (2) Vitamin B_{12} (3) Vitamin C (4) Vitamin D

Ans. ***(1)***

Sol. Vitamin A found in golden rice which is a genetically engineered rice to enrich vitamin A in it.

37. Aril is edible in which of the following fruit ?

(1) Annona (2) Myristica (3) Litchi (4) All of these

Ans. ***(4)***

Sol. Aril is edible in Annona, Myristica and Litchi.

38. Semen is frozen in

(1) Liquid nitrogen (2) Refrigerator (3) Ice (4) All of these

Ans. ***(1)***

Sol. Semen can be frozen in Liquid nitrogen.

39. Diploid is

(1) Ovum (2) Polleu (3) Both (1) and (2) (4) Zygote

Ans. ***(4)***

Sol. Zygote forms by fusion of two haploid gametes so formed as diploid cell.

40. T-lymphocytes originate from

(1) Bone marrow (2) Stomach (3) Thymus (4) Liver

Ans. ***(1)***

Sol. T-lymphocytes originate from Bone-Marrow.

41. The wheel of a motor car makes 1000 revolutions in moving 440 m. The diameter of the wheel is

(1) 0.44 m (2) 0.14 m (3) 0.24 m (4) 0.34 m

Ans. ***(2)***

Sol. $2\pi r \times 1000 = 440$

$$r = \frac{440}{2\pi \times 1000} = 0.07$$

diameter $= 2r = 2 \times 0.07 = 0.14$ m

42. The value of $\frac{(0.03)^2 - (0.01)^2}{0.03 - 0.01}$ is

(1) 0.02 (2) 0.004 (3) 0.4 (4) 0.04

Ans. ***(4)***

Sol. $\frac{(0.03)^2 - (0.01)^2}{0.03 - 0.01}$

$$= \frac{\left(\frac{3}{100}\right)^2 - \left(\frac{1}{100}\right)^2}{\frac{3}{100} - \frac{1}{100}} = \frac{\frac{9}{10000} - \frac{1}{10000}}{\frac{3}{100} - \frac{1}{100}}$$

$$= \frac{\frac{8}{10000}}{\frac{2}{100}} = \frac{4}{100} = 0.04$$

43. If thesum of two numbers is 22 and sum of their squares is 404 then the product of the number is

(1) 40 (2) 44 (3) 80 (4) 88

Ans. ***(1)***

Sol. Let the two numbers be x and y.

$x + y = 22$ ..... (1)

$x = 22 - y$

and $x^2 + y^2 = 404$

$(22 - y)^2 + y^2 = 404$ from equation (1)

$484 + y^2 - 44y + y^2 = 404$

$2y^2 - 44y + 80 = 0$

$y^2 - 22y + 40 = 0$

$y^2 - 20y - 2y + 40 = 0$

$(y - 20)(y - 20) = 0$

$y = 20$

$x = 22 - 20 = 2$

$\therefore$ product of the numbers $= x \times y = 20 \times 2 = 40$

44. How many seconds will a 500 m long train take to cross a man, walking with a speed of 3 km/h. in the direction of the moving train if the speed of the the train is 63 km/h ?

(1) 25 sec (2) 30 sec (3) 40 sec (4) 45 sec

Ans. ***(2)***

Sol. $\frac{L_1 + L_2}{S_1 - S_2}$

$L_1 = 500$ m $= 0.5$ km

$L_2 = 0$

$S_1 = 63$ km/hr

$S_2 = 3$ km/hr

$$= \frac{0.5}{63 - 3} = \frac{0.5}{60} = \frac{1}{120} \text{ hr}$$

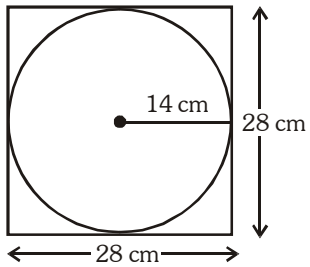
$$= \frac{1}{120} \times 3600 = 30 \text{ sec.}$$

45. The area (in sq. cm) of the largest circle that can be drawn inside a square of side 28 cm is

(1) 17248 (2) 784 (3) 8624 (4) 616

Ans. ***(4)***

Sol.



