

Date: 05/11/2017

Max. Marks: 100

SOLUTIONS

Time allowed: 90 mins

1. A copper wire is stretched to decrease the radius by 0.1%. Calculate the percentage change in its resistance:
 (1) 0.3%, decrease (2) 0.4% decrease (3) 0.4%, increase (4) 0.2% increase

Ans. (3)

Sol. Initial resistance = R_1 , Final resistance = R_2 , Initial length = ℓ_1 , final length = ℓ_2 , Initial radius = r_1 , final radius = r_2

$$r_2 = r_1 - \frac{1}{1000} R_1 \Rightarrow r_2 = 0.999 r_1$$

$$\text{Now, } \pi r_1^2 \times \ell_1 = \pi r_2^2 \times \ell_2$$

$$\ell_2 = \frac{\ell_1}{0.99801}$$

$$\frac{R_1}{R_2} = \frac{\rho \ell_1 / A_1}{\rho \ell_2 / A_2} \Rightarrow \frac{R_1}{R_2} = \frac{\ell_1}{\ell_2} \times \left(\frac{r_2}{r_1} \right)^2$$

$$R_1 = 0.9960 R_2$$

$$R_2 - R_1 = 0.004 = 0.4\%$$

0.4% increase in resistance.

2. There are two metal spheres of same volume and same material at same temperature, but one is hollow and other is solid. Which sphere will expand more if (a) they are heated to same temperature (b) same heat is given to both?

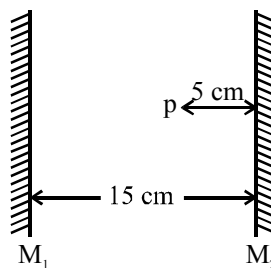
- (1) a - Hollow sphere, b - solid sphere (2) a - Same expansion for both b- Hollow sphere
 (3) a - Hollow sphere, b - same expansion for both (4) a- Solid sphere , b - Hollow sphere

Ans. (2)

Sol. (a) Both will expand same if they are heated to same temperature.

(b) If some heat is given to both than hollow sphere will expand more.

3. Between two plane parallel mirrors an object P is placed as shown in figure. Distances of first three images from mirror M_2 will be (in cm):



- (1) 5,10,15 (2) 5,15,30 (3) 5,15,25 (4) 5,25,30

Ans. (NA)

Sol. Answer not available in options

4. How many turns of a nichrome wire 1mm in diameter should be wound around a porcelain cylinder with radius 2.5 cm to obtain a heater with resistance of 20Ω .

(Given ρ (Nichrome) = $1.0 \times 10^{-6} \Omega\text{m}$)

- (1) 650 (2) 1200 (3) 100 (4) 5

Ans. (3)

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

$$20 = \frac{1.0 \times 10^{-6} \times \ell}{\pi \times 0.5 \times 0.5 \times 10^{-3} \times 10^{-3}}$$

$$\ell = \frac{20 \times \pi \times 0.25 \times 10^{-6}}{1.0 \times 10^{-6}}$$

$$\ell = 20 \times \pi \times 0.25 \text{ m}$$

For 1 turn length required is = $2\pi R$ (where R is radius of cylinder)

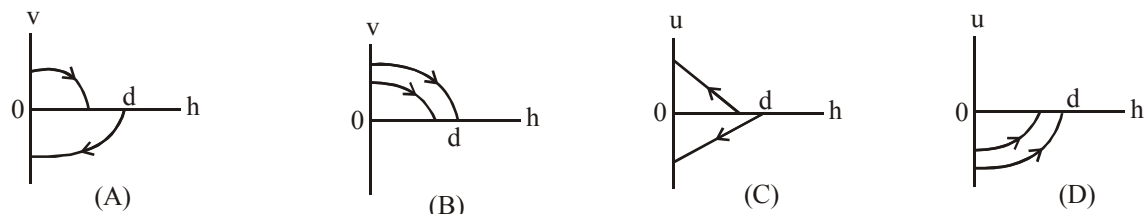
$$1 \text{ turn} = 2\pi R \text{ m}$$

$$1 \text{ m} = \frac{1}{2\pi R} \text{ turns}$$

For ℓ , no of turns = $\ell \times \frac{1}{2\pi R}$ turns

$$20 \times \pi \times 0.25 \times \frac{1}{2 \times \pi \times 2.5} \times 10^2 = \frac{500}{5} = 100 \text{ turns}$$

5. A ball is dropped vertically from a height d above the ground. It hits the ground and bounces up vertically to height $d/2$. Neglecting air resistance, its velocity v varies with height h above the ground as :



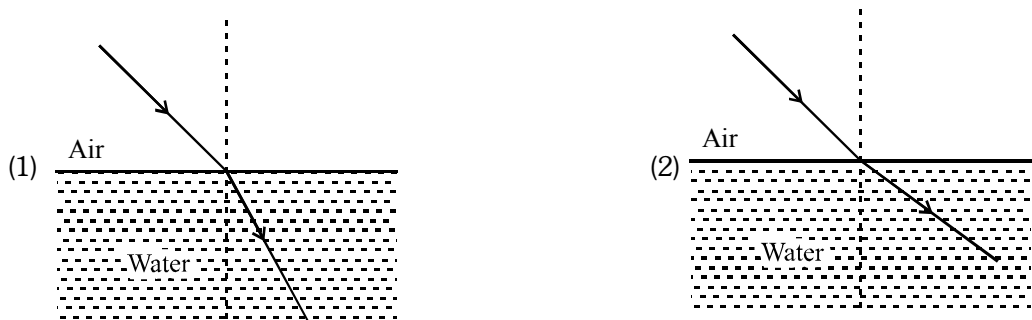
- (1) A (2) B (3) C (4) D

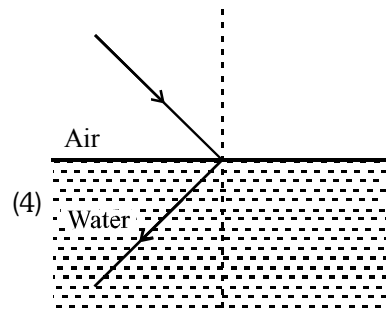
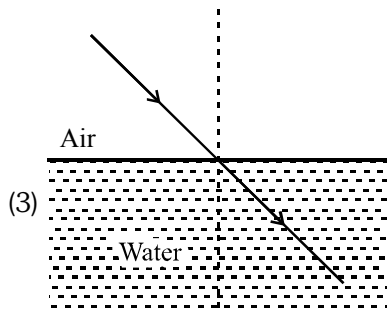
Ans. (1)

Sol. As $v^2 = u^2 + 2gh$
 $v^2 \propto h$

Thus the graph is a curve.

