Practice Test - 6

(Physics)

1. A point P is the contact point of a wheel on ground which rolls on ground without slipping. The value of displacement of the point P when wheel completes half of rotation (If radius of wheel is 1 m)

(A) 2 m (B) $\sqrt{\pi^2+4}$ m

(C) π m (D) $\sqrt{\pi^2+2}$ m

2. A solid cylinder of mass M and radius R rolls without slipping down an inclined plane of length L and height *h*. What is the speed of its centre of mass when the cylinder reaches its bottom?

(A) $\sqrt{2gh}$ (B) $\sqrt{\frac{3}{4}gh}$

(C) $\sqrt{\frac{4}{3}gh}$ (D) $\sqrt{4gh}$

3. A solid spherical ball rolls on a table. Ratio of its rotational kinetic energy to total kinetic energy is

(A) $\frac{1}{2}$ (B) $\frac{1}{6}$

(C) $\frac{7}{10}$ (D) $\frac{2}{7}$

4. A small object of uniform density rolls up a curved surface with an initial velocity v'. It reaches up to a maximum height of $\frac{3v^2}{4g}$ with respect to the initial position. The object is

(A) Solid sphere
(B) Hollow sphere
(C) Disc
(D) Ring

5. A hollow cylinder and a solid cylinder are rolling without slipping down an inclined plane, then which of these reaches earlier?

(A) Solid cylinder
(B) Hollow cylinder
(C) Both simultaneously
(D) Can't say anything

6. A disc is rotating with angular speed ω. If a child sits on it, what is conserved?

(A) Linear momentum
(B) Angular momentum
(C) Kinetic energy
(D) Potential energy

7. A solid cylinder is rolling without slipping on a plane having inclination θ and the coefficient of static friction μ_s. The relation between θ and μ_s is

(A) $\tan\theta > 3\mu_s$ (B) $\tan\theta \le 3\mu_s$

(C) $\tan\theta < 3\mu_s^2$ (D) None of these

8. If $\vec{F}$ is the force acting on a particle having position vector $\vec{r}$ and $\vec{\tau}$ be the torque of this force about the origin, then

(A) $\vec{r}\cdot\vec{\tau} = 0$ and $\vec{F}\cdot\vec{\tau} \neq 0$
(B) $\vec{r}\cdot\vec{\tau} \neq 0$ and $\vec{F}\cdot\vec{\tau} = 0$
(C) $\vec{r}\cdot\vec{\tau} > 0$ and $\vec{F}\cdot\vec{\tau} < 0$
(D) $\vec{r}\cdot\vec{\tau} = 0$ and $\vec{F}\cdot\vec{\tau} = 0$

9. A circular platform is mounted on a frictionless vertical axle. Its radius R = 2 m and its moment of inertia about the axle is 200 kg m^2. It is initially at rest. A 50 kg man stands on the edge of the platform and begins to walk along the edge at the speed of 1 ms^{-1} relative to the ground. Time taken by the man to complete one revolution is

(A) π s (B) $\frac{3\pi}{2}$ s

(C) 2π s (D) $\frac{\pi}{2}$ s

10. A thin circular ring of mass M and radius *r* is rotating about its axis with a constant angular velocity ω. Two objects each of mass *m* are attached gently to the opposite ends of a diameter of the ring. The ring will now rotate with an angular velocity

(A) $\frac{\omega(M+2m)}{M}$ (B) $\frac{\omega M}{M+2m}$

(C) $\frac{\omega(M-2M)}{M+2m}$ (D) $\frac{\omega M}{M+m}$

11. A round disc of moment of inertia I_1 about its axis perpendicular to its plane and passing through its centre is placed over another disc of moment of inertia I_2 rotating with an angular velocity □ about the same axis. The final angular velocity of the combination of discs is

(A) $\frac{I_2\omega}{I_1+I_2}$

(B) ω

(C) $\frac{I_1\omega}{I_1+I_2}$

(D) $\frac{(I_1+I_2)\omega}{I_1}$

12. Two discs are rotating about their axes, normal to the discs and passing through the centres of the discs. Disc D_1 has 2 kg mass and 0.2 m radius and initial angular velocity of 50 rad s^{-1}. Disc D_2 has 4kg mass, 0.1 m radius and initial angular velocity of 200 rad s^{-1}. The two discs are brought in contact face to face, with their axes of rotation coincident. The final angular velocity (in rad.s^{-1}) of the system is

(A) 40 (B) 60
(C) 100 (D) 120

13. A wheel having moment of inertia 2 kgm^2 about its vertical axis, rotates at the rate of 60 rpm about this axis. The torque which can stop the wheel's rotation in one minute would be

(A) $\frac{2\pi}{15}$ Nm (B) $\frac{\pi}{12}$ Nm
(C) $\frac{\pi}{15}$ Nm (D) $\frac{\pi}{18}$ Nm

14. What is the torque of the force $\vec{F} = 2\hat{i} - 3\hat{j} + 4\hat{k}$ N acting at the point $\vec{r} = 3\hat{i} + 2\hat{j} + 3\hat{k}$ m about origin?