Area $= \pi \times r^2$

$= \frac{22}{7} \times 14 \times 14$

$= 616\ cm^2$

46. If the cost price of 12 pens is equal to the selling price of 8 pens, the gain percent is

(1) $33\frac{1}{3}\%$ (2) $66\frac{2}{3}\%$ (3) 25% (4) 50%

Ans. ***(4)***

Sol. Given cost price of 12 pens = selling price of 8 pens

Let cost price of 1 pen = Rs 1

$\therefore$ Cost price of 12 pens = Rs. 12

Selling price of 8 pens = Rs.12

and cost price of 8 pens = Rs. 8

$$\text{Gain}\% = \frac{\text{SP of 8pens} - \text{CP of 8 pens}}{\text{CP of 8 pens}} \times 100$$

$$= \frac{12-8}{8} \times 100 = \frac{4}{8} \times 100 = \frac{100}{2} = 50\%$$

47. What is the least number which when divided by 42, 72 and 84 leaves the remainder 25,55 and 67 respectively ?

(1) 521 (2) 512 (3) 504 (4) 487

Ans. ***(4)***

Sol. L.C.M of 42, 72 and 84

2	42, 72, 84
3	21, 36, 42
7	7, 12, 14
2	1, 12, 2
2	1, 6, 1
3	1, 3, 1
	1, 1, 1

L.C.M $= 2 \times 3 \times 7 \times 2 \times 2 \times 3$

$= 42 \times 12$

$= 504$

Required number $= 504 - 17$

$= 487$

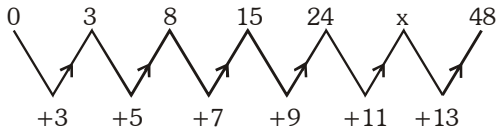
48. The missing term in the sequence 0,3,8,15,24,.....48 is

(1) 35 (2) 30 (3) 36 (4) 39

Ans. (1)

Sol. Let the missing term be x.

From the series it is found that the series is heading with increasing odd numbers from 3.



$\therefore \quad x = 24 + 11 = 35$

and $35 + 13 = 48$

49. The compound interest on Rupees 1000 in 2 years at 4% per annum, the interest being compounded half yearly is

(1) Rs. 636.80 (2) Rs. 824.32 (3) Rs. 912.86 (4) Rs. 828.82

Ans. (NA)

Sol. Amount $= P\left(1+\frac{R}{2\times100}\right)^{2t}$ (when compounded half yearly)

$$=1000\left(1+\frac{4}{2\times100}\right)^{2\times2}$$

$$=1000\left(1+\frac{2}{100}\right)^{4} =1000\left(\frac{51}{50}\right)^{4}$$

$= 1000\,(1.02)^4$

$= \quad 1082.4$

C.I = A – P

= 1082.4 – 1000

= 82.432

50. If 70% of the students in a school are boys and the number of girls be 504, the number of boys is

(1) 1176 (2) 1008 (3) 1208 (4) 3024

Ans. (1)

Sol. If 70% of the students in a school are boys then number of girls = 30%

Let total number of students = x

$$\therefore \quad \frac{30}{100}\times x = 504$$

$$x = \frac{504\times100}{30} = 1680$$

Number of boys $= \frac{70}{100} \times 1680 = 1176$

51. The mess charges for 35 students for 24 days is Rs. 6300. In how many days will the mess charge be Rs. 3375 for 25 students.

(1) 12 (2) 15 (3) 18 (4) 21

Ans. (3)

Sol. The mess charges for 35 students for 24 days is 6300

35 students for 24 days = Rs. 6300

For 1 day $= \frac{6300}{24} = 262.5$

Mess charge of 1 student $= \frac{262.5}{35} = 7.5$

$\therefore$ Let in 'd' days the mess charge be Rs. 3375 for 25 students.

$\therefore$ $7.5 \times 25 \times d = 3375$

$d = \frac{3375}{7.5 \times 25}$

$d = 18$

52. If the volume of two cubes are in the ratio 27 : 64, then the ratio of their total surface area is

(1) 27 : 64 (2) 3 : 4 (3) 9 : 16 (4) 3 : 8

Ans. ***(3)***

Sol. Let a_1 and a_2 be the side of two cubes.