6. While travelling from air to water path of a sound beam is likely to be (see figure below) :





Ans. (2)

Sol. On entering from air to a water, its speed increases, hence bends away from normal.

7. The refractive indices of glass and water are $\frac{5}{3}$ and $\frac{4}{3}$ respectively. For a ray of light moving from glass to water, critical angle will be

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

Ans. (1)

Sol. $n_1 \sin \theta_c = n_2 \sin 90^\circ$

$$\sin \theta_c = \frac{n_2 \sin 90^\circ}{n_1} = \frac{n_2}{n_1} = \frac{4}{3} \times \frac{3}{5}$$

$$\theta_c = \sin^{-1} \frac{4}{5}$$

8. Which of the following is correct ?

- (1) 1 tesla = $4\pi \times 10^{-7}$ gauss (2) 1 tesla = 8.89×10^9 gauss
 (3) 1 tesla = 10^4 gauss (4) 1 tesla = 1.98 gauss

Ans. (3)

Sol. 1 Tesla = 10^4 gauss

9. Which of the following is renewable source of energy ?

- (1) Wood (2) Petroleum (3) Natural gas (4) Uranium

Ans. (1)

Sol. Wood is renewable source of energy.

10. Two circular coils having identical turns and radius in the ratio 1 : 3 are joined in series. Find the ratio of magnetic field at the centres of coils.

- (1) 1 : 9 (2) $\sqrt{3} : 1$ (3) 3 : 1 (4) 9 : 1

Ans. (3)

Sol. $B = \frac{\mu_0 NI}{2r}$, Since the coil are connected in series, therefore, I is constant. N is also given to be constant.

$$B \propto \frac{1}{r} \quad \therefore \quad \frac{B_1}{B_2} = \frac{3}{1}$$

- 11.** Two objects moving along the same straight line are leaving point A with acceleration a , $2a$ and initial velocity $2u$, u at time $t = 0$. The distance moved by objects with respect to point A when one object initially behind other, overtakes the other is

(1) $\frac{6u^2}{a}$ (2) $\frac{2u^2}{a}$ (3) $\frac{4u^2}{a}$ (4) $\frac{8u^2}{a}$

Ans. (1)

Sol. When one object will overtake the other, both of them will travel same distance in same time.

Distance travelled by first body is

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

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

Distance travelled by second body

$$s = ut + \frac{1}{2} (2a)t^2$$

$$\text{Now, } 2ut + \frac{1}{2} at^2 = ut + at^2$$

$$\frac{1}{2} at^2 - ut = 0 \quad t \left(\frac{1}{2} at - u \right) = 0$$

$$t = 0 \quad \text{or} \quad t = \frac{2u}{a}$$

$$\text{Now, } s = 2u \times \frac{2a}{a} + \frac{1}{2} \times a \times \frac{4u^2}{a^2}$$

$$s = \frac{4u^2}{a} + \frac{2u^2}{a}$$

$$s = \frac{6u^2}{a}$$

- 12.** A car approaches a hill with constant speed. When it is at a distance of 0.96 km, it blows horn whose echo is heard by the driver 6 second later. If the speed of sound in air is 300 m/s, calculate the speed of the car :

(1) 100 m/s (2) 20 m/s (3) 50 m/s (4) 70 m/s

Ans. (2)

Sol. $s = 0.96 \text{ km}$

$$t = 6 \text{ sec}$$

$$v = 300 \text{ m/s}$$

Now, distance travelled by car = $v \times 6 = x$

Distance travelled by sound = $960 + (960 - x) = (1920 - x)\text{m}$

$$v_{\text{sound}} = 330 \text{ m/s} \quad v = \frac{s}{t}$$

$$300 = \frac{(1920 - x)}{6}$$

$$1800 = 1920 - x$$

$$x = 120 \text{ m}$$

$$\text{speed of car} = \frac{x}{6} = \frac{120}{6} = 20 \text{ m/s.}$$

13. A block of ice is floating in a liquid of specific gravity 1.2 contained in a beaker. What will happen to the liquid level when ice completely melts?

- (1) Liquid level will increase (2) Liquid level will decrease
(3) Liquid level will remain unchanged (4) Depends on the size of block

Ans. (1)

Sol. Liquid level will increase

14. The molecular weight of O₂ and N₂ are 32 and 28 respectively. At 15°C the temperature of 1 g of O₂ will be the same as that of 1 g of N₂ in the same bottle at the temperature.