(A) $-6\hat{i} + 6\hat{j} - 12\hat{k}$ (B) $-17\hat{i} + 6\hat{j} + 13\hat{k}$
(C) $6\hat{i} - 6\hat{j} + 12\hat{k}$ (D) $17\hat{i} - 6\hat{j} - 13\hat{k}$

15. A couple produces

(A) Linear and rotational motion
(B) No motion
(C) Purely linear motion
(D) Purely rotational motion

16. The instantaneous angular position of a point on a rotating wheel is given by the equation $\theta(t) = 2t^3 - 6t^2$. The torque on the wheel becomes zero at

(A) $t = 2$ s (B) $t = 1$ s
(C) $t = 0.2$ s (D) $t = 0.25$ s

17. The angular speed of a fly-wheel making 120 revolutions/minute is

(A) 4π rad/s (B) $4\pi^2$ rad/s
(C) π rad/s (D) 2π rad/s

18. The moment of inertia of a uniform circular disc of radius R and mass M about an axis passing from the edge of the disc and normal to the disc is

(A) MR^2
(B) $\frac{1}{2}MR^2$
(C) $\frac{3}{2}MR^2$
(D) $\frac{7}{2}MR^2$

19. From a circular disc of radius R and mass $9M$, a small disc of mass M and radius $R/3$ is removed concentrically. The moment of inertia of the remaining disc about an axis perpendicular to the plane of the disc and passing through its centre is

(A) $\frac{40}{9}MR^2$ (B) MR^2
(C) $4\,MR^2$ (D) $\frac{4}{9}MR^2$

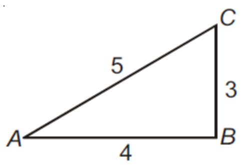
20. Four identical thin rods each of mass M and length l, form a square frame. Moment of inertia of this frame about an axis through the centre of the square and perpendicular to its plane is

(A) $\frac{1}{3}MI^2$ (B) $\frac{4}{3}MI^2$
(C) $\frac{2}{3}MI^2$ (D) $\frac{13}{3}MI^2$

21. A thin rod of length L and mass M is bent at its midpoint into two halves so that the angle between them is 90°. The moment of inertia of the bent rod about an axis passing through the bending point and perpendicular to the plane defined by the two halves of the rod is

(A) $\frac{\sqrt{2}ML^2}{24}$ (B) $\frac{ML^2}{24}$
(C) $\frac{ML^2}{12}$ (D) $\frac{ML^2}{6}$

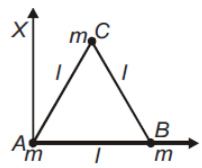
22. The ABC is a triangular plate of uniform thickness. The sides are in the ratio shown in the figure. I_{AB}, I_{BC} and I_{CA} are the moments of inertia of the plate about AB, BC and CA respectively. Which one of the following relations is correct?



(A) $I_{AB} + I_{BC} = I_{CA}$ (B) I_{CA} is maximum
(C) $I_{AB} > I_{BC}$ (D) $I_{BC} > I_{AB}$

23. Three particles, each of mass m gram, are situated at the vertices of an equilateral triangle ABC of side l cm (as shown in the figure). The moment of inertia of the system about a line AX perpendicular to AB and in the plane of ABC, in gcm^2 units will be

(A) $\frac{3}{4}ml^2$
(B) $2\,ml^2$
(C) $\frac{5}{4}ml^2$
(D) $\frac{3}{4}ml^2$



24. A heavy solid sphere is thrown on a horizontal rough surface with initial velocity u without rolling. What will be its speed, when it starts pure rolling motion?

(A) $\frac{3u}{5}$ (B) $\frac{2u}{5}$

(C) $\frac{5u}{7}$ (D) $\frac{2u}{7}$

25. A cylinder rolls down two different inclined planes of the same height but of different inclinations

(A) In both cases the speed and time of descent will be different

(B) In both cases the speed and time of descent will be same

(C) The speed will be different but time of descent will be same

(D) The time of descent will be different but speed will be same

26. A disc of mass 3 kg rolls down an inclined plane of height 5 m. The translational kinetic energy of the disc on reaching the bottom of the inclined plane is

(A) 50 J (B) 100 J

(C) 150 J (D) 175 J

27. A car is going round a circle of radius R_1 with constant speed. Another car is going round a circle of radius R_2 with constant speed. If both of them take same time to complete the circles, the ratio of their angular speeds and linear speeds will be

(A) $\sqrt{\frac{R_1}{R_2}}, \frac{R_1}{R_2}$ (B) 1, 1

(C) $1, \frac{R_1}{R_2}$ (D) $\frac{R_1}{R_2}, 1$

28. A body revolves with constant speed v in a circular path of radius r. The magnitude of its average acceleration during motion between two points in diametrically opposite direction is

(A) Zero (B) $\frac{v^2}{r}$

(C) $\frac{2v^2}{\pi r}$ (D) $\frac{v^2}{2r}$

29. An object of mass m moves with constant speed in a circular path of radius R under the action of a force of constant magnitude F. The kinetic energy of object is

(A) $\frac{1}{2}FR$

(B) FR

(C) $2FR$

(D) $\frac{1}{4}FR$

30. The angular speed of earth around its own axis is

(A) $\frac{\pi}{43200}$ rad/s (B) $\frac{\pi}{3600}$ rad/s

(C) $\frac{\pi}{86400}$ rad/s (D) $\frac{\pi}{1800}$ rad/s

31. A particle moves in a circle of radius 25 cm at two revolutions per second. The acceleration of the particle is (in m/s^2)

(A) π^2 (B) $8\pi^2$

(C) $4\pi^2$ (D) $2\pi^2$

32. A particle is revolving in a circular path of radius 25 m with constant angular speed 12 rev/min. Then the angular acceleration of particle is

(A) $2\pi^2$ rad/s^2 (B) $4\pi^2$ rad/s^2

(C) π^2 rad/s^2 (D) Zero

33. The ratio of angular speeds of minute hand and hour hand of a watch is

(A) 6 : 1 (B) 12 : 1

(C) 60 : 1 (D) 1 : 60

34. If θ is angle between the velocity and acceleration of a particle moving on a circular path with decreasing speed, then

(A) $\theta = 90°$ (B) $0° < \theta < 90°$

(C) $90° < \theta < 180°$ (D) $0° \le \theta \le 180°$

35. If speed of an object revolving in a circular path is doubled and angular speed is reduced to half of original value, then centripetal acceleration will become/remain