$\therefore \quad \frac{V_1}{V_2} = \frac{27}{64} \Rightarrow \frac{a_1^3}{a_2^3} = \frac{27}{64} \Rightarrow \frac{a_1}{a_2} = \frac{3}{4}$

Now ratio of total surface area will be

$\frac{6a_1^2}{6a_2^2} = \left(\frac{a_1}{a_2}\right)^2 = \left(\frac{3}{4}\right)^2 = \frac{9}{16}$

53. If $1^3 + 2^3 + \ldots\ldots + 10^3 = 3025$ then $4 + 32 + 108 + \ldots\ldots + 4000$ is equal to

(1) 1200 (2) 12100 (3) 12200 (4) 12400

Ans. ***(2)***

Sol. $1^3 + 2^3 + \ldots\ldots\ldots\ldots + 10^3 = 3025$

$4 + 32 + 108 + \ldots\ldots\ldots\ldots + 4000$

$= 4\,[1 + 8 + 27 + \ldots\ldots + 4000]$

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

$= 4 \times 3025$

$= 12100$

54. What is the square root of $9 + 2\sqrt{14}$?

(1) $1 + 2\sqrt{2}$ (2) $\sqrt{3} + \sqrt{6}$ (3) $\sqrt{2} + \sqrt{7}$ (4) $\sqrt{2} + \sqrt{5}$

Ans. ***(3)***

Sol. $\sqrt{9 + 2\sqrt{14}}$

$= \sqrt{9 + 2\sqrt{2 \times 7}} = \sqrt{9 + 2\sqrt{2}\sqrt{7}}$

$= \sqrt{(\sqrt{2})^2 + (\sqrt{7})^2 + 2\sqrt{2}\sqrt{7}}$

$= \sqrt{(\sqrt{2} + \sqrt{7})^2} = \sqrt{2} + \sqrt{7}$

55. 7 Oranges are bought for Rs. 3. At what rate per hundred must be sold to gain 33%

(1) Rs. 56 (2) Rs. 60 (3) Rs. 58 (4) Rs. 57

Ans. ***(4)***

Sol. Cost of 7 oranges = Rs. 3

cost of 1 orange = $\frac{3}{7}$

cost of 100 oranges = $\frac{3}{7}\times 100$

C.P of 100 ranges = 42.85

Let S.P of 100 organges = x.

$\therefore$ Gain% = 33 = $\frac{x-(42.85)}{42.85}\times 100$

14.14 = x – 42.85

x = 56.99

x = 57

56. $\sqrt[3]{1-\frac{127}{343}}$ is equal to

(1) $\frac{5}{9}$ (2) $1-\frac{1}{7}$ (3) $\frac{4}{7}$ (4) $1-\frac{2}{7}$

Ans. ***(2)***

Sol. $\sqrt[3]{1-\frac{127}{343}} = \sqrt[3]{\frac{343-127}{343}} = \sqrt[3]{\frac{216}{343}} = \sqrt[3]{\left(\frac{6}{7}\right)^3}$

$= \frac{6}{7} = 1-\frac{1}{7}$

57. Two numbers are in the ratio 3 : 4. If 5 is subtracted from each, then the ratio will be 2 : 3. What is the smallest number ?

(1) 15 (2) 18 (3) 20 (4) 24

Ans. ***(1)***

Sol. Let the two numbers be a and b.

$\therefore \quad \frac{a}{b}=\frac{3}{4} \Rightarrow a=\frac{3b}{4}$ ..... (1)

If 5 is subtracted from each then ratio will be

$\frac{a-5}{b-5}=\frac{2}{3}$

3a – 15 = 2b – 10

3a – 2b = 5

$3\left(\frac{3b}{4}\right)-2b=5$ (from equation (1))

$\frac{9b}{4}-2b=5 \Rightarrow \frac{9b-8b}{4}=5 \Rightarrow \frac{b}{4}=5$

b = 20

$a=\frac{3\times 20}{4}=15$

$\therefore$ Smallest number is 15

58. The present age difference between father and son is 14 years. The ratio of their age will be 4 : 3 after 11 years. How old is son now ?

(1) 25 yrs (2) 31 yrs (3) 30 yrs (4) 28 yrs

Ans. ***(2)***

Sol. Let the present age of father and son be f and s respectively.

$\therefore$ $f - s = 14$

$f = 14 + s$

After 11 years

$$\frac{f+11}{s+11} = \frac{4}{3}$$

$3f + 33 = 4s + 44$

$3f - 4s = 11$

$3(14 + s) - 4s = 11$

$42 + 3s - 4s = 11$

$s = 31$

$\therefore$ son is of 31 years.

