

3. A block A of mass m_1 rests on a horizontal table. A light string connected to it passes over a frictionless pulley at the edge of table and from its other end another block B of mass m_2 is suspended. The coefficient of kinetic friction between the block and table is μ_k . When the block A is sliding on the table, the tension in the string is [NCERT Page-61]

- 1) $\frac{(m_2 + \mu_k m_1)g}{(m_1 + m_2)}$ 2) $\frac{(m_2 - \mu_k m_1)g}{(m_1 + m_2)}$
 3) $\frac{m_1 m_2 (1 + \mu_k)g}{(m_1 + m_2)}$ 4) $\frac{m_1 m_2 (1 - \mu_k)g}{(m_1 + m_2)}$

Sol. (3): $T - \mu_k m_1 g = m_1 a$
 $m_2 g - T = m_2 a$

$$T - \mu_k m_1 g = \frac{m_1 (m_2 g - T)}{m_2} \quad \therefore T = \frac{m_1 m_2 g (\mu_k + 1)}{(m_1 + m_2)}$$

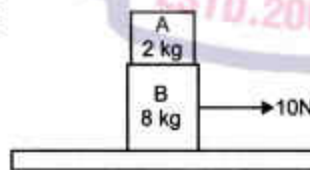
4. A uniform chain of length L is lying partly on the table, the remaining part hanging down from the edge of the table. If coefficient of friction between the chain and the table is 0.5, what is the minimum length of the chain that should lie on the table, to prevent the chain from slipping down to the ground?

- 1) $L/3$ 2) $L/2$
 3) $2L/3$ 4) $3L/4$

Sol. (3): $y = \frac{\mu L}{\mu + 1} = \frac{L}{3}$ (overhang)

Portion of length on table is $L - \frac{L}{3} = \frac{2L}{3}$

5. Block A of mass of 2 kg is placed over blocks of mass 8 kg. The combination is placed over a rough horizontal surface.



Coefficient of friction between B and the floor is 0.5. Coefficient of friction between blocks A and B is 0.4. A horizontal force of 10 N is applied on block B. The force of friction between blocks A and B is ($g = 10 \text{ ms}^{-2}$) [NCERT Page-60]

- 1) 100 N 2) 40 N
 3) 50 N 4) zero

Sol. (4): Total mass of blocks A and B = 2 + 8 = 10 kg.
 Friction between surface and combination of A and B
 $F = \mu R = 0.5 \times 10 \times 10 = 50 \text{ N} \quad \therefore F_{\text{app}} < f_{\text{max}}$

6. The force required to just move a body up an inclined plane is double the force required to just prevent it from sliding down. If θ is the angle of friction and ϕ is the angle which the plane makes with horizontal, then

[NCERT Page-61]

- 1) $\tan \phi = 2 \tan \theta$ 2) $\tan \phi = 3 \tan \theta$
 3) $\tan \phi = \tan \theta$ 4) $\tan \theta = 3 \tan \phi$

Sol. (2): $mg(\sin \phi + \mu \cos \phi) = 2mg(\sin \phi - \mu \cos \phi)$

$$\Rightarrow \tan \phi = 3\mu, \text{ As } \mu = \tan \theta \text{ So, } \tan \phi = 3 \tan \theta$$

7. A body is projected with a speed $u \text{ m/s}$ at an angle β with the horizontal. The kinetic energy

at the highest point is $\frac{3}{4}$ th of the initial kinetic

energy. The value of β is [NCERT Page-39, 74]

- 1) 30° 2) 45°
 3) 60° 4) 120°

Sol. (1): $KE = K \cos^2 \beta$ where, $K = \frac{1}{2} m v^2$

$$\text{Thus, } K \cos^2 \beta = \frac{3}{4} K \Rightarrow \cos \beta = \frac{\sqrt{3}}{1} \Rightarrow \beta = 30^\circ$$

8. A projectile can have the same range for two angles of projection. If h_1 and h_2 are maximum heights when the range in the two cases is R , then the relation between R , h_1 and h_2 is

[NCERT Page-39]

- 1) $R = 4\sqrt{h_1 h_2}$ 2) $R = 2\sqrt{h_1 h_2}$
 3) $R = \sqrt{h_1 h_2}$ 4) None of these

Sol. (1): $R = 4\sqrt{h_1 h_2}$

9. A man walks on a straight road from his home to a market 2.5 km away with a speed of 5 km h^{-1} . Finding the market closed, he instantly turns and walks back home with a speed of 7.5 km h^{-1} . The average speed of the man over the interval of time 0 to 50 min is equal to [NCERT Page-14]

- 1) 6 km h^{-1} 2) $\frac{25}{4} \text{ km h}^{-1}$
 3) $\frac{30}{4} \text{ km h}^{-1}$ 4) $\frac{45}{8} \text{ km h}^{-1}$

QUESTION BOOKLET VERSION : 11

Sol. (1): $t = \frac{d}{v} = \frac{2.5}{5} = \frac{1}{2}$ hr. and returns back with the speed of 7.5 km hr^{-1} in rest time of 20 min.

$$\text{Distance} = 7.5 \times \frac{20}{60} = 2.5 \text{ km} \quad v_{\text{avg}} = \frac{s}{t} = 6 \text{ km h}^{-1}$$

10. The motion of a particle along a straight line is described by equation $x = 8 + 12t - t^2$, where x is in metre and t is in second. The retardation of the particle when its velocity becomes zero, is [NCERT Page-15]

- 1) 24 ms^{-2} 2) zero
3) 6 ms^{-2} 4) 12 ms^{-2}

Sol. (4): $v = 12 - 2t$ and $a = -2$

when $v = 0$, $0 = 12 - 2t$ we get $t = 6$
and at $t = 6$ and $a = -2 \text{ m/s}^2$

11. A particle travels one fourth of the distance with constant speed of 5 m/s and remaining distance with the constant speed of 18 m/s . What is the average speed of the car? [NCERT Page-14]

- 1) 11.5 m/s 2) 10.9 m/s
3) 15 m/s 4) 10 m/s

Sol. (2): Average speed = $\frac{x}{t_1 + t_2} = \frac{x}{\frac{x}{4 \times 5} + \frac{3x}{4 \times 18}} = 10.9 \text{ m/s}$

12. A rocket of mass 10 kg burns 0.1 kg of fuel per sec. If velocity of exhaust gas is 1 km/sec , then it lifts with an acceleration of ($g = 9.8 \text{ m/s}^2$)

- 1) 2 ms^{-2} 2) 0.2 ms^{-2}
3) 10 ms^{-2} 4) 1 ms^{-2}

Sol. (2): $\frac{vdm}{dt} - mg = ma$

$$1000 \times 0.1 - 10 \times 9.8 = 10a$$

or $a = 0.2 \text{ m/s}^2$

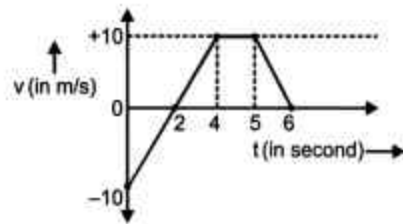
13. A minute hand of the clock is 1 m long. The distance covered by the tip of the minute hand from 03:00 am to 03:30 pm is

- 1) 3π 2) 5π
3) 15π 4) 25π

Sol. (4): Distance covered by the tip of minute hand from 3:00am to 3:30 pm is

$$= 12 \times 2\pi r + \frac{1}{2} \times 2\pi r = 25\pi r = 25\pi \times 1 = (25\pi) \text{ m}$$

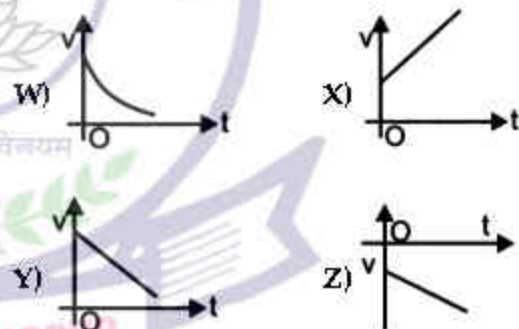
14. For the velocity-time ($v \sim t$) graph as shown in figure, the incorrect statement is [NCERT Page-17]



- 1) The average velocity for the entire journey is 2.5 m/s .
2) The average acceleration from 1 s to 4 s is 5 m/s^2 .
3) The average speed for the first 4 s is zero.
4) The acceleration at $t = 3 \text{ s}$ is 5 m/s^2 .

Sol. (3): Average speed = $\frac{\text{Total distance}}{\text{Total time}} = 5 \text{ m/s}$

15. Given below are four curves describing variation of velocity with time of a particle. Which one of these describe the motion of a particle initially in positive direction with constant negative acceleration? [NCERT Page-17]



- 1) (W) 2) (X)
3) (Y) 4) (Z)

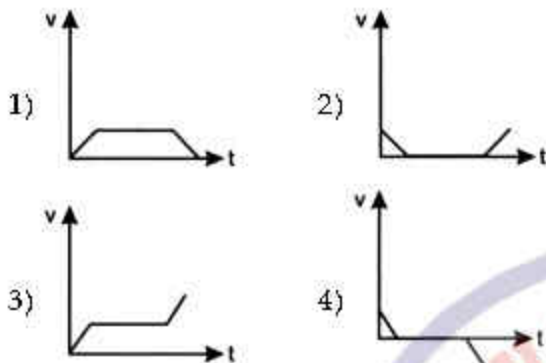
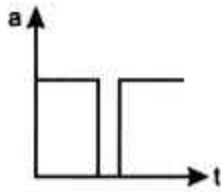
Sol. (3): $v = u - at$, $y = c - mx$

16. A car, moving with a speed of 50 km/hr , can be stopped by brakes after at least 6 m . If the same car is moving at a speed of 100 km/hr , the minimum stopping distance is [NCERT Page-18]

- 1) 6 m 2) 12 m
3) 18 m 4) 24 m

Sol. (4): $S \propto u^2$. Now speed is two times so distance will be four times $S = 4 \times 6 = 24 \text{ m}$

17. Acceleration-time graph of a body is shown. The corresponding velocity-time graph of the same body is [NCERT Page-17]



Sol. (3): Acceleration is constant, velocity is increasing

18. A car starts from rest travelling with constant acceleration. If distance covered by it in 10th second of its journey is 19 m, what will be the acceleration of car?

- 1) 4 m/s² 2) 3 m/s²
3) 2 m/s² 4) 1 m/s²

Sol. (3): $19 = 0 + \frac{a}{2}(2 \times 10 - 1) \Rightarrow a = 2 \text{ m/s}^2$

19. The velocity of a particle at an instant is 10 ms⁻¹. After 3 s its velocity will become 16 ms⁻¹. The velocity at 2 s, before the given instant would have been [NCERT Page-18]

- 1) 6 ms⁻¹ 2) 4 ms⁻¹
3) 2 ms⁻¹ 4) 1 ms⁻¹

Sol. (1): For 2nd part 10 m/s is initial velocity.