(A) Same

(B) Double

(C) Half

(D) Quadruple

36. A body is revolving with a uniform speed v in a circle of radius r. The tangential acceleration is

(A) $\frac{v}{r}$ (B) $\frac{v^2}{r}$

(C) Zero (D) $\frac{v}{r^2}$

37. A particle does uniform circular motion in a horizontal plane. The radius of the circle is 20 *cm*. The centripetal force acting on the particle is 10 *N*. It's kinetic energy is

(A) 0.1 *J*

(B) 0.2 *J*

(C) 2.0 *J*

(D) 1.0 *J*

38. A body of mass *m* is suspended from a string of length *l*. What is minimum horizontal velocity that should be given to the body in its lowest position so that it may complete one full revolution in the vertical plane with the point of suspension as the centre of the circle

(A) $v=\sqrt{2lg}$ (B) $v=\sqrt{3lg}$

(C) $v=\sqrt{4lg}$ (D) $v=\sqrt{5lg}$

39. A particle moves with constant angular velocity in circular path of certain radius and is acted upon by a certain centripetal force *F*. If the angular velocity is doubled, keeping radius the same, the new force will be

(A) $2F$ (B) F^2

(C) $4F$ (D) $F/2$

40. In the above question, if the angular velocity is kept same but the radius of the path is halved, the new force will be

(A) $2F$ (B) F^2

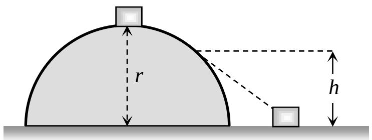
(C) $F/2$ (D) $F/4$

41. In above question, if the centripetal force *F* is kept constant but the angular velocity is doubled, the new radius of the path (original radius *R*) will be

(A) $2R$ (B) $R/2$

(C) $R/4$ (D) $4R$

42. A small body of mass *m* slides down from the top of a hemisphere of radius *r*. The surface of block and hemisphere are frictionless. The height at which the body lose contact with the surface of the sphere is



(A) $\frac{3}{2}r$ (B) $\frac{2}{3}r$

(C) $\frac{1}{2}gt^2$ (D) $\frac{v^2}{2g}$

43. A body of mass *m* kg is rotating in a vertical circle at the end of a string of length *r* metre. The difference in the kinetic energy at the top and the bottom of the circle is

(A) $\frac{mg}{r}$ (B) $\frac{2mg}{r}$

(C) $2mgr$ (D) mgr

44. A car is travelling with linear velocity *v* on a circular road of radius *r*. If it is increasing its speed at the rate of '*a*' meter/sec^2, then the resultant acceleration will be

(A) $\sqrt{\left\{\frac{v^2}{r^2}-a^2\right\}}$ (B) $\sqrt{\left\{\frac{v^4}{r^2}+a^2\right\}}$

(C) $\sqrt{\left\{\frac{v^4}{r^2}-a^2\right\}}$ (D) $\sqrt{\left\{\frac{v^2}{r^2}+a^2\right\}}$

45. A ball of mass 0.1 *kg* is suspended by a string. It is displaced through an angle of 60° and left. When the ball passes through the mean position, the tension in the string is

(A) 19.6 *N* (B) 1.96 *N*

(C) 9.8 *N* (D) Zero

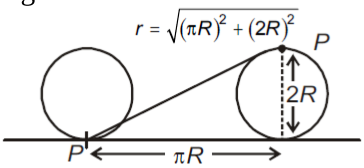
ANSWER KEY

1. (B)
2. (C)
3. (D)
4. (C)
5. (A)
6. (B)
7. (B)
8. (D)
9. (C)
10. (B)
11. (A)
12. (C)
13. (C)
14. (D)
15. (D)
16. (B)
17. (A)
18. (C)
19. (A)
20. (B)
21. (C)
22. (D)
23. (C)
24. (C)
25. (D)
26. (B)
27. (C)
28. (C)
29. (A)
30. (A)
31. (C)
32. (D)
33. (B)
34. (C)
35. (A)
36. (C)
37. (D)
38. (D)
39. (C)
40. (C)
41. (C)
42. (B)
43. (C)
44. (B)
45. (B)

HINT AND SOLUTIONS

1. **(B)**

Use pythagoras theorem



$r = R\sqrt{\pi^2 + 4} = \sqrt{\pi^2 + 4}$ m

2. **(C)**

Using mechanical energy conservation

$$Mgh = \frac{1}{2}mv^2 + \frac{1}{2}\left(\frac{1}{2}MR^2\right)\frac{v^2}{R^2}$$

$$Mgh = \frac{3}{2}Mv^2$$

$$v = \sqrt{\frac{4gh}{3}}$$

3. **(D)**

4. **(C)**

$$U_i + k_i = U_f + k_f$$

$$0 + \left(\frac{1}{2}mv^2 + \frac{1}{2}I\left(\frac{v}{r}\right)^2\right) = mg\left(\frac{3v^2}{4g}\right) + 0$$

Solving this, we get

$$I = \frac{Mr^2}{2} \Rightarrow \text{body is disc}$$

5. **(A)**

Body of smaller $\frac{K^2}{R^2}$ will take less time. Solid cylinder has smaller $\frac{K^2}{R^2}$.

6. **(B)**

7. **(B)**

$$\mu_s \ge \frac{\frac{1}{2}mr^2\tan\theta}{\frac{1}{2}mr^2 + mr^2}$$

$$\mu_s \ge \frac{\tan\theta}{3}$$

$$3\mu_s \ge \tan\theta$$

8. **(D)**

$\vec{\tau}$ will be perpendicular to $\vec{F}$ and $\vec{r}$ as $\vec{\tau} = \vec{r} \times \vec{F}$