59. If the side of a square is increased by 25% then, how much percent does its area gets increased

(1) 56.25% (2) 50% (3) 12.5% (4) 156.25%

Ans. ***(1)***

Sol. Let the side of a square be a

$\therefore$ Area $= a^2$

If side is increased by 25% then now side is $= a + \frac{25}{100} a$

New side $= \frac{125a}{100}$

New area $= \left(\frac{125a}{100}\right)^2 = \frac{25a^2}{16}$

% age increase $= \frac{\frac{25a^2}{16} - a^2}{a^2} \times 100$

$= \frac{900}{16} = 56.25\%$

60. What is the value of $2.\overline{6} - 1.\overline{9}$?

(1) $0.\overline{6}$ (2) $0.\overline{9}$ (3) $0.\overline{7}$ (4) 0.7

Ans. ***(1)***

Sol. $x = 2.\overline{6}$

$= 2 + \frac{6}{9}$

$y = 1.\overline{9}$

$= 1 + \frac{9}{9}$

$x - y = 2 + \frac{6}{9} - \left(1 + \frac{9}{9}\right)$

$= 1 - \frac{3}{9}$

$= \frac{6}{9}$

$= 0.\overline{6}$

61. Brazil was discovered in

(1) 1500 (2) 1505 (3) 1510 (4) 1515

Ans. (1)

Sol. Europeans arrived in Brazil at the opening of the 16th century. The first European to colonize Brazil was Pedro Álvares Cabral on April 22, 1500 under the sponsorship of the Kingdom of Portugal. From the 16th to the early 19th century, Brazil was a colony and a part of the Portuguese Empire.

62. Magna Carta or the Great Charter was signed in

(1) 1210 (2) 1215 (3) 1220 (4) 1225

Ans. (2)

Sol. The Magna Carta was signed in June 1215 between the barons of Medieval England and King John. 'Magna Carta' is Latin and means "Great Charter".

63. Habeas Corpus Act was passed in ?

(1) 1679 (2) 1683 (3) 1691 (4) 1697

Ans. (1)

Sol. The Habeas Corpus Act 1679 is an Act of the Parliament of England passed during the reign of King Charles II by what became Habeas Corpus.

64. "Boston Tea Party" incident happened in ?

(1) 1770 (2) 1771 (3) 1772 (4) 1773

Ans. (4)

Sol. On the night of December 16, 1773, Samuel Adams and the Sons of Liberty boarded three ships in the Boston harbor and threw 342 chests of tea overboard. This resulted in the passage of the punitive Coercive Acts in 1774 and pushed the two sides closer to war.

65. America was discovered in ?

(1) 1491 (2) 1492 (3) 1493 (4) 1494

Ans. (2)

Sol. Christopher Columbus Discovered America in 1492.

66. Who is known as "Father of History" ?

(1) Mark Antony (2) Nero (3) Herodotus (4) Homer

Ans. (3)

Sol. Herodotus, later famous as a historian to the point of becoming known by his admirers as the 'father of history'.

67. What is the name of autobiography of Adolf Hitler ?

(1) First Attack (2) Mein Kampf (3) My Spirit (4) Ray of Hope

Ans. (2)

Sol. Mein Kampf was the autobiography of Adolf Hitler.

68. The Parliament of Great Britain was formed in the year

(1) 1705 (2) 1706 (3) 1707 (4) 1708

Ans. (3)

Sol. The Parliament of Great Britain was formed in 1707 following the ratification of the Acts of Union by both the Parliament of England and the Parliament of Scotland.

69. The first news paper in the world was started by ?

(1) Japan (3) China (3) USA (4) India

Ans. (2)

Sol. China started the first newspaper in 1582.

70. In which year, first census was conducted in India ?

(1) 1884 (2) 1872 (3) 1881 (4) 1856

Ans. (2)

Sol. The first census was conducted in India in 1872, but regular census started in 1881.

71. Who was elected the President of Indian National Congress in the Surat Session 1907 famous for Surat Split ?

(1) Dr. Rash Bihari Ghosh (2) Lala Lajpat Rai

(3) Dadabhai Naoroji (4) Pherozeshah Mehta

Ans. (1)

Sol. Surat Session was led by Rash Bihari Ghosh

72. Who among the following was the first Indian Woman President to chair the Indian National Congress at Kanpur session of 1925 ?