Hence $16 = 10 + a(3) \Rightarrow a = 2 \text{ m/s}^2$

For 1st part 10 m/s is final velocity

$10 = u + 2 \times 2 \Rightarrow u = 6 \text{ m/s}$

20. Position of particle in meters is given as $x = (-4t^3 + t^4 + 12)$, where t is in seconds. How long does a particle take to come to rest? [NCERT Page-14]

- 1) 3 s 2) 1 s
3) 2 s 4) 4 s

Sol. (1): $v = \frac{dx}{dt} = \frac{d}{dt}(-4t^3 + t^4 + 12) = -12t^2 + 4t^3$

when $v = 0 = -12t^2 + 4t^3$ or $12t^2 = 4t^3$ or $t = 3 \text{ s}$

21. A particle is moving such that its position coordinates (x, y) are (2 m, 3 m) at time $t = 0$, (6 m, 7 m) at time $t = 2 \text{ s}$ and (13 m, 14 m) at time $t = 5 \text{ s}$. Average velocity vector (v_{av}) from $t = 0$ to 5 s is [NCERT Page-14]

- 1) $\frac{1}{2}(13\hat{i} + 14\hat{j})$ 2) $\frac{7}{3}(\hat{i} + \hat{j})$
3) $2(\hat{i} - \hat{j})$ 4) $\frac{11}{5}(\hat{i} + \hat{j})$

Sol. (4): $v_{av} = \frac{\text{net displacement}}{\text{time taken}} = \frac{(13-2)\hat{i} + (14-3)\hat{j}}{5} = \frac{11}{5}(\hat{i} + \hat{j})$

22. From the top of tower 40 m high, a projectile is thrown up with a velocity of $10\sqrt{2} \text{ m/s}$, at an angle 45° with the horizontal. The time taken by it to reach the ground [NCERT Page-35]

- 1) 4 s 2) 3 s
3) 2 s 4) 5 s

Sol. (1): $u_x = 10\sqrt{2} \cos 45^\circ = 10 \text{ m/s}$

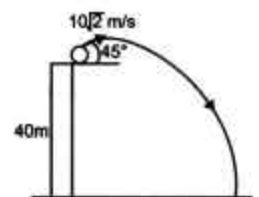
$40 = -10t + 5t^2$ or $t^2 - 2t - 8 = 0$

or $t^2 - 4t + 2t - 8 = 0$

$t(t-4) + 2(t-4) = 0$

or $(t+2)(t-4) = 0$

$\Rightarrow t = 4, -2 \Rightarrow t = 4 \text{ seconds}$



23. For a given angle of the projectile if the initial velocity is doubled the range of the projectile becomes [NCERT Page-39]

- 1) Half 2) One-fourth
3) Two times 4) Four times

Sol. (4): $R = \frac{u^2 \sin 2\theta}{g}$ $\therefore R' = \frac{(2u)^2 \sin 2\theta}{g} = 4R$

24. Two projectiles are projected with the same velocity. If one is projected at an angle of 30° and the other at 60° to the horizontal, the ratio of maximum heights reached is [NCERT Page-39]

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

Sol. (1): $H_1 : H_2 = \sin^2 30^\circ : \sin^2 60^\circ = \frac{1}{4} : \frac{3}{4} = 1 : 3$

QUESTION BOOKLET VERSION : 11

25. An aeroplane flying at 540 km/hr horizontally drops a packet when it was exactly above the target, at a height of 2 km from the target. By what horizontal distance packet will miss the target? **[NCERT Page-35]**

- 1) 3 km 2) 5 km
3) 6 km 4) 9 km

Sol. (1): Time to reach ground $t = \sqrt{\frac{2H}{g}} = \sqrt{\frac{2 \times 2000}{10}} = 20\text{s}$

$$R = u \times t = 540 \times \frac{5}{18} \times 20 = 3000\text{m} = 3\text{km}$$

26. A ball is projected horizontally with a speed of 20 m/s from a large height. What time after the projection its vertical and horizontal components of speed become equal? **[NCERT Page-39]**

- 1) 2 sec 2) 1 sec
3) 3 sec 4) 4 sec

Sol. (1): $v_y = v_x \therefore gt = u \therefore 10t = 20 \Rightarrow t = 2 \text{ sec}$

27. A ball is projected horizontally with a velocity of 5 m/s from the top of a building 19.6 m high. How long will the ball take to hit the ground? **[NCERT Page-35]**

- 1) $\sqrt{2}$ s 2) 2 s
3) $\sqrt{3}$ s 4) 3 s

Sol. (2): $T = \sqrt{\frac{2H}{g}} = \sqrt{\frac{2 \times 19.6}{9.8}} = 2\text{s}$

28. A car is going towards north at 40 km/h and the train is going towards east at 30 km/h. What is the magnitude of relative velocity of car as seen by a passenger in train?

- 1) 5 km/h 2) 50 km/h
3) 100 km/h 4) 200 km/h

Sol. (2): $v_{rel} = \sqrt{(40)^2 + (30)^2} = 50\text{km/hr}$

29. Rain is falling vertically with 3 ms^{-1} and a man is moving due North with 4 ms^{-1} . In which direction he should hold the umbrella to protect himself from rains?

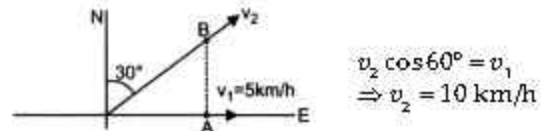
- 1) 37° north of vertical 2) 37° south of vertical
3) 53° north of vertical 4) 53° south of vertical

Sol. (3): $v_{rm} = v_r - v_m = -3\hat{k} - 4\hat{j}$
 $\tan \beta = \frac{4}{3} \Rightarrow \beta = 53^\circ \text{ North of vertical}$

30. Ship A is travelling with a velocity of 5 km h^{-1} due east. The second ship is heading 30° east of north. What should be the speed of second ship if it is to remain always due north with respect to the first ship?

- 1) 10 km h^{-1} 2) 9 km h^{-1}
3) 8 km h^{-1} 4) 7 km h^{-1}

Sol. (1): For B always to be north of A, the velocity components of both along east should be same



31. The x and y coordinates of the particle at any time are $x = 5t - 2t^2$ and $y = 10t$ respectively, where x and y are in meters and t in seconds. The acceleration of the particle at $t = 2 \text{ s}$ is **[NCERT Page-36]**

- 1) 5 m/s^2 2) -4 m/s^2
3) -8 m/s^2 4) 0

Sol. (2): $v_x = 5 - 4t, v_y = 10, a_x = -4, a_y = 0$

$$\vec{a} = a_x \hat{i} + a_y \hat{j}, \vec{a} = -4\hat{i} \text{ m/s}^2$$

32. A ball is thrown with a velocity $6\hat{j}$ with an acceleration $6\hat{i} + 2\hat{j}$. The velocity of the ball after 5 seconds is **[NCERT Page-36]**

- 1) $30\hat{i} + 10\hat{j}$ 2) $30\hat{i} + 16\hat{j}$
3) $10\hat{i} + 24\hat{j}$ 4) None of these

Sol. (2): using $v = u + at$ $v_x = 6(5) = 30 \text{ ms}^{-1}$

$$v_y = 6 + 2(5) = 16 \text{ ms}^{-1} \quad v = 30\hat{i} + 16\hat{j}$$

33. A person sitting in an open car moving at constant velocity throws a ball vertically up into air. The ball falls **[NCERT Page-50]**

- 1) outside the car
2) in the car ahead of the person
3) in the car to the side of the person
4) exactly in the hand which threw it up

Sol. (4): Car moving with constant velocity is an inertial frame and horizontal velocity of ball and person is same as of car.

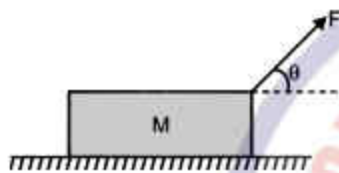
QUESTION BOOKLET VERSION : 11

34. If the coefficient of friction of a plane inclined at 45° is 0.5. Then, acceleration of a body sliding freely on it will be [NCERT Page-61]

- 1) $\frac{9.8}{2\sqrt{2}} \text{ ms}^{-2}$ 2) $\frac{9.8}{\sqrt{2}} \text{ ms}^{-2}$
 3) 9.8 ms^{-2} 4) 4.8 ms^{-2}

Sol. (1): $a = g(\sin \theta - \mu \cos \theta) = 9.8(\sin 45^\circ - 0.5 \cos 45^\circ)$
 $= 9.8\left(\frac{1}{\sqrt{2}} - 0.5 \times \frac{1}{\sqrt{2}}\right) = \frac{9.8}{2\sqrt{2}} \text{ ms}^{-2}$

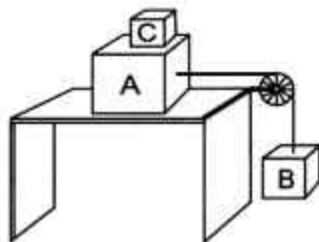
35. A wooden block of mass m resting on a rough horizontal table (coefficient of friction μ) is pulled by a force F as shown in figure. The acceleration of the block moving horizontally is [NCERT Page-60]



- 1) $\frac{F \cos \theta}{m}$ 2) $\frac{\mu F \sin \theta}{M}$
 3) $\frac{F}{m}(\cos \theta + \mu \sin \theta) - \mu g$ 4) None of these

Sol. (3): $F \sin \theta + N = mg$
 $N = mg - F \sin \theta$, $f_s = \mu N$, $F \cos \theta - f_s = ma$
 $a = \frac{F \cos \theta - \mu(mg - F \sin \theta)}{m} = \frac{F}{m}(\cos \theta + \mu \sin \theta) - \mu g$

36. Two masses A and B of 10 kg and 5 kg respectively are connected with a string passing over a frictionless pulley fixed at the corner of a table as shown. The coefficient of static friction of A with table is 0.2. The minimum mass of C that may be placed on A to prevent it from moving is [NCERT Page-60]



- 1) 15 kg 2) 10 kg
 3) 5 kg 4) 12 kg

Sol. (1): $\mu = \frac{m_B}{m_A + m_C} \Rightarrow 0.2 = \frac{5}{10 + m_C} \Rightarrow m_C = 15 \text{ kg}$

37. A box of mass 2 kg is placed on the roof of a car. The box would remain stationary until the car attains a maximum acceleration. Coefficient of static friction between the box and the roof of the car is 0.2 and $g = 10 \text{ ms}^{-2}$. This maximum acceleration of the car, for the box to remain stationary, is [NCERT Page-61]

- 1) 8 ms^{-2} 2) 6 ms^{-2}
 3) 4 ms^{-2} 4) 2 ms^{-2}

Sol. (4): For the box remains stationary, $ma_{\max} = \mu_s mg$
 $a_{\max} = \mu_s g = 0.2 \times 10 \text{ ms}^{-2} = 2 \text{ ms}^{-2}$

38. A conveyor belt is moving at a constant speed of 2 m/s. A box is gently dropped on it. The coefficient of friction between them is $\mu = 0.5$. The distance that the box will move relative to belt before coming to rest on it taking $g = 10 \text{ ms}^{-2}$ is [NCERT Page-61]

- 1) 1.2 m 2) 0.6 m
 3) zero 4) 0.4 m

Sol. (4): $s = \frac{u^2}{2\mu g} = 0.4 \text{ m}$

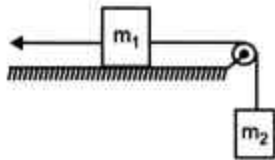
39. Statement-1 : A block of mass m is kept at rest on an inclined plane, the rest force applied by the surface to the block will be mg .

Statement-2 : Contact force is the resultant of normal contact force and friction force.

- 1) If both Statement-1 and Statement-2 are correct.
 2) If Statement-1 is correct but Statement-2 is incorrect.
 3) If Statement-1 is incorrect but Statement-2 is correct.
 4) If both Statement-1 and Statement-2 are incorrect.

Sol. (1): $f = mg \sin \theta$... (i)
 $N = mg \cos \theta$... (ii)
 $R = \sqrt{N^2 + f^2} = mg$

40. A constant force $F = \frac{m_2 g}{2}$ is applied on the block of mass m_1 as shown in the figure. The string and pulley are light and surface of the table is smooth. The acceleration of m_1 is

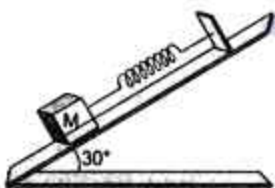


[NCERT Page-54]

- 1) $\frac{m_2 g}{2(m_1 + m_2)}$ towards right
- 2) $\frac{m_2 g}{2(m_1 - m_2)}$ towards left
- 3) $\frac{m_2 g}{2(m_2 - m_1)}$ towards right
- 4) $\frac{m_2 g}{2(m_2 - m_1)}$ towards left

Sol. (1): $\Rightarrow m_2 g - T = m_2 a \dots (i)$
 $\Rightarrow T - \frac{m_2 g}{2} = m_1 a \dots (ii)$
 Using (i), (ii) $a = \frac{m_2 g}{2(m_1 + m_2)}$

41. A body of mass 5 kg is suspended by a spring balance on an inclined plane as shown in figure. The spring balance measure

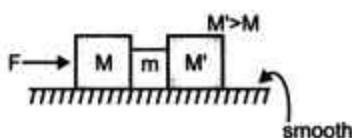


[NCERT Page-58]

- 1) 50 N
- 2) 25 N
- 3) 500 N
- 4) 10 N

Sol. (2): Since downward force along the inclined plane
 $= mg \sin \theta = 5 \times 10 \times \sin 30^\circ = 25 \text{ N}$

42. A constant force F is applied in horizontal direction as shown. Contact force between M and m is N and between m and M' is N' then



[NCERT Page-54, 56]

- 1) N or N' equal
- 2) $N > N'$
- 3) $N' > N$
- 4) cannot be determined

Sol. (2): $F \rightarrow \boxed{M} \leftarrow N_1 \quad N_1 \rightarrow \boxed{m} \leftarrow N_2 \quad N_2 \rightarrow \boxed{M'}$

$$F - N_1 = Ma$$

$$N_1 - N_2 = ma, N_2 = M'a \quad \therefore N_1 = (M' + m)a$$

$$\therefore M' > M \Rightarrow N_1 > N_2$$

43. A 60 kg man stands on a spring scale in the lift. At some instant he finds, scale reading has changed from 60 kg to 50 kg for a while and then comes back to the original make. What should we conclude? [NCERT Page-59]

- 1) The lift was in constant motion upwards.
- 2) The lift was in constant motion downwards.
- 3) The lift while in constant motion upwards, is suddenly stopped.
- 4) The lift while in constant motion downwards, is suddenly stopped.