9. **(C)**

$0 = (50)(1)(2) - 200\,\omega$

$$\omega = \frac{1}{2} \text{ rad/s}$$

$$v_{\text{rel}} = 1 + 2\left(\frac{1}{2}\right) = 2$$

$$T = \frac{(2\pi)(2)}{2} = 2\pi \text{ s}$$

10. **(B)**

Using angular momentum conservation

$$(Mr^2\omega) = (M + 2m)r^2\omega'$$

$$\omega' = \frac{M}{M + 2m}\omega$$

11. **(A)**

Using angular momentum conservation

$$I_1(0) + I_2(\omega) = (I_1 + I_2)\,\omega'$$

$$\omega' = \frac{I_2\omega}{I_1 + I_2}$$

12. **(C)**

Using angular momentum conservation

$$I_1\omega_1 + I_2\omega_2 = (I_1 + I_2)\omega$$

$$\frac{1}{2}(2)(0.2)^2(50) + \frac{1}{2}4(0.1)^2(200)$$

$$= \left[\frac{1}{2}(2)(0.2)^2 + \frac{1}{2}4(0.1)^2\right]\omega$$

$$6 = \frac{6}{100}\omega$$

$\omega = 100$ rad/s

13. **(C)**

$$\alpha = \frac{0 - \frac{60 \times 2\pi}{60}}{60}$$

$$= \frac{-2\pi}{60} \text{ rad/s}^2$$

$$\tau = I\alpha = (2)\left(\frac{\pi}{30}\right) = \frac{\pi}{15} \text{ Nm}$$

14. **(D)**

$$\tau = \vec{r} \times \vec{F} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 3 & 2 & 3 \\ 2 & -3 & 4 \end{vmatrix}$$

$$\hat{i}(17) - \hat{j}(6) + \hat{k}(-13)$$

$$17\hat{i} - 6\hat{j} - 13\hat{k}$$

15. **(D)**

16. (B)

$\theta = 2t^3 - 6t^2$

$\omega = \dfrac{d\theta}{dt} = 6t^2 - 12t$

$\alpha = \dfrac{d\omega}{dt} = 12t - 12$

$\alpha = 0 \quad \Rightarrow \quad 12t - 12 = 0 \quad \Rightarrow t = 1\text{s}$

17. (A)

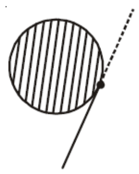
$$120 \text{ rev/min} = \frac{2\pi(120)}{60} = 4\pi \text{ rad/s}$$

18. (C)

$I = I_{cm} + MR^2$

$= \dfrac{MR^2}{2} + MR^2$

$= \dfrac{3}{2}MR^2$



19. (A)

$I_1 = \dfrac{1}{2}(9M)R^2 = \dfrac{9MR^2}{2}$

$I_2 = \dfrac{1}{2}M\left(\dfrac{R}{3}\right)^2 = \dfrac{MR^2}{18}$

$I = I_1 - I_2$

$= \dfrac{9MR^2}{2} - \dfrac{MR^2}{18} = \dfrac{40MR^2}{9}$

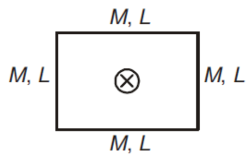
20. (B)

$I = I_{cm} + Md^2$

$I_{Total} = 4I$

$= 4\left[\dfrac{MI^2}{12} + M\left(\dfrac{I}{2}\right)^2\right]$

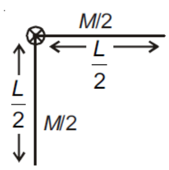
$= \dfrac{4MI^2}{3}$



21. (C)

$l = 2l$

$= \dfrac{2\dfrac{M}{2}\left(\dfrac{L}{2}\right)^2}{3} = \dfrac{ML^2}{12}$



22. (D)

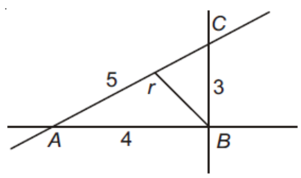
$I_{AB} = m(3)^2$

$I_{BC} = m(4)^2$

$I_{CA} = mr^2$

$r < 4$

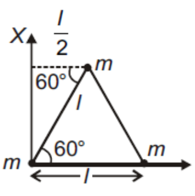
$\Rightarrow \quad I_{BC} > I_{AB}$



23. (C)

$I = I_1 + I_2 + I_3$

$= 0 + m\left(\dfrac{l}{2}\right)^2 + ml^2 = \dfrac{5ml^2}{4}$



24. (C)

Using angular momentum conservation

$mur = mvr + \dfrac{2}{5}mr^2\left(\dfrac{v}{r}\right)$

$u = 7\dfrac{v}{5}$

$v = \dfrac{5u}{7}$

25. (D)

26. (B)

Using mechanical energy conservation

$mgh = \dfrac{1}{2}mv^2 + \dfrac{1}{2}I\omega^2$

$3(5)(10) = \dfrac{1}{2}mv^2 + \dfrac{1}{2}mI^2\left(\dfrac{v^2}{I^2}\right)$

$150 = \dfrac{3}{4}mv^2$

$mv^2 = 200$

$\dfrac{1}{2}mv^2 = 100 \text{ J} = \text{K.E.}_{\text{Translation}}$

27. (C)

The angular speed is given by

$\omega = \dfrac{2\pi}{T}$

$\omega \propto \dfrac{1}{T} \Rightarrow \dfrac{\omega_1}{\omega_2} = \dfrac{T_2}{T_1}$

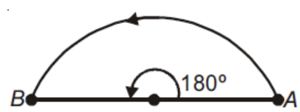
if $T_1 = T_2 \Rightarrow 1 : 1$

and linear speed $v = R\omega$

$V \propto R \quad \Rightarrow \quad \dfrac{V_1}{V_2} = \dfrac{R_1}{R_2}$

28. (C)

$a_{avg} = \dfrac{2v\sin\left(\dfrac{\theta}{2}\right)}{\left(\dfrac{r\theta}{v}\right)}$



$a_{avg} = \dfrac{2v^2\sin\left(\dfrac{\theta}{2}\right)}{r\theta}$

Here, $\theta = \pi$ rad

$a_{avg} = \dfrac{2v^2\sin\left(\dfrac{\pi}{2}\right)}{r\times\pi} \Rightarrow \quad a_{avg} = \dfrac{2v^2}{\pi r}$