(1) Sarojini Naidu (2) Annie Beasant (3) Nellie Sengupta (4) Indira Gandhi

Ans. (2)

Sol. Anni Besant was the first woman president of INC.

73. Cotton is an important agro-based industrial raw material. Which row of states is most important in the production of this raw material ?

(1) Gujarat, Uttar Pradesh, Bihar (2) Maharastra, Tamilnadu, Punjab

(3) Tamilnadu, Kerala, Goa (4) Karnataka, Odisha, Jharkhand

Ans. (1)

Sol. Gujarat, Uttar Pradesh, Bihar.

74. Which row of states has been important for the production of pulses in India ?

(1) Kerala, Bihar, Jharkhand (2) Bihar, Uttar Pradesh, West Bengal

(3) Rajasthan, Madhya Pradesh, Uttar Pradeshy (4) Uttar Pradesh, Assam, Orissa

Ans. (3)

Sol. Rajasthan, Madhya Pradesh, Uttar Pradesh

75. Select the correct statement

(1) Damodar Valley Multipurpose River Valley Project has increased the flood frequency in West Bengal

(2) River Damodar directly goes to the Bay of Bengal

(3) Damodar Valley multipurpose river valley project benfits the states of west Bengal and Jharkhand

(4) River Subernrekha is a tributary of river Damodar

Ans. (3)

Sol. Damodar Valley multipurpose river valley project benefits the states of West Bengal and Jharkhand.

76. ***Assertion (A) :*** Most of the coal of India are reserved in Chattisgarh. Jharkhand and Odisha.

Reason (R) : Coal reserves occur in sedimentary rocks.

(1) Both A and R are true and R explains A

(2) Both A and R are true but R does not explain A

(3) A is true but R is false

(4) A is false but R is true

Ans. (1)

Sol. Both A and R are true.

77. Nanda Devi biosphere is istuated in the state of

(1) Nagland (2) Arunachal Pradesh (3) Tripura (4) Uttarakhand

Ans. (4)

Sol. Nand Devi biosphere is situated in Uttarakhand.

78. Barh Super Thermal Power station is situated in the state of

(1) Bihar (2) Andhra Pradesh (3) Rajasthan (4) Punjab

Ans. (1)

Sol. Barh Super Thermal Power Station or NTPC Barh is located in Barh in the Indian state of Bihar.

79. India is the largest producer of

(1) Wheat (2) Maize (3) Rice (4) Milk

Ans. (4)

Sol. Out of the given options, India is the largest producer of milk.

80. Sugar Mills of Bihar are principally situated in the districts of

(1) Patna and Nalanda (2) Munger and Gaya

(3) West Champaran and East Champaran (4) Katihar and Purnea

Ans. (3)

Sol. The belt of eastern Uttar Pradesh extends further in Bihar and the districts of Darbhanga , Saran , Champaran, and Muzaffarpur are included here.

81. Which row of the given table is correct ?

	Major Port	***State***
(1)	Kandala	Maharastra
(2)	Mangalore	Karnataka
(3)	Marmagao	Kerala
(4)	Haldia	Odisha

Ans. (2)

Sol. Kandala is located in Gujarat, Marmagao in Goa, Haldia in Kolkata, Mangalore in Karnataka. Hence 2 is the correct match.

82. Which state of India is famous for Jute textile industry ?

(1) Tripura (2) Assam (3) Bihar (4) West Bengal

Ans. (4)

Sol. West Bengal is the hub of jute production.

83. Select the correct statement

(1) Contour lines connect the spots of equal height

(2) Contour lines help in measuring the height of mountain peak

(3) Contour lines help in under standing the Ocean Currents

(4) Contour lines help in under standing the nature of rock structure.

Ans. (4)

Sol. Contour lines connect the spots of equal height.

84. Which places were first connected by railways in India ?

(1) Kolkata to Patna (2) Chennai to Rameshwaram

(3) Mumbai to Thane (4) Mumbai to Pune

Ans. (3)

Sol. First railway line - Mumbai to Thane.

85. In the reference of Right to Information 2005, which of the following institution and its highest information official is not correctly matched ?

Institution

(1) Supreme Court

(2) Union Public Service Commission

(3) Lok Sabha

(4) State's High Court

Competent Official

(1) The Chief Justice of India

(2) The Chairman, Union Public Service Commission

(3) The Speaker, Lok Sabha

(4) The Chief Justice of High Court

Ans. (2)

Sol. Joint Director in case of UPSC.