Sol. (3): The lift while in constant motion upwards, is suddenly stopped.

44. A 30 gm bullet initially travelling at 120 m/s penetrates 12 cm into a wooden block. The average resistance exerted by the wooden block is [NCERT Page-18, 54]

- 1) 2850 N
- 2) 2200 N
- 3) 2000 N
- 4) 1800 N

Sol. (4): $F = \frac{m(u^2 - v^2)}{2S} = \frac{30 \times 10^{-3} \times (120)^2}{2 \times 12 \times 10^{-2}} = 1800 \text{ N}$

45. A body, under the action of a force $\vec{F} = 6\hat{i} - 8\hat{j} + 10\hat{k}$, acquires an acceleration of 1 ms^{-2} . The mass of this body must be [NCERT Page-54]

- 1) $2\sqrt{10}$ kg
- 2) 10 kg
- 3) 20 kg
- 4) $10\sqrt{2}$ kg

Sol. (4): Here, $\vec{F} = 6\hat{i} - 8\hat{j} + 10\hat{k}$

$$|F| = \sqrt{36 + 64 + 100} = 10\sqrt{2} \text{ N}$$

$$a = 1 \text{ ms}^{-2} \quad \therefore m = \frac{10\sqrt{2}}{1} = 10\sqrt{2} \text{ kg}$$

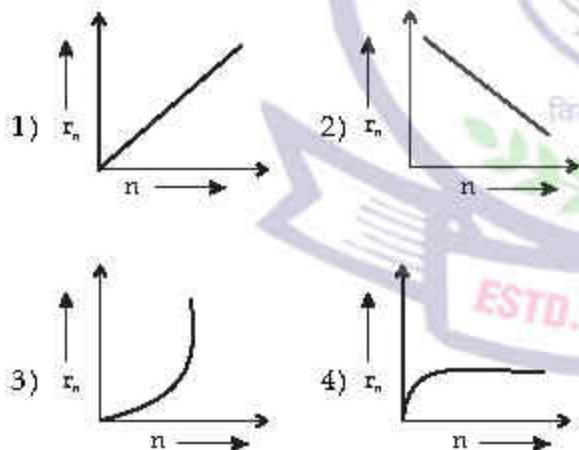
Chemistry : Structure of atom + Electrochemistry + Redox Reaction

46. If radius of 1st excited state in He^+ is r_1 , then radius of 2nd excited state in Li^{+2} will be.

- 1) $2r_1$ 2) $3r_1$
 3) $1.5r_1$ 4) $4r_1$

Sol.(3) He^+] $n=2, Z=2, r=r_1$
 $r_1 = \frac{0.529 \times 4^2}{2} = 2 \times 0.529$
 Li^{+2}] $n=3, Z=3, r=r_2$
 $r_2 = 3 \times 0.529$
 $\frac{r_2}{r_1} = \frac{3}{2} \mid r_2 = 1.5r_1$

47. For Hydrogen-atom, variation of radius of n^{th} orbit with 'n' is given as.



Sol.(3) $r_n = 0.529 \times n^2$
 $r_n \propto n^2$
 $\therefore r_n = k n^2$
 $y = m \cdot x^2$
 Equation of parabola closed to y-axis.

48. If P.E. of second Bohr's orbit in H-atom is taken as zero, then total energy of the ground state will be.

- 1) -13.6 eV/atom 2) -10.2 eV/atom
 3) -6.8 eV/atom 4) -3.4 eV/atom

Sol.(3) In the second Bohr orbit of H:
 $\rightarrow E_n = \frac{-13.6 \text{ eV/atom}}{4}$
 $\rightarrow PE = 2 \times E_n = \frac{-13.6}{2} = -6.8 \text{ eV/atom}$
 $\rightarrow PE$ became zero - ans on adding $+6.8$ in first orbit
 $E_1 = -13.6 + 6.8 = -6.8 \text{ eV/atom}$

49. Which quantum no, determine energy of electrons in H-atom?

- 1) n 2) l
 3) m_l 4) m_s

Sol.(1)

50. A hydrogen sample is prepared in a particular excited state 'A'. Photons of energy 255 eV get absorbed into the sample to take some of electrons to a further excited state B. Quantum no. of the state A and B are.

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

Sol.(2)

$E_4 - E_2 = 2.55 \text{ eV}$

51. No. of maximum electrons in a shell having

$m_s = +\frac{1}{2}$

- 1) $2l+1$ 2) $2n^2$
 3) n^2 4) $2(2l+1)$

Sol.(3)

No. of e^- in a shell = $2n^2$
 \therefore Total No. of e^-
 i) with, $S = +\frac{1}{2} = n^2$
 ii) with, $S = -\frac{1}{2} = n^2$
 Total = $2n^2$

52. True set of Postulates of Bohr's model are.

- Electrons move around the nucleus only along certain select circular orbits, associates with definite energies.
- As long as an electron revolves in a particular orbit or shell, it neither absorbs, nor emits energy.
- Angular momentum of electron in an orbit is integral multiple of $\frac{h}{\pi}$
- When energy is supplied by some external source to an electron it may jump to higher energy level by absorbing a definite amount of energy.

- 1) (i), (ii) and (iv) only 2) (i) and (ii) only
3) (i), (ii) and (iii) only 4) (i), (ii), (iii) and (iv)

Sol.(1)

53. Select the correct statement(s) regarding $3p_y$ orbital.

- Total no of nodes are 2.
- Number of maxima in the curve $4\pi r^2(r)$ vs. r is two
- Quantum number n , l and m for orbital may be 3, 1 and -1 respectively.
- The magnetic quantum number may have positive value

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

Sol.(1)

54. Which set of quantum numbers is/are not consistent with the theory?

i) $n = 2, l = 0, m = -1, s = +\frac{1}{2}$

ii) $n = 2, l = 0, m = 0, s = -\frac{1}{2}$

iii) $n = 1, l = -1, m = 0, s = -\frac{1}{2}$

iv) $n = 3, l = 3, m = -3, s = +\frac{1}{2}$

- 1) (i), (ii) and (iv) only 2) (i) and (ii) only
3) (i), (ii) and (iii) only 4) (i), (iii) and (iv)

55. If the number of maxima in the curve $4\pi r^2(r)$ vs. r is in radial probability distribution curve are 3, then possible subshell will be.

- a) 4p b) 5d c) 6f d) 3s

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

Sol.(1)

56. Which of the following statements are correct for an electron that has $n = 4$ and $m = -2$?

- The electron may be in a d-orbital
- The electron is in the fourth principal electronic shell
- The electron may be in a p-orbital
- The electron must have the spin quantum number = $+1/2$

- 1) (i), (ii) and (iv) only 2) (i) and (ii) only
3) (i), (ii) and (iii) only 4) (i), (ii), (iii) and (iv)

Sol.(2)

57. Choose the correct statement(s).

- The shape of an atomic orbital depends upon azimuthal quantum number
- The orientation of an atomic orbital depends upon the magnetic quantum number.
- The energy of an electron in an atomic orbital of multi-electron atom depends upon principal quantum number only
- The number of degenerate atomic orbitals of one type depends upon the value of azimuthal quantum number.

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

Sol.(2)

58. Which statement is not correct

- Conductance of an electrolytic solution increases with dilution
- Conductance of an electrolytic solution decreases with dilution
- Specific conductance of an electrolytic solution decreases with dilution
- Equivalent conductance of an electrolytic solution increases with dilution

Sol. (2)

59. The resistance of 0.01 M solution of an electrolyte was found to be 200 ohm at 298 K using a conductivity cell of cell constant 0.66 cm^{-1} . The molar conductance of solution is.

- 1) $330 \text{ mho cm}^2 \text{ mol}^{-1}$
- 2) $3.14 \text{ mho cm}^2 \text{ mol}^{-1}$
- 3) $314.28 \text{ mho}^{-1} \text{ cm}^2 \text{ mol}^{-1}$
- 4) $3.14 \text{ mho}^{-1} \text{ cm}^2 \text{ mol}^{-1}$

Sol. (1)
$$K = \frac{1}{l} \times R = \frac{1}{200} \times 6$$

$$= \left(\frac{0.66}{200} \right) \text{ cm}^{-1}$$

$$\lambda_m = \frac{K \times 1000}{M}$$

$$= \left(\frac{0.66 \times 1000}{200 \times 0.01} \right)$$

$$= \frac{660}{2} = 330$$

60. The molar conductance at infinite dilution of AgNO_3 , AgCl and NaCl are 116.5, 121.6 and 110.3 respectively. The molar conductances of NaNO_3 is

- 1) 111.4
- 2) 105.2
- 3) 130.6
- 4) 150.2

Sol. (2)
$$\lambda_m^\circ(\text{NaNO}_3) = \lambda_m^\circ(\text{NaCl}) + \lambda_m^\circ(\text{AgNO}_3) - \lambda_m^\circ(\text{AgCl})$$

$$= 110.3 + 116.5 - 121.6$$

$$= 105.2 \text{ cm}^2 \text{ mol}^{-1}$$

61. One Faraday of current was passed through the electrolytic cell placed in series containing solution of Ag^+ , Ni^{2+} , and Cr^{3+} respectively. The amounts of Ag (at. wt. = 108), Ni (at. wt. = 59) and Cr (at. wt. = 52) deposited will be

	Ag	Ni	Cr
1)	108 g	29.5 g	17.4 g
2)	108 g	59.0 g	52.0 g
3)	108 g	108.0 g	108.0 g
4)	108 g	117.5 g	166.0 g

Sol. (1) on passing 1F

Ag^+	Ni^{2+}	Cr^{3+}
\downarrow	\downarrow	\downarrow
108	$\left(\frac{59}{2} \right)$	$\left(\frac{52}{3} \right)$

62. The same amount of electricity was passed through two cells containing molten Al_2O_3 and molten NaCl . If 1.8 g of Al were liberated in one cell, the amount of Na liberated in the other cell is

- 1) 4.6 g
- 2) 2.3 g
- 3) 6.4 g
- 4) 3.2 g

Sol. (1) $W \propto E$ (Eq. Wt)

$$E_{\text{Al}} = \frac{27}{3} = 9 \text{ gm}$$

9 gm Al - 1F
 $\therefore 1.8 \text{ g} \rightarrow 0.2 \text{ F}$
 1 F \rightarrow 23 gm Na
 0.2 F \rightarrow 4.6 gm Na

63. The mass of copper that will be deposited at cathode in electrolysis of 0.2 M solution of copper sulphate when a quantity of electricity equal to that required to liberate 2.24 L of hydrogen at STP from 0.1 M aqueous H_2SO_4 is passed

- (At. mass of Cu = 63.5) will be
- 1) 1.59 g
 - 2) 3.18 g
 - 3) 6.35 g
 - 4) 12.70 g

Sol. (3)
$$\lambda_m = \frac{V_m}{l} = \frac{2.24}{22.4} = 0.1 \text{ mol l}^{-1}$$

$$\therefore \text{Wt of H} = 0.2 \text{ gm}$$

$$1 \text{ gm H} \rightarrow 1 \text{ F}$$

$$\therefore 0.2 \text{ gm H} \rightarrow 0.2 \text{ F}$$

$$\therefore 0.2 \text{ F Cu}^{2+} = 63.5$$

$$\therefore 0.2 \text{ F} \rightarrow 6.35 \text{ gm}$$

64. The reduction potential values are given below.

$\text{Al}^{3+}/\text{Al} = -1.67 \text{ volt}$, $\text{Mg}^{2+}/\text{Mg} = -2.34 \text{ volt}$
 $\text{Cu}^{2+}/\text{Cu} = +0.34 \text{ volt}$, $\text{I}_2/\text{I}^- = +0.53 \text{ volt}$

Which one is the best reducing agent?