- (1) 56°C (2) -15°C (3) 13°C (4) -21°C

Ans. (4)

Sol. $n_1RT_1 = n_2RT_2$ [P₁V – constant]

$$\frac{1}{32} \times 288 = \frac{1}{28} \times T_2$$

$$T_2 = \frac{1}{32} \times 288 \times 28 = -21^\circ\text{C}$$

15. Which of the following processes cause the emission of an X-ray?

- (1) Alpha emission (2) Positron emission (3) K-electron capture (4) Gamma emission

Ans. (1)

Sol. Alpha emission

16. The IUPAC name of Ph-CH=CH·COOH is

- (1) 3-phenylpropenoic acid (2) Cinnamic acid
(3) 1-carboxy-2-phenylethene (4) 1-phenylpropenoic acid

Ans. (1)

Sol. 3-phenylpropenoic acid [Ph-CH=CH-COOH]

17. Which of the following is the most reactive species?

- (1) Cl₂ (2) ICl (3) Br₂ (4) I₂

Ans. (2)

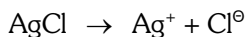
Sol. ICl Due to electronegativity difference

18. The solubility of AgCl in 0.1 M NaCl will be

- (1) Increase (2) Decrease
(3) Remain unchanged (4) AgCl will dissolve completely

Ans. (2)

Sol. The solubility of AgCl in 0.1 M NaCl will be



$$K_{sp} = [\text{Ag}^+][\text{Cl}^-] = 1.6 \times 10^{-10}$$

Let s = solubility of AgCl in 0.1 M Cl⁻

then $\therefore [\text{Ag}^+] = s$ & $[\text{Cl}^-] = s + 0.1$

$$\therefore 1.6 \times 10^{-10} = s[s + 0.1]$$

Assume $s \ll 0.1$ then

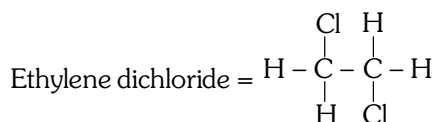
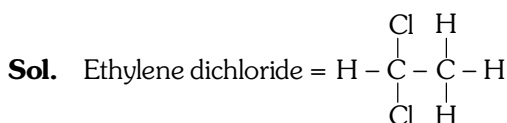
$$1.6 \times 10^{-10} = s(0.1)$$

$$s = \frac{1.6 \times 10^{-10}}{0.1} = s = 1.6 \times 10^{-9} \text{ M}$$

\therefore Solubility decreases

19. Ethylene dichloride and ethyllidene dichloride are
 (1) Geometrical isomers (2) Chain isomers (3) Position isomers (4) Not isomers

Ans. (3)



∴ They are position isomer in which position of Cl will be changed.

20. Ozone is
 (1) An allotrope of oxygen (2) An isomer of oxygen
 (3) An isotone of oxygen (4) isostructural with H₂O₂

Ans. (1)

Sol. Ozone is allotrope of oxygen.

21. Match the Column A with Column B

Column A		Column B	
(1)	Energy of mass less particles	(a)	Four
(2)	$\Psi\Psi^*$	(b)	Hund rule
(3)	Number of lobes in a 3d orbital other than 3d _z ²	(c)	E = pc
(4)	Mutual repulsion of atomic electron	(d)	a ² +b ²

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

Ans. (4)

Sol. It is a correct match.

22. The first organic compound which was synthesized in the laboratory was
 (1) Methane (2) Urea (3) Acetic acid (4) Cane sugar

Ans. (2)

Sol. Urea is first organic compound was synthesised by wholer accidently.

23. Assertion-Reason Questions

- (a) If the assertion as well as reason are correct, and the reason is the correct explanation of the assertion
 (b) If the assertion as well as the reason are correct, but the reason is not the correct explanation of the assertion
 (c) If the assertion is correct but reason is not
 (d) If the reason is correct but assertion is not

Assertion : Graphite is chemically more reactive than diamond.

Reason : Diamond is very hard but graphite is soft.

Choose the correct answer :

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

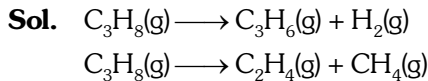
Ans. (2)

Sol. Graphite has one free electron so it is more reactive than diamond. Graphite has layered structure that's why it is soft.

24. Cracking of propane is expected to yield

- (1) Propane and hydrogen (2) Ethene and methane
(3) Ethane and methane (4) Propene, ethene, methane and hydrogen

Ans. (4)



25. Which of the following statements is correct in context to Tyndall effect ?

- (1) Scattering and polarizing of light by small suspended particles is called Tyndall effect.
(2) Tyndall effect of colloidal particles is due to dispersion of light
(3) Tyndall effect is due to refraction of light
(4) Zig-Zag motion of suspended particles

Ans. (2)

Sol. Colloidal solution scatters the beam of light passing through it, is called Tyndall effect.

26. Electrolysis of dilute aqueous NaCl solution was carried out by passing 10 milliampere (mA) current. The time (in seconds) required to liberate 0.01 mole of gas at the cathode is (given that Faraday constant (F) = 96500 C mol⁻¹)

- (1) 9.65×10^4 s (2) 19.30×10^4 s (3) 28.95×10^4 s (4) 38.60×10^4 s

Ans. (2)

Sol. $m = \frac{EIt}{F}$

$$t = \frac{mF}{EI} = \frac{0.01 \times 2 \times 96500}{1 \times 10 \times 10^{-3}} = 19.3 \times 10^4 \text{ s}$$

27. The kidney in human beings are a part of the system for

- (1) Nutrition (2) Respiration (3) Excretion (4) Transportation

Ans. (3)

Sol. Kidneys are main excretory organs of human beings.

28. The xylem in plants are responsible for

- (1) Transport of water (2) Transport of food (3) Transport of amino acid (4) Transport of oxygen

Ans. (1)

Sol. In plants water is transported with the help of xylem.

29. The autotrophic mode of nutrition requires

- (1) Carbon dioxide and water (2) Chlorophyll
(3) Sunlight (4) All of the above

Ans. (4)

Sol. Autotrophic mode of nutrition requires water, carbon dioxide, sunlight and chlorophyll for synthesis of glucose.

30. The breakdown of pyruvate to give carbon dioxide, water and energy takes place in :

- (1) Cytoplasm (2) Mitochondria (3) Chloroplast (4) Nucleolus

Ans. (2)

Sol. The breakdown of pyruvate to carbon dioxide, water and energy takes place in the mitochondria.