86. To which article of the Indian constitution is the verdict of S. R. Bommai versus Union of India related ?

(1) Article-29 (2) Article-32 (3) Article-353 (4) Article-356

Ans. (4)

Sol. S. R. Bommai v. Union of India was a landmark judgment of the Supreme Court of India, where the Court discussed at length provisions of Article 356 of the Constitution of India and related issues. This case had huge impact on Centre-State Relations.

87. In the constitution of India the provision related to which of following is not clearly mentioned ?

(1) Inter State Council (2) All India Service

(3) The Contingency Fund of India (4) National Development Council

Ans. (4)

Sol. NDC is an Extra Constitutional and Non Statutory Body.

88. Which of the following does recognize the political parties in India ?

(1) The Speaker of the Lok Sabha (2) The President

(3) The Election Commission (4) d

Ans. (3)

Sol. Election Commission recognizes the political parties in India and also assigns political symbols to them.

89. What is Pressure group ?

(1) A group struggline for power

(2) A group struggling for fulfilling its own interest

(3) Political Party

(4) Private group

Ans. (4)

Sol. It pressurises the government to change or modify its policies.

90. Of the following what are the main functions of a political party

(i) Role of Opposition

(ii) To contest election for getting power

(iii) Development of political awareness among the people

(iv) Formation of the government

(1) (i) and (ii) (2) (ii) and (iii) (3) (iii) and (iv (4) All the above

Ans. (4)

Sol. All of these are the functions of a political party.

91. What is the objective of Panchayati Raj System ?

(i) Decentralization of Power

(ii) Local participation in the government system

(iii) Undemocratization of system

(iv) Unitary government

(1) (i) and (iii) (2) (i) and (ii) (3) (iii) and (iv) (4) All the above

Ans. (2)

Sol. Decentralisation of power and local participation.

92. Which of the following factors does affect the voting behavior of voters in India ?

(i) Caste (ii) Religion (iii) Constitution (iv) Region

(1) (i) and (iv) (2) (i) and (ii) (3) (i), (ii) and (iv) (4) All the above

Ans. (3)

Sol. Behaviour of voters are affected by the caste, religion and also the region which they live in.

93. Which of the following is correct ?

(a) I.S.I. standard is used for standardization of agricultural products.

(b) Right to information bill was passed in India in November 2005.

(c) Human protection act was passed in India in 1993.

(d) Consumer protection act was passed in 1986.

(1) All of the above (2) Only option a and option b

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

Ans. (NA)

Sol. Human Rights protection Act was passed in 1993. "Rights" is missing from the question.

94. The clay used by a potter is which type of capital

(1) Fixed capital (2) Working capital (3) Human capital (4) All of the above

Ans. (2)

Sol. Clay is a raw material and hence is a working capital.

95. Which of the following is not considered as a social indication of poverty.

(1) Less number of means of transport

(2) Illiteracy level

(3) Lack of access to health care

(4) Lack of job opportunity

Ans. (1)

Sol. Means of transport cannot be termed as a social indicator of social poverty.

96. The best index to measure Economic development is :

(1) State Income (2) Per capita income (3) Political stability (4) None of the above

Ans. (2)

Sol. Per Capita Income is the best index to measure Economic Development.

97. When did the cooperatives begin in India ?

(1) 1901 (2) 1904 (3) 1912 (4) 1915

Ans. (2)

Sol. By 1904, the Co-operative Society Act was passed, which marked the beginning of Cooperatives in India.

98. Which sector contributes the highest in Bihar's income?

(1) Agricultural sector (2) Industrial sector (3) Service sector (4) None of the above

Ans. (3)

Sol. The economy of Bihar is largely service-oriented, but it also has a significant agricultural base. The state also has a small industrial sector. As of 2012, agriculture accounts for 22%, industry 5% and service 73% of the state's economy.

99. "A commodity which is used to denote anything which is widely accepted in payment of goods or in discharge of other business obligation" who gave this definition ?

(1) Marshal (2) Crowther (3) Coulborn (4) Robertson

Ans. (4)

Sol. This definition was given by Robertson.

100. Removing barrier or restrictions set by the government is called

(1) Liberalsation (2) Investment (3) Favourable trade (4) Free trade

Ans. (1)

Sol. Liberalisation means removing barrier or restrictions set by the government.