- 1) Al
- 2) Mg
- 3) Cu
- 4) Mg^{+2}

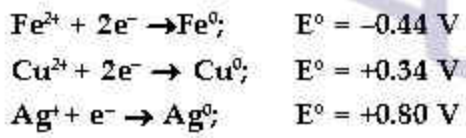
Sol. (2)

65. A galvanic cell is set up from a zinc bar weighing 100 g and 1.0 litre of 1.0 M CuSO_4 solution. How long would the cell run if it is assumed to deliver a steady current of 1.0 amp. ($1F = 96500$)

- 1) 1F|sec. 2) 2F|sec.
3) 3F|sec. 4) 4F|sec.

Sol. (2) $n_{\text{Zn}} = \left[\frac{100}{65} \right] = 1.5 > 1$
 $n_{\text{CuSO}_4} = M \times V = 1 \times 1 = 1 \text{ mole.}$
 $\text{Zn} + \text{CuSO}_4 \rightarrow \text{ZnSO}_4 + \text{Cu}$
 Here L-R = CuSO_4 :
 $\therefore n_{\text{Cu}^{2+}} = 1 \text{ mole}$
 (Deposited)
 $\text{No. of } F = \frac{\text{No. of } \text{Sm}^{\text{val}}}{\text{val}}$
 $= n \times n\text{-factor}$
 $= 1 \times 2 = 2$
 $q = 2 \times 96500 \text{ C}$
 $t = \frac{q}{i} = \frac{2 \times 96500}{1} \text{ sec.}$
 $= 2 \text{ F | sec.}$

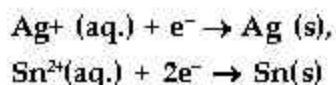
66. Using the standard electrode potential values given below, decide which of the statements, I, II, III and IV are correct. Choose the right answer from (1), (2), (3) and (4).



- I. Copper can displace iron from FeSO_4 solution
 II. Iron can displace copper from CuSO_4 solution.
 III. Silver can displace copper from CuSO_4 solution.
 IV. Iron can displace silver from AgNO_3 solution

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

67. The standard electrode potentials for the reactions



at 25°C are 0.80 volt and -0.14 volt, respectively. The standard emf of the cell.

- $\text{Sn} | \text{Sn}^{2+} (1\text{M}) | \text{Ag}^+ (1\text{M}) | \text{Ag}$ is
 1) 0.66 volt 2) 0.80 volt
 3) 1.08 volt 4) 0.94 volt

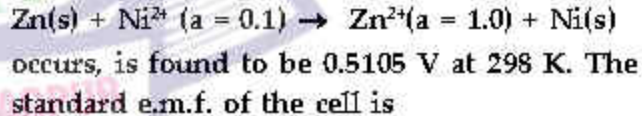
Sol. (4) $E_{\text{cell}} = S.R.P(C) - S.R.P(A)$
 $= 0.8 + 0.14$
 $= 0.94 \text{ V}$

68. Each of the three metals x, y and z were put in turn into aqueous solution of the other two. $x + \text{salt of } y \text{ (or } z) = y \text{ (or } z) + \text{salt of } x$ Which one of the following observation is incorrect?

- 1) $y + \text{salt of } x = \text{no action observed}$
 2) $y + \text{salt of } z = z + \text{salt of } y$
 3) $z + \text{salt of } x = x + \text{salt of } z$
 4) $z + \text{salt of } y = \text{no action observed}$

Sol. (3)

69. The emf of the cell in which the following reaction



- 1) -0.5105 V
 2) 0.5400 V
 3) 0.4810 V
 4) 0.5696 V

Sol. (2) $E_{\text{cell}} = E_{\text{cell}}^\circ - \frac{0.059}{2} \log \left(\frac{1}{0.1} \right)$
 $0.5105 = E_{\text{cell}}^\circ - \frac{0.059}{2}$
 $E_{\text{cell}}^\circ = 0.5105 + 0.0295$
 $= 0.5400 \text{ V}$

70. Which of the following represents the potential of silver wire dipped in to 0.1 M AgNO_3 solution at 25°C ?

- 1) E°_{red} 2) $(E^\circ_{\text{red}} + 0.059)$
 3) $(E^\circ_{\text{ox}} - 0.059)$ 4) $(E^\circ_{\text{red}} - 0.059)$

Sol. (4) $\text{Ag}^+ + e^- \rightarrow \text{Ag}$

$$E_{\text{Ag}} = E^\circ_{\text{Ag}} + 0.059 \log(\text{Ag}^+)$$

$$= (E^\circ_{\text{Ag}} - 0.059)$$

$$(\because \text{Ag}^+ = 0.1 \text{M})$$

71. For a reaction- $\text{A(s)} + 2\text{B}^+ \rightarrow \text{A}^{2+} + 2\text{B}$
 KC has been found to be 10^{12} . The E° cell is

- 1) 0.354 V 2) 0.708 V
 3) 0.0098 V 4) 1.36 V

Sol. (1) $E^\circ_{\text{cell}} = \frac{0.059}{n} \log K_c$

$$= \frac{0.059}{2} \log(10^{12})$$

$$= 0.06 \times 6 = 0.36 \text{ V}$$

72. A current of 9.65 amp. is passed through an aqueous solution of NaCl using suitable electrodes for 1000 s. Given that 1 faraday equals 96500 coulombs the amount of NaOH (mol wt. 40.00) formed on electrolysis is

- 1) 2.0 g 2) 8.0 g
 3) 4.0 g 4) 1.0 g

Sol. (3) $q = i \times t$
 $= 9.65 \times 1000$
 $= 9650 = 0.1 \text{ F}$

$$\text{Eq. wt of } \text{NaOH} = 40 \text{ gm}$$

$$1 \text{ F} \rightarrow 40 \text{ gm}$$

$$0.1 \text{ F} \rightarrow ? \quad 4 \text{ gm}$$

73. During electrolysis of fused calcium hydride, the hydrogen is produced at

- 1) Cathode
 2) Anode
 3) Hydrogen is not liberated at all
 4) H_2 produced reacts with oxygen to form water

Sol. (2)

74. For a dibasic acid (H_2X) solution at 25°C , molar conductance at infinite dilution, is $425 \text{ ohm}^{-1} \text{ cm}^2 \text{ mol}^{-1}$. The specific conductance of a solution of H_2X is $3.825 \text{ ohm}^{-1} \text{ cm}^{-1}$. If the apparent degree of dissociation is 90% the normality of the solution is

- 1) 0.90 2) 1.0
 3) 10 4) 20

Sol. (4)

$$\alpha = \frac{\lambda_m}{\lambda_m^\infty}$$

$$\lambda_m = 0.9 \times \lambda_m^\infty$$

$$\lambda_m = 0.9 \times 425$$

$$= 382.5$$

$$\lambda_m = \frac{k \times 1000}{M}$$

$$382.5 = \frac{3.825 \times 1000}{M}$$

$$M = 10$$

$$N = \frac{M \times n}{1000} = \frac{10 \times 2}{1000} = 2 \text{ N}$$

75. Number of correct statements.

- The hydrogen electrode is dipped in a solution of $\text{pH} = 3$ at 25° . The potential of the cell would be -0.177 V .
- Cu is placed in AgNO_3 solution turns blue.
- 1.5 F. electricity is passed through a solution of AlCl_3 , 13.5 g. Al are deposited.
- A solution of sodium sulphate in water is electrolysed using inert electrodes. The product at the cathode and anode are respectively H_2 and O_2 .

- 1) 4 2) 3
 3) 2 4) 1

Sol. (1)

76. The hydrogen electrode is dipped in a solution of pH = 3 at 25°. The oxidation potential of the cell would be.....if the pressure of hydrogen gas is 10 atm.

- 1) More than 0.177 V 2) Less than 0.177 V
3) 0.177 V 4) 0.059 V

Sol. (1)

77. The value of Λ_m° for NH_4Cl , NaOH and NaCl are 129.8, 248.1 and 126.4 $\text{ohm}^{-1} \text{cm}^2 \text{mol}^{-1}$ respectively. Calculate the pH of the solution of 0.1 M for NH_4OH if $\Lambda_m = 25.15 \text{ ohm}^{-1} \text{cm}^2 \text{mol}^{-1}$

- 1) 12 2) 10
3) 11 4) 13

Sol. (1)

$$\begin{aligned} \Lambda_m^\circ(\text{NH}_4\text{OH}) &= \Lambda_m^\circ(\text{NH}_4^+) + \Lambda_m^\circ(\text{OH}^-) - \Lambda_m^\circ(\text{Na}^+) - \Lambda_m^\circ(\text{Cl}^-) \\ &= 129.8 + 248.1 - 126.4 \\ &= 251.5 \\ \Lambda_m &= 25.15 \quad (C = 0.1 \text{ M}) \\ \Lambda_m &= \frac{\Lambda_m^\circ}{\alpha} = 0.1 \\ \text{NH}_4\text{OH} &\rightleftharpoons \text{NH}_4^+ + \text{OH}^- \\ [\text{OH}^-] &= \alpha = 0.01 \\ \text{pOH} &= 2 \\ \text{pH} &= 12 \end{aligned}$$

78. The cost of electricity required to deposit 1 gm. of Mg is Rs. 5.00. How much would it cost to deposit 10 gm. of Al

- (At wt. Al = 27, Mg = 24)
1) Rs. 10.00 2) Rs. 27.00
3) Rs. 44.44 4) Rs. 66.67

Sol. (4) Eq. wt of Mg = 12 gm:

$$\begin{aligned} 1 \text{ gm Mg} &\longrightarrow 5/- \\ \therefore 12 \text{ gm Mg} &\longrightarrow 60/- \\ \therefore \text{Cost of 1F} &= 60/- \\ \text{Eq. wt of Al} &= 9 \text{ gm} \\ 9 \text{ gm Al} &\longrightarrow 60/- \\ \therefore 10 \text{ gm Al} &\longrightarrow > 60/- \end{aligned}$$

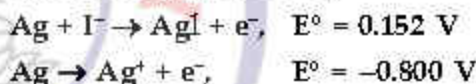
79. By how much times will potential of half cell Cu^{2+}/Cu change if the solution is diluted to 100 times at 298 K.

- 1) Increases by 59 mv
2) Decreases by 59 mv
3) Increases by 29.5 mv
4) Decreases by 29.5 mv

Sol. (2)

$$\begin{aligned} \text{Cu}^{2+} (0.01 \text{ M}) + 2e^- &\longrightarrow \text{Cu} \\ &\uparrow \text{ after 100 times} \\ &\uparrow \text{ dilution} \\ E_{\text{RP}} &= E_{\text{RP}}^\circ - \frac{0.059}{n} \log \frac{1}{\text{Cu}^{2+}} \\ E_{\text{RP}} - E_{\text{RP}}^\circ &= -\frac{0.059}{2} \log(100) \\ &= -0.059 \text{ V} \\ &= -59 \text{ mV} \\ \therefore \text{R.P. Dec. by} &= 59 \text{ mV} \end{aligned}$$

80. Given the data at 25° C,



What is the value of log Ksp for AgI?

$$\left(\frac{2.303 RT}{F} = 0.059 \text{ V} \right)$$

- 1) -8.12 2) +8.612
3) -37.83 4) -16.13

Sol. (4)

$$\begin{aligned} \text{(i)} \quad \text{Ag} + \text{I}^- &\longrightarrow \text{AgI} + e^-, \quad E_{\text{RP}} = 0.152 \text{ V} \\ \text{(ii)} \quad \text{Ag} &\longrightarrow \text{Ag}^+ + e^-, \quad E_{\text{RP}} = -0.80 \text{ V} \\ \text{(iii)} \quad \text{AgI} &\rightleftharpoons \text{Ag}^+ + \text{I}^-, \quad E_{\text{RP}} = ? \\ \text{(iii)} &= \text{(ii)} - \text{(i)} \\ n_2 E_2 &= n_1 E_1 - n_2 E_2 \\ E_3 &= \frac{(n_2 E_1 - n_1 E_2)}{n_3} \\ &= \frac{(1 \times 0.8 - 0.152)}{1} \\ &= -0.952 \text{ V} \\ E_{\text{cell}} &= E_{\text{cath}} - \frac{0.059}{n} \log K_{\text{sp}} \\ 0 &= -0.952 - \frac{0.059}{1} \log K_{\text{sp}} \\ \log K_{\text{sp}} &= \frac{-0.952}{0.059} = -16.13 \end{aligned}$$

81. The chemical reaction,



taking place in a galvanic cell is represented by the notation.