31. Which of the following is a plant hormone ?

- (1) Insulin (2) Thyroxin (3) Oestrogen (4) Cytokinin

Ans. (4)

Sol. Cytokinin is a plant hormone responsible for cell division.

32. The gap between two neurons is called a

- (1) Dendrite (2) Synapse (3) Axon (4) Impulse

Ans. (2)

Sol. The gap between two neurons is called synapse.

33. The brain is responsible for

- (1) Thinking (2) Regulating the heart beat
(3) Balancing the body (4) All of the above

Ans. (4)

Sol. Brain is responsible for functions like thinking, heart beat regulation, balancing of body etc.

34. Asexual reproduction takes place through budding in

- (1) Amoeba (2) Yeast (3) Plasmodium (4) Leishmania

Ans. (2)

Sol. Yeast shows asexual reproduction through budding.

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

- (1) Ovary (2) Vas deferens (3) Uterus (4) Fallopian tube

Ans. (2)

Sol. Vas deferens is a part of male reproductive system in human beings.

36. The anther contains

- (1) Sepals (2) Ovules (3) Carpel (4) Pollen grains

Ans. (4)

Sol. Pollen grains, which are male gametophytes are present in the anther of flower.

37. Morphologically and genetically similar organism is called :

- (1) Clone (2) Somaclones (3) Cosmids (4) Cybrids

Ans. (1)

Sol. Clones are exact copies of their parents morphologically and genetically.

38. Which one of these is diploid ?

- (1) Egg (2) Pollen (3) Male gamete (4) Zygote

Ans. (4)

Sol. Zygote is produced by the fusion of male gamete (n) and female gamete (n), thus zygote produced is diploid (2n).

39. Which one is not an oviparous animal ?

- (1) Snake (2) Chicken (3) Crocodile (4) Human

Ans. (4)

Sol. Humans give birth to young ones (viviparous), rest all other animals are oviparous, i.e. lay eggs.

40. Involuntary actions like blood pressure, salivation and vomiting are controlled by this part of hind brain

- (1) Medals (2) Cerebellum (3) Medulla (4) Cerebrum

Ans. (3)

Sol. Medulla oblongata which is a part of hind brain is responsible for controlling involuntary actions of body.

41. If $(x^{31} + 31)$ is divided by $(x + 1)$, the remainder is

- (1) 0 (2) 1 (3) 30 (4) 31

Ans. (3)

Sol. $p(x) = x^{31} + 31$
 when divided by $(x + 1)$, the remainder will be $P(-1)$
 Remainder $= (-1)^{31} + 31 = 30$

42. If the quadratic equation $x^2 - 3kx + 2e^{2\log k} - 1 = 0$ has real roots such that the product of roots is 7, then the value of k is
 (1) ± 1 (2) ± 2 (3) ± 3 (4) None of these

Ans. (4)

Sol. $x^2 - 3kx + 2e^{2\log k} - 1 = 0$

Product of roots = 7

$$2e^{2\log k} - 1 = 7$$

$$\Rightarrow e^{2\log k} = 4$$

$$\Rightarrow e^{\log k^2} = 4$$

$$\Rightarrow k^2 = 4$$

$$\Rightarrow k = \pm 2$$

but \log^{-2} is not defined

$$\Rightarrow k = 2$$

43. The value of $(0.16)^{\log 2.5} \left(\frac{1}{3} + \frac{1}{3^2} + \frac{1}{3^3} + \dots \infty \right)$ is

(1) 2 (2) 3 (3) 4 (4) None of these

Ans. (NA)

Sol. If base of log is 2.5 then

$$(0.16)^{\log 2.5} \left(\frac{1}{3} + \frac{1}{3^2} + \frac{1}{3^3} + \dots \infty \right)$$

$$= \left(\frac{16}{100} \right)^{\log_{2.5} \left(\frac{1}{1 - \frac{1}{3}} \right)}$$

$$= \left(\frac{5}{2} \right)^{-2 \log_{\frac{5}{2}} \left(\frac{1}{2} \right)}$$

$$= \left(\frac{5}{2} \right)^{\log_{\frac{5}{2}} \left(\frac{1}{2} \right)^{-2}}$$

$$= 4$$

44. If S_1, S_2 and S_3 are the sum of $n, 2n$ and $3n$ terms of an Arithmetic Progression (A.P.) then which one of the following is true.

(1) $S_3 = S_2 + S_1$ (2) $S_3 = 3(S_2 - S_1)$ (3) $S_3 = 2(S_2 - S_1)$ (4) $S_3 = 4(S_1 - S_2)$

Ans. (2)

Sol. Let a and d are first term and common difference of the A.P. respectively.

$$\text{Therefore } S_1 = \frac{n}{2} (2a + (n - 1) d) \quad \dots(1)$$

$$S_2 = \frac{2n}{2} (2a + (2n - 1) d) \quad \dots(2)$$

$$S_3 = \frac{3n}{2} (2a + (3n - 1) d) \quad \dots(3)$$

Subtracting equation (1) from (2) we get

$$S_2 - S_1 = \frac{n}{2} (4a + (4n - 2) d - 2a - (n - 1) d)$$

$$\Rightarrow S_2 - S_1 = \frac{n}{2} (2a + (3n - 1) d)$$

Multiple both side by 3

$$\Rightarrow 3(S_2 - S_1) = \frac{3n}{2} (2a + (3n - 1) d)$$

$$3(S_2 - S_1) = S_3 \text{ (for eq. (3))}$$

$$\Rightarrow S_3 = 3(S_2 - S_1)$$

45. Which one of the following decimal expansion is not terminating?

(1) $\frac{14}{2^0 \times 5^3}$

(2) $\frac{9}{2^2 \times 5^3}$

(3) $\frac{8}{2^4 \times 5^0}$

(4) $\frac{15}{2^5 \times 3^2}$

Ans. (4)

Sol. Denominators of option (1), (2) and (3) are of the form $2^m \times 5^n$, therefore they are terminating decimals.