29. (A)

$\text{KE} = \dfrac{1}{2}mv^2 = \dfrac{1}{2}\dfrac{F}{a}\times v^2 = \dfrac{1}{2}\dfrac{F\times v^2}{\left(\dfrac{v^2}{R}\right)} = \dfrac{1}{2}FR$

30. (A)

Angular speed = $\frac{2\pi}{T}$

$T \rightarrow$ Time period of earth = 24 h

$\omega = \frac{2\pi}{24\times60\times60} = \frac{\pi}{43200}$ rad s^{-1}

31. (C)

$a = r\omega^2$

$a = \frac{25}{100}(2\times2\pi)^2 \quad \Rightarrow \quad a = 4\pi^2$ m/s^2

32. (D)

Angular acceleration is the rate of change of angular speed or angular velocity if $\vec{\omega}$ remains constant then $\alpha = 0$.

33. (B)

ω_{mh} = Angular speed of minute hand

ω_{hh} = Angular speed of hour hand

$\omega_{mh} = \frac{2\pi}{60\,\text{m}} = \frac{2\pi}{60\times60}$ rad s^{-1}

$\omega_{hh} = \frac{2\pi}{12\,\text{h}} = \frac{2\pi}{12\times60\times60}$ rad s^{-1}

$$\frac{\omega_{mh}}{\omega_{hh}} = \frac{\frac{2\pi}{60\times60}}{\frac{2\pi}{12\times60\times60}} = \frac{1}{1}\times\frac{12}{1}$$

$\omega_{mh} : \omega_{hh} \Rightarrow 12:1$

34. (C)

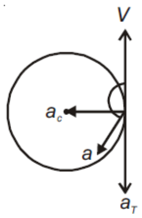
θ between v and Q is $90° < \theta < 180°$

35. (A)

$a_c = r\omega^2 = (r\omega)(\omega)$

$a_c = v\omega$

$a_c = (2v)\left(\frac{\omega}{2}\right) = v\omega = a_c$



36. (C)

In uniform circular motion only centripetal acceleration works.

37. (D)

$\frac{mv^2}{r} = 10 \Rightarrow \frac{1}{2}mv^2 = 10\times\frac{r}{2} = 1J$

38. (D)

For looping the loop minimum velocity at the lowest point should be $\sqrt{5gl}$.

39. (C)

$F = m\omega^2R \;\therefore\; F \propto \omega^2$ (m and R are constant)

If angular velocity is doubled force will becomes four times.

40. (C)

$F = m\omega^2R \;\therefore\; F \propto R$ (m and ω are constant)

If radius of the path is halved, then force will also become half.

41. (C)

$F = m\omega^2R \;\therefore\; R \propto \frac{1}{\omega^2}$ (m and F are constant)

If ω is doubled then radius will become 1/4 times *i.e.* $R/4$

42. (B)

43. (C)

Difference in K.E. = Difference in P.E. = $2mgr$

44. (B)

$$a_{resultant} = \sqrt{a^2_{radial} + a^2_{tangential}} = \sqrt{\frac{v^4}{r^2} + a^2}$$

45. (B)

$T = mg + \frac{mv^2}{l} = mg + \frac{m}{l}[2gl(1-\cos\theta)]$

$= mg + 2mg(1-\cos 60°)$

$= 2mg = 2 \times 0.1 \times 9.8 = 1.96\ N$

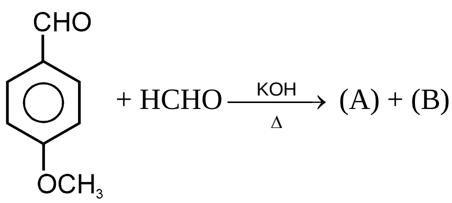
(Chemistry)

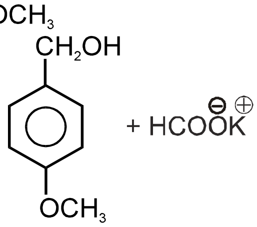
46. In the reaction,

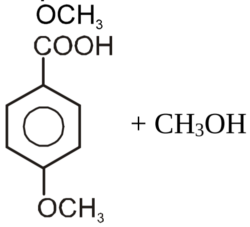
$$(CH_3)_3CCHO + HCHO \xrightarrow[\text{heat}]{\text{NaOH}} A + B$$

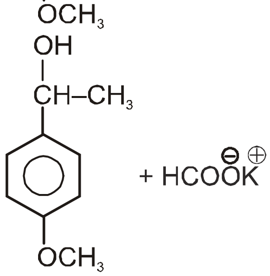
the products (A) and (B) are respectively

(A) $(CH_3)_3CCH_2OH$ and $HCOO^- Na^+$
(B) $(CH_3)_3CCOONa$ and CH_3OH
(C) $(CH_3)_3CCH_2OH$ and CH_3OH
(D) $(CH_3)_3COONa$ and $HCOO^- Na^+$.

47. 

(A) 

(B) 

(C) 

(D) Both (A) and (B)

48. The only aldehyde which undergoes haloform reaction is

(A) Formaldehyde
(B) Acetaldehyde
(C) Benzaldehyde
(D) Propionaldehyde

49. An optically active compound reacts with hydroxylamine to form an oxime and also gives a positive haloform test. What is the structure of the compound?