- 1) $\text{Pt}(s) | \text{H}_2(g), 1\text{bar} | 1\text{MKCl}(aq) | \text{AgCl}(s) | \text{Ag}(s)$
- 2) $\text{Pt}(s) | \text{H}_2(g), 1\text{bar} | 1\text{MHCl}(aq) | 1\text{M Ag}(aq) | \text{Ag}(s)$
- 3) $\text{Pt}(s) | \text{H}_2(g), 1\text{bar} | 1\text{MHCl}(aq) | \text{AgCl}(s) | \text{Ag}(s)$
- 4) $\text{Pt}(s) | \text{H}_2(g), 1\text{bar} | 1\text{MHCl}(aq) | \text{Ag}(s) | \text{AgCl}(s)$

Sol. (3)

82. Resistance of a conductivity cell filled with a solution of an electrolyte of concentration 0.1 M is 100Ω . The conductivity of this solution is 1.29 Sm^{-1} . Resistance of the same cell when filled with 0.02 M of the same solution is 52Ω . The molar conductivity of 0.02M solution of the electrolyte will be

- 1) $124 \times 10^{-4} \text{ Sm}^2 \text{ mol}^{-1}$
- 2) $1240 \times 10^{-4} \text{ Sm}^2 \text{ mol}^{-1}$
- 3) $1.24 \times 10^{-4} \text{ Sm}^2 \text{ mol}^{-1}$
- 4) $12.4 \times 10^{-4} \text{ Sm}^2 \text{ mol}^{-1}$

Sol. (2)

$$k = l \times b = \frac{l}{R} \Rightarrow b = k \times R$$

$$b = 1.29 \times 100 = 129 \text{ cm}^2$$

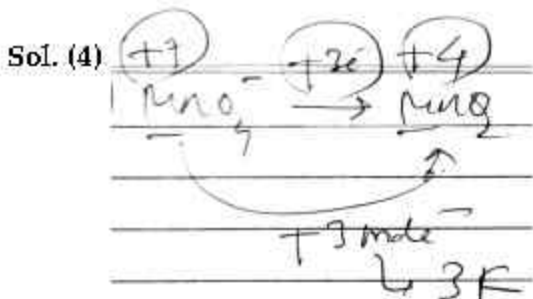
$$= 1.29 \text{ cm}^2$$

$$\lambda_m = \frac{k \times 1000}{M} \quad k = \frac{b}{R} = \left(\frac{1.29}{52} \right)$$

$$= \frac{1.29 \times 1000}{52 \times 0.02} \quad M = 0.02$$

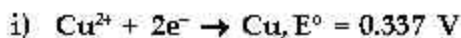
83. The charge required for the reduction of 1 mol of MnO_4^- in neutral medium if current has 50% efficiency.

- 1) 1 F
- 2) 3 F
- 3) 5 F
- 4) 6 F



Since, 50% efficiency we need to pass 6F.

84. Given :



Electrode potential, for the reaction,



- 1) Less than 0.52 V
- 2) 0.52 V
- 3) More than 0.52 V
- 4) 0.30 V

Sol. (1)

$$\text{i) } \text{Cu}^{2+} + 2e^- \rightarrow \text{Cu}, E_1^\circ = 0.337 \text{ V}$$

$$\text{ii) } \text{Cu}^{2+} + e^- \rightarrow \text{Cu}^+, E_2^\circ = 0.153 \text{ V}$$

$$\text{iii) } \text{Cu}^+ + e^- \rightarrow \text{Cu}, E_3^\circ = ?$$

$$\text{(iii)} = \text{(i)} - \text{(ii)}$$

$$n_3 E_3^\circ = n_1 E_1^\circ - n_2 E_2^\circ$$

$$E_3^\circ = \frac{(n_1 E_1^\circ - n_2 E_2^\circ)}{n_3}$$

$$= \frac{(2 \times 0.337 - 0.153)}{1}$$

$$= 0.521 \text{ V}$$

$\approx \text{eq}^{\text{th}} \text{(ii)}, \text{ of } \text{Cu}^+ \downarrow$
Hence R.P. \downarrow
 $< 0.521 \text{ V}$

85. Limiting molar conductance of H^+ and CH_3COO^- ions are 344 and 40 respectively. Molar conductance of 0.008 M CH_3COOH is 38.4. What will be the value of K_a for CH_3COOH

- 1) 1.4×10^{-5}
- 2) 8.8×10^{-5}
- 3) 1.4×10^{-4}
- 4) 1×10^{-5}

Sol. (2)

$$\lambda_m^\circ (\text{CH}_3\text{COOH})$$

$$= 344 + 40 = 384$$

$$\lambda_m = 38.4$$

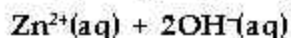
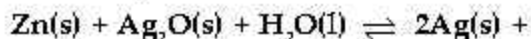
$$\alpha = \frac{38.4}{384} = 0.1$$

$$K_a = \frac{\alpha^2}{1-\alpha} = \frac{0.008 \times (0.1)^2}{1-0.1}$$

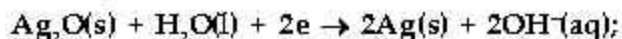
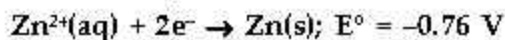
$$= \frac{8 \times 10^{-5}}{0.9}$$

$$= 8.88 \times 10^{-5}$$

86. A button cell used in watches function as following



If half cell potentials are



$$E^{\circ} = 0.34 \text{ V}$$

The cell potential will be

- 1) 1.34 V 2) 1.10 V
3) 0.42 V 4) 0.84 V

Sol. (2)

$$E_{\text{cell}}^{\circ} = \text{SRP (C)} - \text{SRP (A)}$$

$$= 0.34 - (-0.76)$$

$$= 1.10 \text{ V}$$



disproportionation is not shown by.

- 1) i only 2) i and ii only
3) ii and iii only 4) i, ii and iii

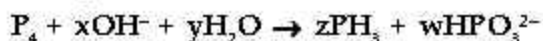
Sol.(4)

88. For HNC, select the correct statement.

- i) It is a hydride
ii) O.N. of nitrogen is -3.
iii) O.N. of carbon is +2
iv) There is co-ordinate bond between nitrogen and carbon.
- 1) i only 2) i and ii only
3) ii and iii only 4) ii, iii and iv

Sol.(4)

89. In a given balanced redox reaction.



- a) $x = 4, y = 2$ b) $x = 2, y = 1$
c) $z = 2, w = 2$ d) $z = 1, w = 1$
- 1) (a) and (b) only 2) (b) and (c) only
3) (a) and (c) only 4) (a), (b) and (c) only

Sol. (3)

90. Statement-I : The eq. wt. of iodine in



Statement-II : Equivalent weight of BrO_3^{-} is Mol. wt/6.

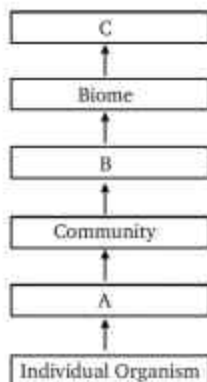
If the reaction is $\text{BrO}_3^{-} \rightarrow \text{Br}^{-}$ (acidic medium).

- 1) Both Statement I and Statement II are correct
2) Both Statement I and Statement II are incorrect
3) Statement I is correct but Statement II is incorrect
4) Statement I is incorrect but Statement II is correct

Sol. (1)

Biology

91. Identify A, B and C in the ecological hierarchy: [New NCERT Page 191]



- | A | B | C |
|---------------|------------|-----------|
| 1) Population | Biosphere | Landscape |
| 2) Ecosystem | Population | Ecosphere |
| 3) Population | Ecosystem | Biosphere |
| 4) Ecosphere | Population | Ecosystem |

Ans. (3)

92. Assertion (A) : Gibberellins cause fruits like apple to elongate and improve their shape.

Reason (R) : GA_3 is used to seed up the malting process in brewing industry. [New NCERT Page 176]

- 1) If both (A) and (R) are true and (R) is the correct explanation of (A).
- 2) If both (A) and (R) are true but (R) is not the correct explanation of (A).
- 3) If (A) is true but (R) is false.
- 4) If both (A) and (R) are false.

Ans. (2)

93. Match column I with column II.

[New NCERT Page 174]

Column-I (PGR)	Column-II (Derivatives)
a Auxin	i Indole compounds
b Gibberellins	ii Terpene derivatives
c Cytokinin	iii N ⁶ -furfuryl aminopurine
d Abscisic acid	iv Carotenoid derivatives

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

Ans. (2)

94. Match column I with column II.

[New NCERT Page 175, 176, 177]

Column-I	Column-II
a IAA	i Overcoming genetic dwarfing
b GA	ii Most widely used PGR in agriculture
c Cytokinin	iii Induced parthenocarpy in tomato
d Ethylene	iv Coconut milk factor

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

Ans. (1)

95. Statement (A) : Development of plant is influenced by the external factors.

Statement (B) : Development is the sum total of growth and differentiation. [New NCERT Page 174]

- 1) If both statement (A) and (B) are true and the statement (B) is the correct explanation of statement (A).
- 2) If both statement (A) and (B) are true and the statement (B) is not the correct explanation of statement (A).
- 3) If statement (A) is true but statement (B) is false.
- 4) If both statements (A) and (B) are false statements.

Ans. (2)

96. Read the following statements :

[New NCERT Page 177]

- GA causes increase in length of grape stalks and causes apples to elongate and improve its shape
- GA causes bolting in beet, cabbage and many plants with rosette habit
- Kinetin is modified cytosine
- Cytokinins are abundant in root apices, developing shoot buds and young fruits
- Cytokinins cause lateral shoot growth and adventitious shoot formation

Which of the above statements are correct?

- 1) i, ii and iii
- 2) ii only
- 3) iii and iv
- 4) i, ii, iv and v

Ans. (4)

97. Evidence shows that some grasses benefit from being grazed. Which of the following terms would best describe this plant-herbivore interaction? [NCERT Based]

- 1) Predation 2) Mutualism
3) Commensalism 4) Competition

Ans. (2)

98. Carrying capacity is : [New NCERT Page 195]

- 1) The term used to describe the stress a population undergoes due to limited resources
2) Always unlimited
3) The maximum population size that a particular environment can support
4) Seldom reached by marine producers and consumers because of the vast resources of ocean

Ans. (3)

99. A population of rabbits has an annual per capita birth rate of 0.06 and annual per capita death rate of 0.02. [New NCERT Page 194]

Calculate an estimate of the number of individuals added (net) to a population of 1,000 individuals in one year :

- 1) 400 individuals added
2) 20 individuals added
3) 40 individuals added
4) 120 individuals added

Ans. (3)

100. Why do populations grow more slowly as they approach their carrying capacity ?

[New NCERT Page 194]

- 1) Density-dependent factors lead to fewer births and increased mortality
2) Density-independent factors lead to fewer births and increased mortality
3) Hormonal changes promote higher death rates in crowded populations
4) Individuals voluntarily stop mating so that overcrowding does not occur

Ans. (1)

101. Find out the incorrect match w.r.t. age-pyramid :

[New NCERT Page 192]

- 1) Triangular pyramid – Young/growing population
2) Bell-shaped pyramid – Stable/mature population
3) Urn-shaped pyramid – Positive growth
4) Urn-shaped pyramid – Declined/negative growth

Ans. (3)

102. In a tide-pool, 18 species of invertebrates were reduced to 10 after one species was removed. This species removed was likely a :

- 1) Herbivore [NCERT Based]
2) Pathogen
3) Mutualistic organism 4) Keystone species

Ans. (4)

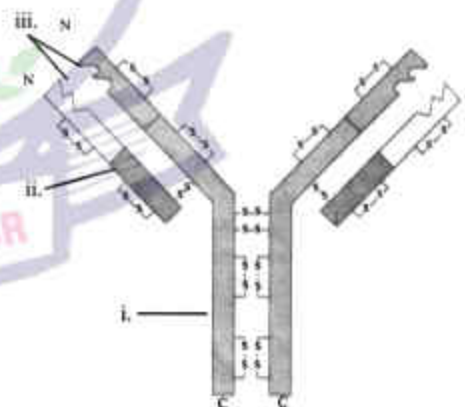
103. Statement (A) : Ethylene can either act as growth promoter or inhibitor.