But in option (4) :

$$\frac{15}{2^5 \times 3^2} = \frac{5}{2^5 \times 3}$$

Here, denominator is not of the form $2^m \times 5^n$, therefore it is not a terminating decimal.

46. The equation $\sin^2\theta = \frac{x^2 + y^2}{2xy}$ is possible if

(1) $x = y$

(2) $x = -y$

(3) $x = y$

(4) $x = -y$

Ans. (1)

Sol. $\sin^2\theta = \frac{x^2 + y^2}{2xy}$

Now, $(x - y)^2 \geq 0$

$$\Rightarrow x^2 + y^2 \geq 2xy$$

$$\Rightarrow \frac{x^2 + y^2}{2xy} \geq 1 \text{ (}\because \sin^2\theta = \frac{x^2 + y^2}{2xy} \Rightarrow xy \geq 0\text{)}$$

but $\sin^2\theta \leq 1$. Therefore $\frac{x^2 + y^2}{2xy} = 1$

$$\Rightarrow x = y$$

47. The image of the point (3, 8) in the line $x + 3y = 7$ is

(1) (1,4)

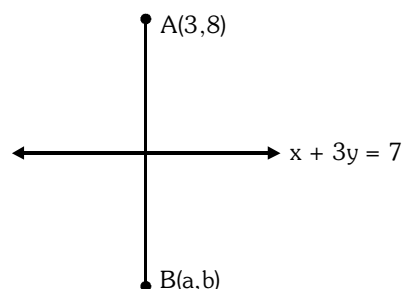
(2) (4,1)

(3) (-1, -4)

(4) (-4 - 1)

Ans. (3)

Sol.



$$\text{Slope of AB} = \frac{b - 8}{a - 3} = m_1$$

$$\text{Slope of the line} = m_2 = \frac{-1}{3}$$

$$\text{Also, } m_1 m_2 = 1$$

$$\Rightarrow \frac{b-8}{a-3} \times \left(\frac{-1}{3}\right) = -1$$

$$\Rightarrow \frac{b-8}{3a-9} = 1$$

$$\Rightarrow 3a - b = 1 \quad \dots(1)$$

$$\text{Mid-point of AB} \Rightarrow \left(\frac{a+3}{2}, \frac{b+8}{2}\right)$$

The midpoint of line AB should also satisfies $3a - b = 1$.

$$\therefore \frac{a+3}{2} + 3\left(\frac{b+8}{2}\right) = 7$$

$$\Rightarrow a + 3 + 3b + 24 = 14$$

$$\Rightarrow a + 3b = -13 \quad \dots(2)$$

from equation (1) and equation (2)

$$a = -1 \text{ and } b = -4$$

48. A triangle ABC, right angled at A, has point A and B as (2, 3) and (0, -1) respectively. If BC = 5 units, then the point C is

(1) (-4, 2)

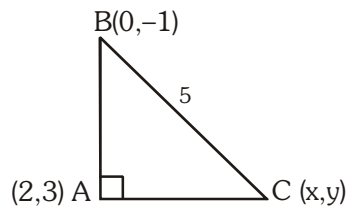
(2) (4, 2)

(3) (3, -3)

(4) (0, -4)

Ans. (2)

Sol. In ΔABC , by pythagoras theorem



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

$$x^2 + (y + 1)^2 = 2^2 + 4^2 + (x - 2)^2 + (y - 3)^2$$

$$x^2 + y^2 + 2y + 1 = 4 + 16 + x^2 + 4 - 4x + y^2 + 9 - 6y$$

$$4x + 8y = 32$$

$$x + 2y = 8 \quad \dots(1)$$

$$\text{Now } BC^2 = 25$$

$$x^2 + (y + 1)^2 = 25$$

$$x^2 + y^2 + 1 + 2y = 25$$

$$(8 - 2y)^2 + y^2 + 1 + 2y = 25$$

$$64 + 4y^2 - 32y + y^2 + 1 + 2y = 25$$

$$5y^2 - 30y + 40 = 0$$

$$y^2 - 6y + 8 = 0$$

$$y^2 - 4y - 2y + 8 = 0$$

$$y(y - 4) - 2(y - 4) = 0$$

$$y = 4, 2$$

from (1) $x = 0, 4$

Thus, C can be (0, 4) or (4, 2)

49. The probability of getting at least one head in tossing two coins is

- (1) $\frac{1}{4}$ (2) $\frac{1}{2}$ (3) $\frac{3}{4}$ (4) None of these

Ans. (3)

Sol. Total outcomes = 4 (HH, TT, HT, TH)

favourable outcomes = 3(HH, HT, TH)

$$\therefore \text{Probability} = \frac{3}{4}$$

50. Two cards are drawn one by one without replacement from a well shuffled pack of 52 cards. The probability that both being aces is

- (1) $\frac{2}{3}$ (2) $\frac{2}{43}$ (3) $\frac{1}{51}$ (4) $\frac{1}{221}$

Ans. (4)

Sol. $\frac{4}{52} \times \frac{3}{51} = \frac{1}{221}$

51. A tree, 20 m high, being broken by the wind, the top struck the ground at an angle 30° . Find the point at which the tree is broken

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

Ans. (NA)

52. The mean of the following data is 8,

x	3	5	7	9	11	13
y	6	8	15	p	8	4

then the value of p is

- (1) 21 (2) 23 (3) 24 (4) 25

Ans. (4)

Sol.

x	y	xy
3	6	18
5	8	40
7	15	105
9	p	9p
11	8	88
13	4	52
Total	41 + p	303 + 9p

$$\bar{x} = \frac{\sum xy}{\sum y}$$

$$8 = \frac{303 + 9p}{41 + p}$$

$$\Rightarrow 328 + 8p = 303 + 9p$$

$$\Rightarrow p = 25$$

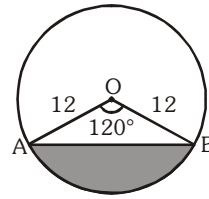
53. A chord of a circle of radius 12 cm subtends an angle of 120° at the centre of circle. Find which one of the following is area of minor segment.