(A) $CH_3CH_2CH(CH_3)COCH_3$
(B) $(CH_3)_2CHCH_2COCH_3$
(C) $CH_3CH_2CH_2COCH_2CH_3$
(D) $(CH_3)_2CHCOCH_2CH_3$

50. A compound with molecular formula, C_4H_8O gives a positive haloform test and a 2,4-DNP derivative. The compound is

(A) $CH_3CH_2CH_2CHO$
(B) $CH_3COCH_2CH_3$
(C) $(CH_3)_2CHCHO$
(D) All the above

51. Which of the following compound does not give iodoform test

(A) Pentanone -3
(B) Pentanone-2
(C) Propanone
(D) Ethanol

52. What is obtained, when propene is treated with N-bromo succinimide

(A) $CH_3 - \underset{\underset{Br}{|}}{C} = CH_2$
(B) $BrCH–CH = CH_2$
(C) $BrCH_2–CH = CHBr$
(D) $BrCH_2 - \underset{\underset{Br}{|}}{CH} - CH_2Br$

53. Fruity smell is given by

(A) Esters
(B) Alcohols
(C) Chloroform
(D) Acid anhydrides

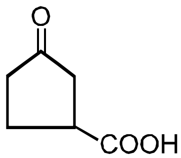
54. When $C_6H_5COCH_3$ reacts with NaOH and bromine, it gives

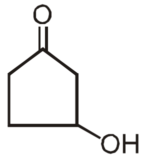
(A) $CHBr_3$
(B) C_6H_5CONa
(C) $C_6H_6COONa + CHBr_3$
(D) CH_3COONa

55. Which of the following reagents converts both acetaldehyde and acetone to alkanes?

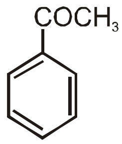
(A) Ni/H_2
(B) $LiAlH_4$
(C) $I_2/NaOH$
(D) Zn-Hg/HCl

56. Clemmensen reduction cannot be used to convert carbonyl group into CH_2 group only in which of the following

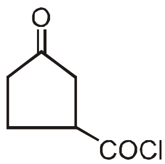
(A) 

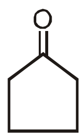
(B) 

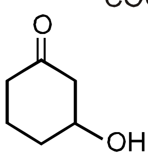
(C) $CH_3-\overset{\overset{O}{\|}}{C}-H$

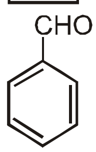
(D) 

57. Wolff Kishner reduction cannot be used to convert carbonyl group into CH_2 group only in which of the following

(A) 

(B) 

(C) 

(D) 

58. Tollen's reagent is not reduced by
(A) Formic acid (B) Acetaldehyde
(C) Benzaldehyde (D) Acetic acid

59. Which of the following is the strongest acid
(A) CH_3COOH (B) $BrCH_2COOH$
(C) $ClCH_2COOH$ (D) FCH_2COOH

60. Crotonaldehyde ($CH_3CH=CHCHO$) can be easily oxidised to crotonic acid ($CH_3CH = CHCOOH$) by using
(A) Alkaline $KMnO_4$ (B) Acidic $K_2Cr_2O_7$
(C) Tollen's reagent (D) HNO_3

61. Oxidation of compound X gives a product which reacts with phenyl hydrazine but does not give a silver mirror test. Possible structure for X is
(A) CH_3CHO (B) CH_3CH_2OH
(C) $(CH_3)_2CHOH$ (D) $CH_3CH_2CH_2OH$

62. In the following reaction sequence product Y is

$$C_2H_5Br \xrightarrow{KCN} X \xrightarrow[\text{Boil}]{\text{Dil.}H_2SO_4} Y$$

(A) Ethanol (B) Ethanal
(C) Propanoic acid (D) Ethanenitrile

63. In the following reaction final product is

$$C_6H_5MgBr \xrightarrow{\text{Ether}} \xrightarrow{H^{\oplus}}$$

(A) Benzoic acid (B) Benzaldehyde
(C) Benzamide (D) Benzene

64. The acid D obtained through the following sequence of reactions is

$$C_6H_5Br \xrightarrow{\text{Alc.KOH}} A \xrightarrow[CCl_4]{Br_2} B \xrightarrow[\text{(excess)}]{KCN} C \xrightarrow{H_3O^+} D$$

(A) Succinic acid (B) Malonic acid
(C) Maleic acid (D) Oxalic acid

65. When excess of chlorine is passed through acetic acid in presence of red phosphorus, it forms
(A) Acetic anhydride
(B) Chloral
(C) Trichloroacetic acid
(D) Methyl chloride

66. The reaction

$$RCOOAg + Br_2 \xrightarrow{CCl_4,\text{Reflux}} R-Br + AgBr + CO_2$$

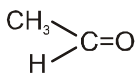
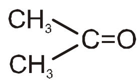
is called
(A) Wurtz reaction
(B) Hunsdiecker reaction
(C) Friedel-Crafts reaction
(D) Kolbe's reaction

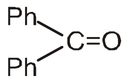
67. It is difficult to esterify $R_3C{-}COOH$ because of
(A) Steric hindrance
(B) Delocalization
(C) Inductive effect of the R group
(D) Hyperconjugation of the alkyl groups

68. Which of the following is correct order of esterification of following acids with CH_3OH
(I) $HCOOH$
(II) CH_3COOH
(III) $CH_3{-}CH_2{-}COOH$
(IV) $CH_3-\underset{\underset{CH_3}{|}}{CH}-COOH$

(A) I = II = III = IV (B) I > II > III > IV
(C) I < II < III < IV (D) I > IV > III > II

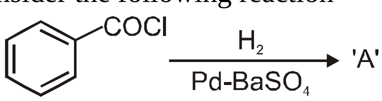
69. The order of reactivity of phenyl magnesium bromide (PhMgBr) with the following compounds

I.  II.  and

III. 