Statement (B) : Ethylene helps in breaking dormancy of seeds and buds and is also responsible for senescence of plant parts like leaves and flower. [New NCERT Page 177]

- 1) If both statement (A) and (B) are true and the statement (B) is the correct explanation of statement (A).
2) If both statement (A) and (B) are true and the statement (B) is not the correct explanation of statement (A).
3) If statement (A) is true but statement (B) is false.
4) If both statements (A) and (B) are false statements.

Ans. (1)

104. In the figure of antibody molecule given below, identify (i), (ii) and (iii).



[New NCERT Page-135]

	i	ii	iii
1)	Heavy chain	Light chain	Antibody binding site
2)	Light chain	Heavy chain	Antigen binding site
3)	Light chain	Heavy chain	Antibody binding site
4)	Heavy chain	Light chain	Antigen binding site

Ans. (4)

105. Connell conducted experiments on the rocky coast of Scotland on barnacles to prove :

[New NCERT Page 199]

- 1) Resource partitioning
- 2) Competitive exclusion
- 3) Competitive release
- 4) All of these

Ans. (2)

106. Read the following statements w.r.t. ethylene – the gaseous plant hormone :

[New NCERT Page 177]

- i. Causes horizontal growth of seedlings
- ii. It is highly effective in causing fruit ripening
- iii. Is responsible for respiratory climatic in fruits which is the enhanced respiration rate during fruit ripening
- iv. Ethylene breaks seed and bud dormancy, initiates germination in peanut seeds and causes sprouting of potatoes.
- v. It is used to initiate flowering and for synchronising fruit set in pineapples.

How many of the above statements are correct?

- 1) Four
- 2) Three
- 3) Two
- 4) Five

Ans. (4)

107. During exponential growth, a population always :

[NCERT Based]

- 1) Loses some individuals to emigration
- 2) Cycles through time
- 3) Grows at its maximum per capita rate
- 4) Quickly reaches and stay at its carrying capacity

Ans. (3)

108. Match the columns : [New NCERT Page 194]

Column I		Column II	
a	Exponential growth equation	i	$\frac{dn}{dt} = rN$
b	Integral form of exponential growth equation	ii	$N_t = N_0 e^{rt}$
c	Logistic growth equation	iii	$\frac{dN}{dt} = rN \left(\frac{K-N}{K} \right)$
d	Integral form of logistic growth equation	iv	$N_t = N_0 e^{r \left(\frac{K-N}{K} \right) t}$

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

Ans. (2)

109. You are given a tissue with its potential for differentiation in an artificial culture. Which of the pairs of hormones would you add to the medium to secure shoots as well as roots?

[New NCERT Page 176]

- 1) Auxin and abscisic acid
- 2) Gibberellin and abscisic acid
- 3) IAA and gibberellin
- 4) Auxin and cytokinin

Ans. (4)

110. Which of the following is correct ?

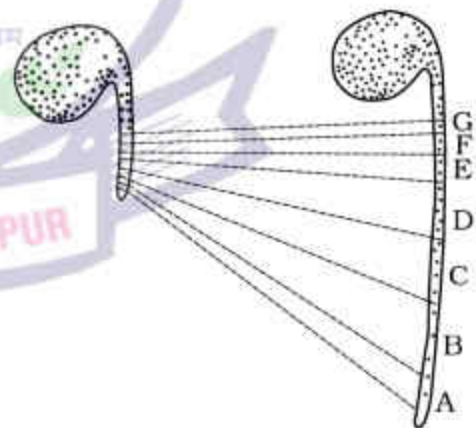
[New NCERT Page 194]

- 1) Logistic growth model is more realistic than exponential growth model
- 2) *r*-selected species have low fecundity, large body size and late maturity
- 3) *K*-selected species have high fecundity, small body size and early maturity
- 4) Altruistic behaviour is common in dogs

Ans. (1)

111. What does the following figure represent?

[New NCERT Page 168]



- 1) The growth of pollen tube is measured in term of surface area.
- 2) Detection of the zone of elongation by the parallel line technique.
- 3) Detection of the zone of maturation by parallel line technique.
- 4) Detection of zone of meristematic activity by the parallel line technique.

Ans. (2)

112. Read the following statements :

- i. NAA and 2, 4-D are synthetic auxins
- ii. Auxins promote flowering in pineapples
- iii. Auxins help to prevent fruit and leaf drop at early stages but promote the abscission of older mature leaves and fruits
- iv. Apical bud removal is applied for hedge making and creating bushy tea plants.
- v. Auxin induces parthenocarpy, like, in tomatoes. [New NCERT Page 175]

How many of the above statements are correct?

- 1) Four
- 2) Five
- 3) Two
- 4) Three

Ans. (2)

113. A protozoan reproduces by binary fission. What will be the number of protozoans in its population after six generations?

[NCERT Exemplar]

- 1) 128
- 2) 24
- 3) 64
- 4) 32

Ans. (3)

114. Which of the following best describes resource partitioning? [New NCERT Page 199]

- 1) Slight variations in niche that allow similar species to coexist
- 2) A climax community that is reached when no new niches are available
- 3) Competitive exclusion that results in the success of superior species
- 4) Two species that can coevolve to share identical niches

Ans. (1)

115. Ethephon : [New NCERT Page 177]

- 1) Hastens fruit ripening in tomatoes and apples, accelerates abscission in flowers and fruits
- 2) Promotes female flower development in cucumbers thereby increasing the yield
- 3) In aqueous solution is readily absorbed and transported within the plant and releases ethylene slowly
- 4) All of the above

Ans. (4)

116. Choose wrong statement :

[New NCERT Page 177]

- 1) Ethylene induces flowering in mango tree
- 2) Ethylene promotes senescence of plant organs especially of leaves and flowers
- 3) Ethylene promotes rapid internode/petiole elongation in deep water rice plants
- 4) Ethylene is the least used PGR in agriculture and horticulture

Ans. (4)

117. Plant hormones can have different effects at different concentrations. This explains how :

[New NCERT Page 175]

- 1) Plant genes recognise pathogen genes
- 2) Some plants are LDP and others are SDP
- 3) Auxins can stimulate cell elongation in apical meristems, yet will inhibit the growth of axillary buds
- 4) Gibberellin concentration can both induce and break seed dormancy

Ans. (3)

118. Characteristic found in the cells of the meristematic zone is/are [New NCERT Page 168]

- 1) The cells of this region are rich in protoplasm, possess small inconspicuous nuclei.
- 2) Their cell wall are primary in nature, thin and cellulosic with abundant plasmodesmatal connections.
- 3) Central vacuoles are present
- 4) All

Ans. (2)

119. The interaction between sea-anemone and hermit crab is a type of : [NCERT Summary]

- 1) Protocooperation
- 2) Mutualism
- 3) Predation
- 4) Parasitism

Ans. (1)

120. Which of the following is correct about growth? [New NCERT Page 167]

- 1) Growth is regarded as one of most fundamental and conspicuous characteristics of living being.
- 2) Growth can be defined as an irreversible permanent increase in size of an organ or its parts or even of an individual cell.
- 3) Generally growth is accompanied by metabolic processes (both anabolic and catabolic), that occur at the expense of energy
- 4) All of the above

Ans. (4)

121. Assertion (A) : Abscisic acid (ABA) is also called stress hormone. [New NCERT Page 177]

Reason (R) : ABA increases the tolerance of plants to various kinds of stresses.

- 1) If both (A) and (R) are true and (R) is the correct explanation of (A).
- 2) If both (A) and (R) are true but (R) is not the correct explanation of (A).
- 3) If (A) is true but (R) is false.
- 4) If both (A) and (R) are false.

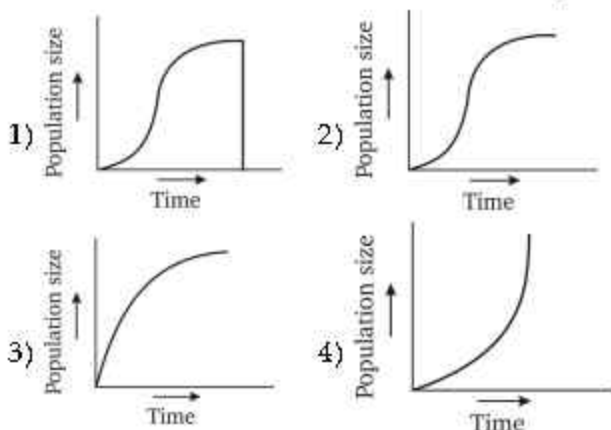
Ans. (1)

122. What interaction exist between the cattle egret and grazing cattle ? [New NCERT Page 201]

- 1) +/+ 2) +/0 3) +/- 4) -/-

Ans. (2)

123. Which of the following graphs illustrates the populations growth curve of a single bacterium growing in a flask of ideal medium at optimum temperature over a period of 24-hours? [New NCERT Page 194]



Ans. (4)

124. Assertion (A) : Auxins help to prevent fruit and leaf drop at early stages. [New NCERT Page 175]

Reason (R) : Auxins promote the abscission of older mature leaves and fruits.

- 1) If both (A) and (R) are true and the (R) is a correct explanation of the (A).
- 2) If both (A) and (R) are true but (R) is not a correct explanation of the (A).
- 3) If both the (A) and (R) are false.
- 4) If the (A) is false but the (R) is true.

Ans. (2)

125. The population at time (t + 1) can be calculated as : [New NCERT Page 193]

$$N_{t+1} = N_t + [(X + Y) - (W + Z)]$$

In the above equation :

- 1) X is immigration and Z is mortality
- 2) X is immigration and Z is natality
- 3) Y is immigration and W is natality
- 4) Y is emigration and W is mortality

Ans. (1)

126. Which of the following is an example of dedifferentiation? [New NCERT Page 172]

- 1) The formation of tracheary elements (xylem tracheids and xylem vessels)
- 2) Formation of meristem like interfascicular cambium from fully differentiated parenchyma cells
- 3) Formation of meristem like cork cambium from fully differentiated parenchyma cells
- 4) Both (2) and (3)

Ans. (4)

127. Read the following statements :

- i. Cattles do not browse Calotropis as these plants produce highly poisonous cardiac glycosides [NCERT Summary]
- ii. Totally unrelated species can compete for the same resource
- iii. Resources need not always be limiting for competition to occur
- iv. In 'Interference competition', the feeding efficiency of one species might be reduced due to the interfering and inhibitory presence of the other species
- v. Abingdon tortoise in Galapagos islands became extinct within a decade after goats were introduced, apparently due to the greater browsing efficiency of goats

How many of the above statements are correct?