- (1) 44.88 sq. cm (2) 44 sq. cm (3) 88.44 sq. cm (4) 440

Ans. (3)

Sol. Area of minor segment = Area of sector - area of ΔOAB

$$\begin{aligned} &\Rightarrow \frac{\pi r^2}{3} - \frac{1}{2} ab \sin 120^\circ \\ &\Rightarrow \frac{22}{7} \times \frac{12 \times 12}{3} - \frac{1}{2} \times 12 \times 12 \times \frac{\sqrt{3}}{2} \\ &\Rightarrow 150.8 - 36 \times 1.732 \\ &\Rightarrow 150.8 - 62.352 = 88.448 \text{ cm}^2 \end{aligned}$$



54. A cone of height 8 m has a curved surface area 188.4 square metres then its volume is

- (1) 200 m³ (2) 201.88 m² (3) 300 m³ (4) 301.44 m³

Ans. (4)

Sol. Given, $\pi r l = 188.4 \text{ m}^2$, $h = 8 \text{ m}$

$$r l = 60$$

$$l = \frac{60}{r}$$

$$\therefore r^2 + h^2 = \frac{3600}{r^2}$$

$$\text{let } r^2 = x, \text{ then } x + h^2 = \frac{3600}{x}$$

$$\Rightarrow x^2 + 64x - 3600 = 0$$

$$\Rightarrow x^2 + 100x - 36x - 3600 = 0$$

$$\Rightarrow x(x + 100) - 36(x + 100) = 0$$

$$\Rightarrow (x - 36)(x + 100) = 0$$

$$\Rightarrow x = 36 \text{ or } x = -100$$

$$\therefore r = 6$$

We know that volume of cone $V = \frac{1}{3} \pi r^2 h$

$$V = \frac{3.14 \times 6^2 \times 8}{3} = 301.44 \text{ m}^3$$

55. A metallic sphere of radius 21 cm is dropped into a cylindrical vessel, which is partly filled with water. The diameter of the vessel is 1.68 m. If the sphere is completely submerged, find by how much the surface of water will rise?

- (1) 1 cm (2) 1.75 cm (3) 2 cm (4) 2.75 cm

Ans. (2)

Sol. Let it rise by = h cm

$$\text{So } \frac{4}{3} \pi r^3 = \pi R^2 h$$

$$\Rightarrow \frac{4}{3} \times 21 \times 21 \times 21 = 84 \times 84 \times h$$

$$\Rightarrow h = \frac{4 \times 21 \times 21 \times 21 \times 21}{3 \times 84 \times 84} = \frac{7}{4} = 1.75 \text{ cm}$$

56. The curved surface area of a cylindrical pillar is 264 m² and its volume is 924 m³. The height of the pillar is

- (1) 4 m (2) 5 m (3) 6 m (4) 7 m

Ans. (3)

Sol. $\frac{V}{\text{C.S.A.}} = \frac{\pi r^2 h}{2\pi r h} = \frac{924}{264}$

$$\Rightarrow \frac{r}{2} = \frac{7}{2} \Rightarrow r = 7 \text{ m}$$

So, $2\pi r h = 264$

$$\Rightarrow 2 \times \frac{22}{7} \times 7 \times h = 264$$

$$\Rightarrow h = \frac{264 \times 7}{7 \times 22 \times 2} = 6 \text{ m}$$

57. The internal and external diameters of hollow hemispherical vessel are 24 cm and 25 cm respectively. If the cost of painting 1 cm² of surface area is Rs. 0.05 then the total of painting the vessel all over is

- (1) Rs. 90.05 (2) Rs. 92.35 (3) Rs. 95.20 (4) Rs. 96.29

Ans. (4)

Sol. Let R and r be the external and internal radii of hollow hemisphere.

Area to be painted

$$= 2\pi (R^2 + r^2) - \pi (R^2 - r^2)$$

$$= 3\pi R^2 + \pi r^2$$

$$= 3\pi \left(\frac{25}{2}\right)^2 + \pi(12)^2 = \frac{26961}{14}$$

Cost of painting 1 cm² = Rs. 0.05

$$\text{Total cost of painting} = \frac{26961}{14} \times 0.05 = \text{Rs. } 96.29.$$

58. In a ΔABC , the bisectors of $\angle B$ and $\angle C$ intersect each other at a point O then $\angle BOC =$

- (1) 90° (2) $90^\circ - \frac{\angle A}{2}$ (3) $90^\circ + \frac{\angle A}{2}$ (4) None of these

Ans. (3)

Sol. In ΔABC ,

$$\angle A + \angle B + \angle C = 180^\circ$$

$$\frac{\angle A}{2} + \frac{\angle B}{2} + \frac{\angle C}{2} = \frac{180^\circ}{2}$$

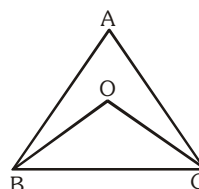
$$\frac{\angle A}{2} + \angle OBC + \angle OCB = 90^\circ$$

$$\angle OBC + \angle OCB = 90^\circ - \frac{\angle A}{2}$$

In ΔOBC , $\angle O + \angle OBC + \angle OCB = 180^\circ$

$$\therefore \angle O + 90^\circ - \frac{\angle A}{2} = 180^\circ$$

$$\angle O = 90^\circ - \frac{\angle A}{2}$$



59. PQ is a long chord of length 8 cm of a circle of radius 5 cm. Tangents at P and Q intersect each other at the point T then the length of TP is