(A) III > II > I
(B) II > I > III
(C) I > III > II
(D) I > II > III

70. Consider the following reaction



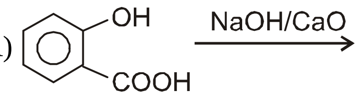
The product 'A' is
(A) C_6H_5CHO
(B) C_6H_5OH
(C) $C_6H_5COCH_3$
(D) C_6H_5Cl

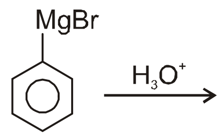
71. An organic compound X on treatment with pyridinium chloro chromate in dichloromethane gives compound Y. Compound Y reacts with I_2 and alkali to form triiodomethane. The compound 'X' is
(A) C_2H_5OH
(B) CH_3CHO
(C) CH_3COCH_3
(D) CH_3COOH

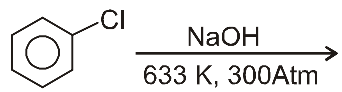
72. Phenol + $CHCl_3$ + KOH $\rightarrow$ product is
(A) Benzoic acid
(B) p-chlorophenol
(C) Salicylaldehyde
(D) salicylic acid

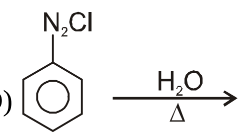
73. Boiling point of alcohol is comparatively higher than that corresponding alkane due to
(A) Intermolecular hydrogen bonding
(B) Intramolecular hydrogen bonding
(C) Volatile nature
(D) None of these

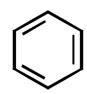
74. In which of the following reactions phenol is not obtained

(A) 

(B) 

(C) 

(D) 

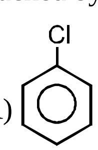
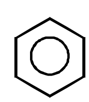
75.  $+CH_3-CH=CH_2 \xrightarrow[\Delta]{H_3PO_4} A$

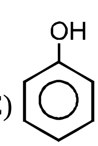
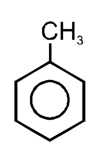
$\xrightarrow[(2)\ H_3O^+]{(1)\ O_2,\Delta} B+C$

The products B and C are respectively
(A) Phenol and acetic acid
(B) Phenol and acetaldehyde
(C) Benzoic acid and acetone
(D) Phenol and acetone

76. Which of the following gives ketone on oxidation
(A) $(CH_3)_3COH$
(B) $CH_3CH_2CH_2OH$
(C) $(CH_3)_2CHCH_2OH$
(D) $CH_3CHOHCH_3$

77. Which of the following will be most easily attacked by an electrophile?

(A)  (B) 

(C)  (D) 

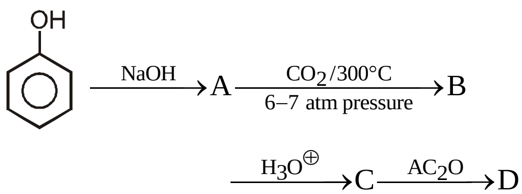
78. Which of the following is ortho-para directing group?

(A) CF_3

(B) CCl_3

(C) $–CH = CH–COOH$

(D) $–NO_2$

79. 

'D' is

(A) Asprin

(B) Valine

(C) Cumene

(D) Salicyclic acid

80. 1, 2, 3-trihydroxybenzene is also known as

(A) Pyrogallol

(B) Phloroglucinol

(C) Resorcinol

(D) Quinol

81. Formaldehyde gives an additive product with methyl magnesium iodide which on aqueous hydrolysis gives

(A) Isopropyl alcohol

(B) Ethyl alcohol

(C) Methyl alcohol

(D) Propyl alcohol

82. $A \xrightarrow[\text{dil. } H_2SO_4]{K_2Cr_2O_7} B \xrightarrow[H_2O]{CH_3MgI} CH_3-\overset{\overset{\displaystyle CH_3}{|}}{\underset{\underset{\displaystyle OH}{|}}{C}}-CH_3$

The reactant A is

(A) $CH_3CHOHCH_3$

(B) CH_3COCH_3

(C) C_2H_5OH

(D) CH_3COOH

83. Action of water in the presence of sulphuric acid with the following alkenes

(i) $CH_3—CH = C\begin{matrix} CH_3 \\ CH_3 \end{matrix}$ and

(ii) $CH_3—CH = CH_2$ gives

(A) (i) $CH_3—CH_2—\underset{\underset{\displaystyle OH}{|}}{C}\begin{matrix} CH_3 \\ CH_3 \end{matrix}$ and

(ii) $CH_3—\underset{\underset{\displaystyle OH}{|}}{CH}—CH_3$

(B) (i) $CH_3—CH = \underset{\underset{\displaystyle OH}{|}}{CH}\begin{matrix} CH_3 \\ CH_3 \end{matrix}$ and

(ii) $CH_3—CH_2—CH_2OH$

(C) (i) $CH_3—CH—\underset{\underset{\displaystyle OH}{|}}{CH}\begin{matrix} CH_3 \\ CH_3 \end{matrix}$ and

(ii) $CH_3—\underset{\underset{\displaystyle OH}{|}}{CH}—CH_3$

(D) (i) $CH_3—CH_2—\underset{\underset{\displaystyle OH}{|}}{C}\begin{matrix} CH_3 \\ CH_3 \end{matrix}$ and

(ii) $CH_3—CH_2—CH_2OH$

84. Which one among the following is Williamson's synthesis?

(A) $\begin{matrix} CH_3 \\ CH_3 \end{matrix}C = O \xrightarrow[\text{Conc. HCl}]{\text{Zn-Hg}} CH_3—CH_2—CH_3$

(B) $CH_3—CHO \xrightarrow[-H_2O]{\text{Dil. NaOH}}$ $CH_3—CH = CH—CHO$

(C) $C_2H_5I + C_2H_5ONa \rightarrow$ $C_2H_5—O—C_2H_5 + NaI$

(D) $HCHO \xrightarrow{NaOH} HCOONa + CH_3OH$

85. In Williamson's synthesis ethoxy ethane is prepared by

(A) Passing ethanol over heated alumina

(B) Heating sodium ethoxide with ethyl bromide

(C) Treating ethyl alcohol with excess of H_2SO_4 at 430-440 K

(D) Heating ethanol with dry Ag_2O

86. Anisole is the product obtained from phenol by the reaction known as

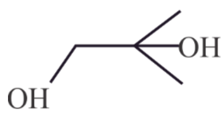
(A) Coupling
(B) Etherification
(C) Oxidation
(D) Esterification

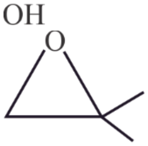
87. Which of the following is the best method for making *iso*-propylmethyl ether?