- 1) Four 2) Five 3) Two 4) Three

Ans. (2)

128. Read the given statements about auxins and state whether they are true or false.

- Auxin promotes apical dominance.
- Auxins have a negative impact on cytokinin levels.
- F.W Went isolated auxins from the coleoptiles of the oat plant.
- Auxin promotes flowering in the pineapple plants. [New NCERT Page 174, 175]

- i-false, ii-false, iii-true, iv-false
- i-true, ii-true, iii-true, iv-true
- i-true, ii-false, iii-true, iv-false
- i-false, ii-true, iii-true, iv-true

Ans. (2)

129. Find the incorrect match : [NCERT Summary]

- Commensalism — Sea anemone and clown fish
- Mutualism — Mycorrhizae
- Coevolution — Fig and wasp
- Amensalism — Epiphytic orchid on a mango tree

Ans. (4)

130. Identify the correct statements regarding cytokinins. [New NCERT Page 175]

- Cytokinins induce cell division.
- Cytokinins delay the onset of senescence.
- Cytokinins initiate chloroplast formation in the presence of light.
- Application of cytokinins overcomes apical dominance and stimulates the growth of lateral buds.

- i, ii, iii and iv 2) i, ii and iii
- ii and iv 4) i and iii

Ans. (1)

131. Which of the following is correct ?

[New NCERT Page 200]

- Parasites do not tend to co-evolve with the host
- 'Brood parasitism' is absent in cuckoo
- In general, herbivores and plants appear to be more adversely affected by competition than carnivores
- The life cycle of endo parasites are often very simple, involving one or two intermediate hosts or vectors

Ans. (3)

132. Which of the following is a partial root parasite ? [NCERT Exemplar]

- 1) Sandal wood 2) Mistletoe
- 3) *Orobanch*e 4) *Ganoderma*

Ans. (1)

133. Find the correct statements. [New NCERT Page 175]

- Causal organism of foolish seedling disease is *Gibberella fujikuroi*.
- ABA is growth promoter.
- Decapitation is widely applied in tea plantation and hedge making.
- Bolting of cabbage can be induced by treatment with IAA.

- 1) i, ii, iii correct 2) i, ii correct
- 3) ii, iv correct 4) i, iii correct

Ans. (4)

134. Which one demonstrates process associated with abscission of a leaf?

[New NCERT Page 175, 177]

- 1) In the leaf concentration of both auxin and ABA decreases.
- 2) In the leaf concentration of both auxin and ABA increases.
- 3) Reduction in ABA concentration and increase of auxin concentration in the leaf.
- 4) Reduction in concentration of auxin and increase of concentration of ABA in the leaf.

Ans. (4)

135. Assertion (A) : 2, 4-D is extensively used in agricultural and horticultural practices.

Reason (R) : 2, 4-D is a herbicide / weedicide.

[New NCERT Page 176]

- 1) If both (A) and (R) are true and (R) is the correct explanation of (A).
- 2) If both (A) and (R) are true but (R) is not the correct explanation of (A).
- 3) If (A) is true but (R) is false.
- 4) If both (A) and (R) are false.

Ans. (1)

136. The peripheral nervous system (PNS):

[New **NCERT** Page 231]

- 1) Through efferent nerve fibres transmit impulses from tissues/organs to the central nervous system (CNS)
- 2) Comprises of all the nerves of the body associated with CNS
- 3) With the help of somatic neural system transmits impulses from the CNS to involuntary organs and smooth muscles
- 4) Through autonomic neural system relays impulses from CNS to skeletal muscles

Ans. (2)

137. Read the following statements about a drug and identify the plant -

- I. These are known for their effects on cardiovascular system of the body
- II. These interact with the receptors present principally in brain
- III. Generally taken by inhalation and oral ingestion

[New **NCERT** Page-142]

- 1) *Papaver somniferum*
- 2) *Erythroxylum coca*
- 3) *Atropa belladonna*
- 4) *Cannabis sativa*

Ans. (4)

138. Statement I: There are diverse groups of PGRs in plants, principally belonging to six groups.

Statement II: These PGRs are synthesised in various parts of the plant they control different differentiation (Changes) and developmental events.

[New **NCERT** Page 174]

- 1) Statement I is correct Statement II is false
- 2) Statement I is incorrect Statement II is true
- 3) Both Statement I and Statement II are true
- 4) Both Statement I and Statement II are false

Ans. (2)

139. How many of following is not the function of cerebellum ?

[New **NCERT** Page 238, Summary]

1. Body balance
 2. Integrate information from semi-circular canal and auditory system
 3. Gastric secretions
 4. Language comprehension
- 1) 2, 3, 4
 - 2) All of the above
 - 3) 3 and 4 only
 - 4) 3 only

Ans. (3)

140. A: Organ transplantation patients are given immunosuppressive drugs.

B: Transplanted tissue has antigens which stimulate the specific immune response of the recipient.

[New **NCERT** Page-135]

- 1) Both statements A and B are true and statement B is the correct explanation of statement A.
- 2) Both statements A and B are true but statement B is not the correct explanation of statement A.
- 3) Statement A is true but statement B is false.
- 4) Both statements A and B are false statements.

Ans. (1)

141. Which of the following have rapid transmission of impulse.

[New **NCERT** Page 234]

- 1) electrical synapse, myelinated neuron
- 2) chemical synapse + myelinated neuron
- 3) electrical synapse + unmyelinated neuron
- 4) chemical synapse + unmyelinated neuron

Ans. (1)

142. What parameters are used for tiger census in our country's national parks and sanctuaries?

[New **NCERT** Page 192]

- 1) Pug marks only
- 2) Pug marks and faecal pellets
- 3) Faecal pellets only
- 4) Actual head counts

Ans. (2)

143. A: LSD and marijuana are clinically used as analgesics.

[New **NCERT** Page-142]

B: Both these drugs suppress brain function.

- 1) Both statements A and B are true and statement B is the correct explanation of statement A.
- 2) Both statements A and B are true but statement B is not the correct explanation of statement A.
- 3) Statement A is true but statement B is false.
- 4) Both statements A and B are false statements.

Ans. (4)

144. How many of following are true regarding neural organisation in animals

- A) Hydra have network of neurons but no brain
- B) Lower invertebrate have simple type of neural system
- C) Insects have better organised system with brain but no ganglia and nerve net.
- D) Vertebrate have less developed system than insects

[New **NCERT** Page 231]

- 1) Two
- 2) Three
- 3) Four
- 4) One

Ans. (1)

145. A: Opioids are the drugs which bind to specific opioid receptors present in our central nervous system. [New NCERT Page-142]

B: Opioids also binds to the cells of gastrointestinal tract.

- 1) Both statements A and B are true and statement B is the correct explanation of statement A.
- 2) Both statements A and B are true but statement B is not the correct explanation of statement A.
- 3) Statement A is true but statement B is false.
- 4) Both statements A and B are false statements.

Ans. (2)

146. Identify the statements that are correct about the cortex of cerebrum? [New NCERT Page 236]

- I. It consists of grey matter.
- II. It shows prominent folds.
- III. It consists of white matter.
- IV. It contains motor areas, sensory areas and association areas.

Choose the correct option,

- 1) Only I
- 2) I and II
- 3) I, II and IV
- 4) I, III and IV

Ans. (3)

147. Match Column-I with Column-II and choose the correct option. [New NCERT Page-131, 132, 133]

Column I		Column II
a Allergy	i	Typhoid fever
b T-helper cells	ii	Single stranded RNA
c Hallucinogens	iii	Wuchereria
d Liver	iv	IgE
e Widal test	v	Cirrhosis
f Filariasis	vi	<i>Atropa belladonna</i>
g ELISA test	vii	Activation of B cells
h AIDS virus	viii	Carcinogens
i Treatment of cancer	ix	AIDS
j X-rays	x	Immunotherapy

- 1) a-iv; b-vi; c-viii; d-v; e-i; f-iii; g-ix; h-ii; i-x; j-vii
- 2) a-iv; b-vii; c-vi; d-v; e-i; f-iii; g-ix; h-ii; i-x; j-viii
- 3) a-iv; b-vii; c-v; d-ii; e-i; f-iii; g-ix; h-vi; i-x; j-viii
- 4) a-iv; b-vii; c-vi; d-v; e-i; f-ix; g-x; h-ii; i-iii; j-viii

Ans. (2)

148. Assertion (A) : The dorsal portion of the midbrain consists mainly of four round swellings (lobes) called corpora quadrigemina.

Reason (R) : Midbrain and forebrain form the brain stem. [New NCERT Page 236]

- 1) If both (A) and (R) are true and (R) is the correct explanation of (A).
- 2) If both (A) and (R) are true but (R) is not the correct explanation of (A).
- 3) If (A) is true but (R) is false.
- 4) If both (A) and (R) are false.

Ans. (3)

149. Read the following statements (i - iv) and select the correct option which states whether the given statements are true (T) or false (F).

- i. Cannabinoids are known for their effects on respiratory system of the body.
- ii. Ringworm is bacterial infection.
- iii. In an antibody molecule, the antigen binding site is located between a heavy chain and light chain.
- iv. A healthy person acquires ascariasis infection through contaminated water and food. [New NCERT Page-143]

- | | | | | | | | |
|------|-----|------|-----|------|-----|------|-----|
| i. | ii. | iii. | iv. | i. | ii. | iii. | iv. |
| 1) F | T | T | T | 2) F | F | T | F |
| 3) T | F | T | F | 4) F | F | T | T |

Ans. (4)

150. Fill up the blanks by choosing the correct option

- a. The primary lymphoid organs are ___ & ___.
 - b. Heroin commonly called smack is chemically ___.
 - c. ___ tumours remain confined to their original location and do not spread to other parts of the body.
 - d. The immune system comprises ___ cells and ___ cells. [New NCERT Page-133]
 - e. ___ is very effective sedative and pain killer.
 - f. A group of symptoms is literally termed as ___.
 - g. The fungi *Trichophyton* is responsible for ___.
- 1) (a)-bone marrow and thymus; (b) - diacetylmorphine; (c) - Benign; (d) - B, T; (e) - Morphine; (f) - syndrome; (g) - ringworms
 - 2) (a)-bone marrow and thymus; (b) - acetylcholine; (c)-Malignant; (d) - B, H; (e) - Cocaine; (f) - disease; (g)-giardiasis
 - 3) (a) bursa fabricus and thymus; (b) codeine; (c)- Benign; (d) -H, C; (e) -Cocaine; (f) - syndrome; (g) - ringworms
 - 4) (a) - bone marrow and liver; (b) - morphine; (c) - Malignant; (d) T, B; (e) - Morphine; (f) - disease; (g) - giardiasis

Ans. (1)

151. Read the following statements and identify the CORRECT ones. : [New NCERT Page 236]

- i. Cerebral aqueduct connects left and right cerebral hemispheres.
- ii. Hypothalamus is involved in thermoregulation.
- iii. Cerebellum wraps around thalamus.
- iv. Hypothalamus has centre for hunger and thirst.

- 1) i and iii
- 2) ii and iv
- 3) iii and iv
- 4) ii and iii

Ans. (2)

152. Which one of the following statement is INCORRECT about innate immunity?

[New NCERT Page-134]

- 1) It is a non-specific defense mechanism.
- 2) It is present since birth.
- 3) It consists of different barriers that prevent entry of foreign agents in the body.
- 4) It retains memory from previous infections.

Ans. (4)

153. Identify the CORRECT statements and select the correct option. [New NCERT Page 235]

- i. Unless a stimulus acts along the nerve fibre, the neural membrane remains depolarized.
- ii. Different types of ion channels are present on the neural membrane.
- iii. Neural membrane is exclusively permeable to Na^+ ions.
- iv. Pre and post synaptic neurons in chemical synapse are separated by synaptic cleft.

- 1) i and iv
- 2) ii and iii
- 3) ii and iv
- 4) i and iii

Ans. (3)

154. Fill up the blanks. [New NCERT Page-144]

- I. A person in the age group ___ can be referred to as an adolescent.
 - II. The period of adolescent is bridge between ___ and ___
 - III. ___ and ___ are damaged due to drug and alcohol abuse.
 - IV. Persistent use of alcohol during ___ causes Foetal Alcohol Syndrome (FAS)
- 1) I-12-18, II-childhood, adulthood, III - Digestive system, heart, IV - childhood
 - 2) I-10-15, II-puberty, adulthood; III-Heart, stomach, IV-adulthood
 - 3) I-15-20, II-adulthood, old age; III-Liver, kidney, IV-pregnancy
 - 4) I-12-18, II-childhood, adulthood, III-Nervous system, liver, IV- pregnancy

Ans. (4)

155. Consider the following statements.

- I. Corpora quadrigemina are rounded protrusions on the upper surface of midbrain.
- II. Corpora quadrigemina are two in number, i.e. one pair.