- (1) 5 cm (2) 6 cm (3) $6\frac{1}{3}$ cm (4) $6\frac{2}{3}$ cm

Ans. (4)

Sol. Let RT = x

In ΔPOT , by pythagores theorem

$$5^2 + PT^2 = (3 + x)^2 \quad \dots(1)$$

In ΔPRT , by pythagores theorem

$$4^2 + x^2 = PT^2 \quad \dots(2)$$

From (1) and (2)

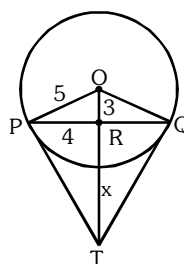
$$5^2 + 4^2 + x^2 = 3^2 + x^2 + 6x$$

$$25 + 16 - 9 = 6x$$

$$x = \frac{16}{3}$$

$$PT^2 = 4^2 + \left(\frac{16}{3}\right)^2$$

$$PT = \frac{20}{3} \text{ cm}$$



60. For which value of K the system of equations $(K - 1)x - y = 5$ and $(K + 1)x + (1 - K)y = 3K + 1$ have infinite many solutions.

- (1) K = 2 (2) K = 7 (3) K = 3 (4) K = 4

Ans. (3)

Sol. For infinitely many solutions

$$\frac{K - 1}{K + 1} = \frac{-1}{1 - K} = \frac{5}{3K + 1}$$

$$\Rightarrow \frac{-1}{1 - K} = \frac{5}{3K + 1}$$

$$\Rightarrow -3K - 1 = 5 - 5K$$

$$\Rightarrow K = 3$$

61. Mussolini violated the rules of League of Nation by the successful aggression against

- (1) Rhine (2) Greece (3) Abyssinia (4) France

Ans. (2)

Sol. Mussolini violated the rules of League of Nations by his successful aggression against Greece.

62. The priciples of Nazism are written in

- (1) Das Capital (2) Mien Kamph (3) War and Peace (4) social Contract

Ans. (2)

Sol. Principles of Nazism were written in Mein Kampf by Hitler

63. Hitler formed a party named

- (1) Communisty Party (2) Labour Party
(3) Conservative Party (4) Nazi Party

Ans. (4)

Sol. Hitler was the founder of Nazi Party.

64. The impact of the French Revolution of 1830 and 1848 in Europe was the emergence of
(1) Feudalism (2) Class-struggle (3) Nationalism (4) Autocracy

Ans. (3)

Sol. Nationalism was a result of the French Revolution.

65. According to the Treaty of Versailles the country held responsible for the World War I was

- (1) England and her allies (2) Germany and her allies
(3) Serbia and Russia (4) Austria

Ans. (2)

Sol. Germany and her allies were held responsible for WWI according to Treaty of Versailles.

66. The country which supported Germany in world War I was

- (1) Italy (2) Austria (3) Russia (4) France

Ans. (2)

Sol. Austria supported Germany in WWI.

67. The Industrial Revolution set in because of

- (1) The changes in the techniques and organisation of production
(2) The Industrial Revolution set in because of
(3) The Developments in maritime activities
(4) The acquisition of colonies

Ans. (1)

Sol. The changes in the techniques and organisation of production led to industrial revolution.

68. Brazil was discovered in

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

Ans. (1)

Sol. Brazil was discovered in 1500

69. Who discovered North Pole ?

- (1) Captain James (2) Magellan (3) Ammundsen (4) Robert Peary

Ans. (4)

Sol. Robert Peary discovered North Pole.

70. Magna Carta or The Great Charter was signed in

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

Ans. (2)

Sol. Magna Carta was signed in 1215

71. On which among the following dates, the Gandhi-Irwin Pact was signed ?

- (1) 5 March, 1931 (2) 6 March, 1941 (3) 4 March, 1931 (4) 15 March, 1931

Ans. (1)

Sol. Gandhi Irwin Pact was signed on 5th March 1931.

72. Consider the following events of Indian National Movement

1. Gandhi Irwin Pact
2. Poona Pact
3. Karachi Session of Indian National Congress.
4. Individual Satyagraha

select the correct chronological order of the events from the codes given below.

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

Ans. (1)

Sol. Gandhi Irwin Pact - 1931

Poona Pact - 1932

Karachi Session of INC - 1933

Individual Satyagraha - 1940-41

73. V shaped contours exhibit

- (1) River valley (2) Glacier (3) Peak of mountain (4) Plateau

Ans. (3)

Sol. V shaped contours exhibit Peak of mountains

74. Rain water harvesting is an approach to sustainably manage the

- (1) Water Resources (2) Energy Resources
(3) Food Resources (4) Agricultural Resources

Ans. (1)

Sol. Rainwater Harvesting is an approach to sustainably manage the water resources.

75. Soil erosion is a major problem in

- (1) Gandak Valley (2) Chambal Valley (3) Purnea Valley (4) Ram Ganga Valley

Ans. (2)

Sol. Chambal valley faces the problem of soil erosion.

76. Select the correct statements

- (a) Karnataka is famous for coffee farming.
(b) Tamilnadu does not produce tea
(c) Kerala is famous for coconut farming.
(d) Goa is famous for pineapple farming.
- (1) b and d (2) a and b (3) a and d (4) a and c

Ans. (NA)

Sol. Option a,c,d are correct.

77. Damodar Valley is famous for

- (1) Iron ore mines (2) Dense forest (3) Coal mines (4) Agriculture

Ans. (3)

Sol. Damodar Valley is famous for coal mines

78. Kaziranga National Park of Assam has been famous for

- (1) Elephants (2) Tigers (3) One-Horn Rhino (4) Lions

Ans. (3)

Sol. Kaziranga is famous for One-Horn Rhino

79. Barh is emerging as a super thermal power station in the state of

- (1) Uttar Pradesh (2) Odisha (3) Tamil nadu (4) Bihar

Ans. (4)

Sol. Barh is emerging as a super thermal power plant located in Bihar.

80. Chemical industries are principally responsible for

- (1) Air and land pollution (2) Air and water pollution
(3) Land and sound pollution (4) None of them

Ans. (2)

Sol. Chemical industries are responsible for air and water pollution.

81. Indian Railway was first started in 1853 in between

- (1) Mumbai and Pune (2) Howrah and Sealdah
(3) Mumbai and Thane (4) Chennai and Coimbatore

Ans. (3)

Sol. The first passenger train in India ran between Bombay (Bori Bunder) and Thane on 16 April 1853.

82. Which one city of Bihar is not situated on the bank of river Ganga

- (1) Ara (2) Patna (3) Bhagalpur (4) Begusarai

Ans. (4)

Sol. Begusarai is not situated along Ganges.

83. National Highway 7 is the longest highway of India, it connects

- (1) Kolkata to Delhi (2) Varanasi to Kanya Kumari
(3) Varanasi to Kanya Kumari (4) Delhi to Bengaluru

Ans. (2)

Sol. National Highway No. 7. ... Varanasi-->Mirzapur-->Lalganj-->Hanumanha-->Mauganj-->Rewa-->Amarpatan-->Maihar-->Jukehi-->Katni--> ... NH 7 - Varanasi-Nagpur-Bangalore- Kanniyakumari

84. Which form of the spacing of contour lines indicates gentle slope

- (1) Contour lines are widely spaced and are almost parallel.
(2) Contour lines are closed and parallel
(3) Contour lines are circular and closer.
(4) Contour lines are irregular.

Ans. (1)

Sol. Widely spaced contour lines indicate gentle slope.

85. Which one of following conditions is wrongly listed as the essential condition for the smooth working of democracy

- (1) Universal suffrage (2) Free and Fair elections
(3) Minority rule (4) Presence of Opposition

Ans. (3)

Sol. Minority rule is not an essential condition for democracy.

86. The President of the Constituent Assembly of India was

- (1) Dr. Rajendra Prasad (2) Bhimrao Ambedkar
(3) Morarji Desai (4) Dr. S.N. Sinha

Ans. (1)

Sol. Dr. Rajendra Prasad was elected as the permanent President of Constituent Assembly.

87. The provision of " Election Commission" for free and fair election in India has been made through

- (1) Article 124 (2) Article 224 (3) Article 325 (4) Article 324

Ans. (4)

Sol. Article 324 provide for an independent Election Commission.

88. The members of cabinet under president system are

- (1) Accountable to President (2) Accountable to Legislature
(3) Accountable to Electorate (4) None of these

Ans. (2)

Sol. Under Presidential system, members of cabinet are Accountable to Legislature

- 89.** The fundamental rights in our constitution is listed from
(1) Article 10 to 25 (2) Article 12 to 32
(3) Article 12 to 35 (4) None of these

Ans. (3)

Sol. Article 12 -35, Specify the Fundamental Rights available

- 90.** The term of a Rajya Sabha member in India is
(1) 5 years (2) 6 years (3) undefined (4) 4 years

Ans. (2)

Sol. Rajya Sabha is a permanent House and is not subject to dissolution. However, one-third Members of Rajya Sabha retire after every second year. A member who is elected for a full term serves for a period of six years.

- 91.** The nomination of members to legislative council is made by
(1) Chief Minister (2) President of India (3) Prime Minister (4) Governor

Ans. (4)

Sol. Governor nominates members to the Legislative Council of the respective state.

- 92.** The longest Constitution of the world is of
(1) India (2) USA (3) France (4) Italy

Ans. (1)

Sol. The Constitution of India is the longest written constitution of any sovereign country in the world

- 93.** Planning Commission was set up in the year
(1) 1951 (2) 1950 (3) 1971 (4) 1991

Ans. (2)

Sol. The Planning Commission was set up by a Resolution of the Government of India in March 1950

- 94.** HDI Rank of India in the world in 2013 was
(1) 73 (2) 135 (3) 150 (4) 146

Ans. (2)

Sol. The Human Development Report 2013 released by the United Nations Development Programme (UNDP), ranked the country at a low 135 among 186 countries on its human development index (HDI)

- 95.** The concept of Vicious Circle of Poverty was given by
(1) Adam Smith (2) T.R. Malthus (3) Karl Marx (4) Ragnar Nurkse

Ans. (4)

Sol. The most fashionable concept is the vicious circle of poverty a concept introduced by Ragnar Nurkse and others. A less developed country is caught in the vicious circle of poverty. The vicious circle argument holds that conditions in LDCs are such that economic development is impossible.

- 96.** The currency of Russia is
(1) Dollar (2) Pound (3) Rouble (4) Riyal

Ans. (3)

Sol. The Ruble has been the currency of Russia for approximately 500 years; it has been used in various countries throughout its history

- 97.** Demonetisation was announced by Prime Minister Modi on
(1) 1 January, 2016 (2) 8 November, 2016
(3) 1 July, 2017 (4) 28 December, 2016

Ans. (2)

Sol. Demonetisation was announced by the Prime Minister of India on 8th November 2016.

98. Bank Rate is the rate at which

- (1) Commercial banks lend to borrowers
- (2) Reserve Bank of India lends to commercial banks
- (3) Co-operative banks lend to its borrowers
- (4) None of these

Ans. (2)

Sol. Bank rate is the interest rate at which Reserve Bank of India lends money to commercial banks.

99. Globalisation policy was initiated by the Government of India in the year

- (1) 1947
- (2) 1977
- (3) 1991
- (4) 2001

Ans. (3)

Sol. The Government of India initiated the globalisation in 1991.

100. United Nations adopted the UN Guidelines for consumer protection in

- (1) 1951
- (2) 1985
- (3) 1991
- (4) 2001

Ans. (2)

Sol. United Nations adopted the UN guidelines for consumer protection in 1985.