Choose the correct option.

- 1) Statement I is correct, but II is incorrect
- 2) Statement I is incorrect, but II is correct
- 3) Both statements I and II are correct
- 4) Both statements I and II are incorrect

Ans. (1)

156. Malignant tumours [New NCERT Page-141]

- I. are mass of neoplastic cells.
- II. are cells that grow very rapidly and damage the surrounding normal tissue.
- III. are cells that show the property of metastasis.

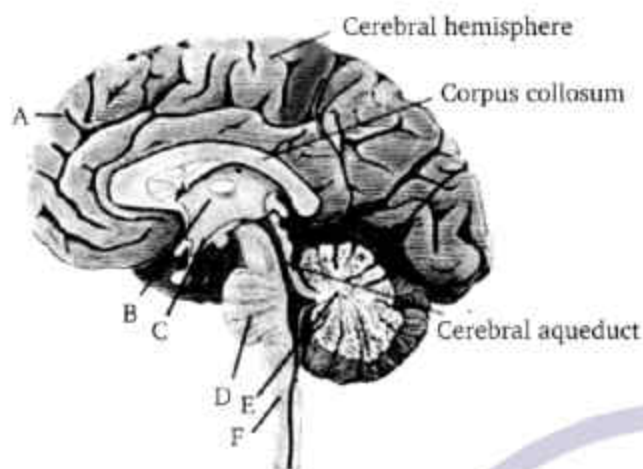
Which of the statements given above are correct?

- 1) I and II
- 2) I and III
- 3) II and III
- 4) All of them

Ans. (4)

157. Identify A, B, C, D, E and F in the diagram showing sagittal section of human brain:

[New NCERT Page 235]



	A	B	C	D	E	F
1)	Cerebellum	Thalamus	Hypothalamus	Pons	Cerebrum	Medulla
2)	Cerebellum	Thalamus	Hypothalamus	Medulla	Cerebellum	Pons
3)	Cerebellum	Hypothalamus	Thalamus	Pons	Cerebellum	Medulla
4)	Cerebrum	Thalamus	Hypothalamus	Pons	Cerebellum	Medulla

Ans. (4)

158. Identify the True(T)/False(F) statements.

- I. Innate immunity is obtained by providing different types of barriers.
- II. Sweat, tears, acid in the stomach and saliva prevent microbial growth.
- III. Acquired immunity is present from the birth and is inherited from parents.

[New NCERT Page-134]

- 1) I-T, II-F, III-T
- 2) I-T, II-T, III-F
- 3) I-F, II-F, III-T
- 4) I-F, II-T, III-T

Ans. (2)

159. Read the following statements carefully and identify the correct option. [New NCERT Page 236]

- I. Medulla contains controlling centres for respiration, cardiovascular reflexes and gastric secretion.
- II. The medulla is connected to the spinal cord.
- III. Cerebellum has a very convoluted surface in order to provide the additional space for more neurons.

- 1) Only I
- 2) I and III
- 3) Only III
- 4) I, II and III

Ans. (4)

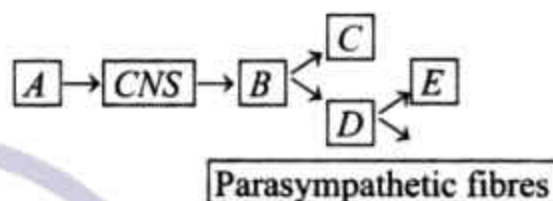
160. Heroin is extracted from the latex of plant

[New NCERT Page-142]

- 1) *Atropa belladonna*
- 2) *Claviceps purpurea*
- 3) *Erythroxylum coca*
- 4) *Papaver somniferum*

Ans. (4)

161. Select the correct arrangement of figure (A-E) in the diagram given below. [New NCERT Page 231]



- 1) A-Afferent, B-Efferent, C-Somatic motor, D-Autonomic, E-Sympathetic fibers
- 2) A-Efferent, B-Afferent, C-Somatic motor, D-Autonomic, E-Sympathetic fibers
- 3) A-Afferent, B-Efferent, C-Autonomic, D-Somatic motor, E-Sympathetic fibers
- 4) A-Efferent, B-Afferent, C-Autonomic, D-Somatic motor, E-Sympathetic fibers

Ans. (1)

162. Match the following columns.

[New NCERT Page 231]

Column I	Column II
a CNS	i From CNS to tissue/organ
b PNS	ii From tissue/organ to CNS
c Afferent fibres	iii Comprises of brain and spinal cord
d Efferent fibres	iv Comprises of nerves of body

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

Ans. (3)

163. Consider the following statements regarding lymphocytes. [New NCERT Page-135]

- I. T-lymphocytes form Cell Mediated Immune System (CMIS).
- II. The T-lymphocyte cells do not secrete antibodies, but help the B-lymphocyte cells to produce them.

Choose the correct option.

- 1) Statement I is correct, but II is incorrect
- 2) Statement I is incorrect, but II is correct
- 3) Both statements I and II are correct
- 4) Both statements I and II are incorrect

Ans. (3)

164. Identify the causal organisms of ringworm.

- i. *Microsporium*
- ii. *Haemophilus*
- iii. *Streptococcus*
- iv. *Trichophyton*
- v. *Wuchereria*

[New NCERT Page-133]

- 1) ii, iii
- 2) ii, v
- 3) iii, v
- 4) i, iv

Ans. (4)

165. Consider the following statements.

- I. Opioids are drugs, which bind to opioid receptors in the central nervous system and gastrointestinal tract.
- II. Heroin is a white, odourless, bitter, crystalline compound.
- III. Heroin is commonly called smack.

Which of the statements given above is/are correct? [New NCERT Page-143]

- 1) I and II
- 2) Only III
- 3) Only II
- 4) I, II and III

Ans. (4)

166. $\text{Na}^+\text{-K}^+$ pump is found in membranes of many cells, like nerve cells. It works against electrochemical gradient and involves an integral protein ATPase. For each molecule of ATP used

[New NCERT Page 233]

- 1) three ions of Na^+ are pumped out and two K^+ are taken in
- 2) three ions of Na^+ are taken in and two K^+ are pumped out
- 3) two ions of Na^+ are thrown out and three K^+ are absorbed
- 4) three ions of K^+ are absorbed and three Na^+ are pumped out

Ans. (1)

167. Consider the following statements.

- I. IgE antibodies are produced in an allergic reaction.
- II. B-lymphocytes mediate cell mediated immunity.
- III. The yellowish fluid colostrum has abundant IgE antibodies.
- IV. Spleen is a secondary lymphoid organ.

Choose the correct option. [New NCERT Page-137]

- 1) Only I is correct
- 2) I and II are correct
- 3) II and III are correct
- 4) I and IV are correct

Ans. (4)

168. Match the following columns.

[New NCERT Page 234]

Column I		Column II	
A.	Synaptic vesicles	1	Resting potential
B.	Electrical potential difference across the resting plasma membrane	2	Action potential
C.	Generation of a nerve impulse	3	Neurotransmitter
D.	Granular bodies found in the cell body of a neuron	4	Müll's granules

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

Ans. (1)

169. Read the following statements (i - iv) about vaccination. [New NCERT Page-136]

- i. Vaccines generate only memory B-cells but not memory T-cells.
- ii. In passive immunization, the patient is injected with preformed antibodies.
- iii. Human Hepatitis B vaccines are produced from yeast by using rDNA technology.
- iv. In case of snakebite, the victim is given an injection containing preformed antibodies against snake venom.

Which statements given above are WRONG?

- 1) Statement i
- 2) Statements ii and iii
- 3) Statements iii and iv
- 4) Statement iv

Ans. (1)

170. Note the following : [New NCERT Page-134]

- | | |
|------------------|-----------------|
| i. Antibodies | ii. Skin |
| iii. Tears | iv. Neutrophils |
| v. T-lymphocytes | vi. Macrophages |
| vii. IgG | viii. Saliva |

Which of the factors given above are NOT involved in acquired immunity?

- | | |
|------------------------------|-----------------------------|
| 1) ii, iii, iv, v, vii, viii | 2) i, iii, v, vi, vii, viii |
| 3) ii, iii, iv, vi, viii | 4) ii, iii, v, vi |

Ans. (3)

171. Assertion (A) The cerebral cortex is referred to as the white matter of the brain.

Reason (R) It has the high concentration of neuron cell bodies in it. [New NCERT Page 235]

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

Ans. (4)

172. Consider the following statements.

- I. A disease that has mosquito as a vector.
- II. The disease is also called as 'breakbone fever'.
- III. Symptoms of this disease include high fever accompanied by severe headache, vomiting, etc.
- IV. There are four different types of a virus that can cause this disease.

Identify the disease.

- | | |
|----------------|---------------|
| 1) Malaria | 2) Dengue |
| 3) Chikungunya | 4) Filariasis |

Ans. (2)

173. Which of the following is incorrect?

[New NCERT Page 231]

- 1) Dendrites transmit nerve impulses towards the body cell
- 2) Axons transmit nerve impulses away from the body to a synapse or to a neuro-muscular junction
- 3) Unmyelinated nerve fibre lack Schwann cells
- 4) Unmyelinated nerve fibre is commonly found in autonomous and the somatic neural systems

Ans. (3)

174. The sequence of events in a nerve conduction is [New NCERT Page 233]

- 1) Threshold → Depolarisation → Repolarisation → Hyperpolarisation
- 2) Hyperpolarisation → Repolarisation → Depolarisation
- 3) Repolarisation → Threshold → Depolarisation → Hyperpolarisation
- 4) Resting potential → Repolarisation → Depolarisation

Ans. (1)

175. During conduction of an impulse on the inside of plasma membrane of a neuron, electrical potential changes from [New NCERT Page 233]

- 1) - ve to + ve and remains + ve
- 2) - ve to + ve and then to - ve
- 3) + ve to + ve and then remains - ve
- 4) + ve to - ve and then to + ve

Ans. (2)

176. Match the columns: [New NCERT Page 232]

Column I		Column II	
a	Unipolar neurons	i	Cerebral cortex
b	Multipolar neurons	ii	Retina of eye
c	Pseudounipolar neurons	iii	Embryonic stage usually
d	Bipolar neurons	iv	Dorsal root ganglion

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

Ans. (3)

177. Which of the following can be considered to be the main source of amoebic dysentery?

[New NCERT Page-132]

- 1) Contaminated food and water
- 2) Water and food contaminated by the faecal matter
- 3) Water and food contaminated by urine
- 4) Water and food contaminated by polluted air

Ans. (2)

178. Match the columns : [New NCERT Page 236]

Column I		Column II	
a	Midbrain	i	Intelligence
b	Cerebrum	ii	Pituitary gland control
c	Hypothalamus	iii	Body orientation and equilibrium
d	Cerebellum	iv	Vision and hearing reflexes

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

Ans. (1)

179. Fill up the blanks (P and Q) in the statement given below and select the correct option.

In human beings, *Salmonella typhi* enters the (P) through contaminated food and water and migrate to other organs through (Q).

[New NCERT Page-130]

- 1) P - large intestine, Q - lymph
 2) P - large intestine, Q - blood
 3) P - small intestine, Q - lymph nodes
 4) P - small intestine, Q - blood

Ans. (4)

180. Find out which of the following statements are true (T) / false (F) and choose the correct option: [New NCERT Page 234]

- I. There are two types of synapses - electrical and chemical. Electrical synapses are rare in our body
 II. At a chemical synapse, the membranes of pre - and post - synaptic neurons are separated by fluid-filled space called synaptic cleft
 III. A nerve impulse is transmitted from one neuron to another through junctions called synapsis
 IV. The neuron which transmits the impulse to other neuron and is present before the synaptic cleft is called post-synaptic neuron

- 1) I-T, II-T, III-F, IV-F 2) I-T, II-T, III-T, IV-F
 3) I-T, II-T, III-T, IV-T 4) I-T, II-F, III-F, IV-T

Ans. (1)

• Next Test Syllabus • Date : 08/12/2025

Physics : Electrostatics and Capacitors

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