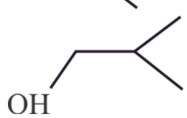
(A) $CH_3I + (CH_3)_2CHOH \rightarrow$
(B) $CH_3I + (CH_3)_2CHO^- \rightarrow$
(C) $(CH_3)_2CHI + CH_3O^- \rightarrow$
(D) $(CH_3)_2CHCl + CH_3OH \rightarrow$

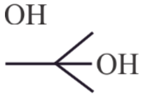
88. 

A is

(A) 

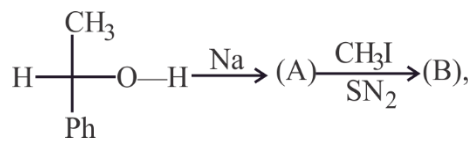
(B) 

(C) 

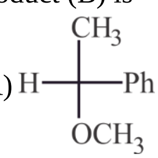
(D) 

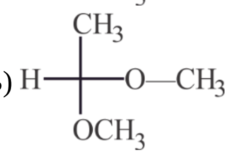
89. The reaction of ethanol with H_2SO_4 does not give

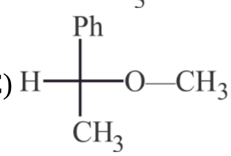
(A) C_2H_4
(B) $C_2H_5OC_2H_5$
(C) C_2H_2
(D) $C_2H_5HSO_4$

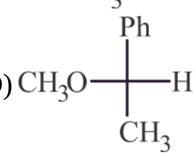
90. 

Product (B) is

(A) 

(B) 

(C) 

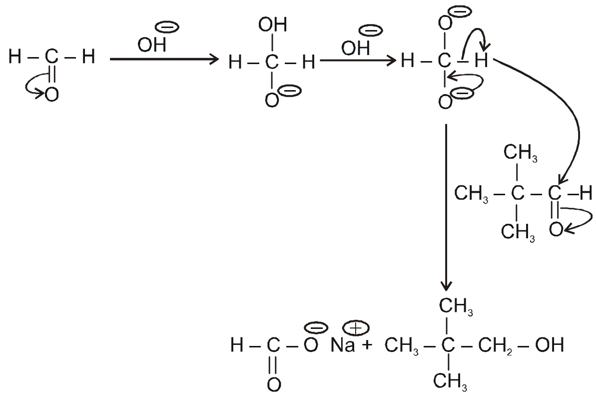
(D) 

Answer Key

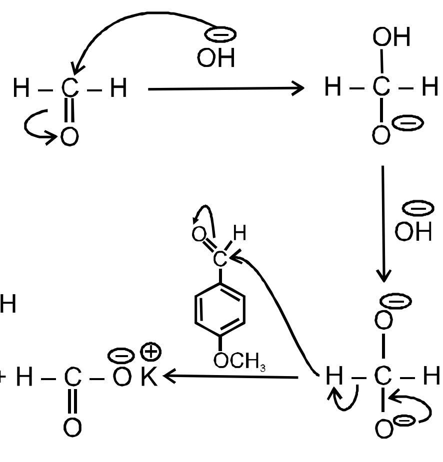
46. (A)
47. (A)
48. (B)
49. (A)
50. (B)
51. (A)
52. (B)
53. (A)
54. (C)
55. (D)
56. (B)
57. (A)
58. (D)
59. (D)
60. (C)
61. (C)
62. (C)
63. (A)
64. (A)
65. (C)
66. (B)
67. (A)
68. (B)
69. (D)
70. (A)
71. (A)
72. (C)
73. (A)
74. (B)
75. (D)
76. (D)
77. (C)
78. (C)
79. (A)
80. (A)
81. (B)
82. (A)
83. (A)
84. (C)
85. (B)
86. (B)
87. (B)
88. (B)
89. (C)
90. (C)

Hint and Solutions

46. (A)



47. (A)



48. (B)

Haloform reaction can give by $-\overset{\overset{\large O}{||}}{C}-CH_3$ group.

49. (A)
Compound containing chiral carbon with carbonyl group.

50. (B)

Compound containing $-\overset{\overset{\large O}{||}}{C}-CH_3$ group give iodoform test.

51. (A)

Haloform reaction can give by $-\overset{\overset{\large O}{||}}{C}-CH_3$ and $CH_3-\underset{OH}{\underset{|}{CH}}-$ group

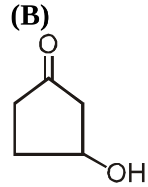
52. (B)
Basic Information.

53. (A)
Basic Information.

54. (C)

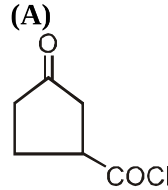
55. (D)
It is fact.

56. (B)



due to presence of –OH group

57. (A)



due to presence of –COCl

58. (D)
Lab test.

59. (D)
Basic Information.

60. (C)
Basic Information.

61. (C)
Aldehydes give silver mirror test but ketones do not.

$(CH_3)_2CHOH \xrightarrow{[O]} (CH_3)_2C{=}O$

→ No silver mirror

→ Phenyl hydrazine formation is possible.

62. (C)

$$C_2H_5Br \xrightarrow{KCN} C_2H_5CN \xrightarrow[\text{Boil}]{\text{Dil. } H_2SO_4} C_2H_5COOH$$

63. (A)

Basic Information.

64. (A)

$$C_2H_5Br \xrightarrow{\text{Alc. KOH}} CH_2{=}CH_2 \xrightarrow[CCl_4]{Br_2} \underset{\substack{|\\Br}}{CH_2}-\overset{\substack{Br\\|}}{CH_2} \xrightarrow[\text{(excess)}]{KCN} \underset{\substack{|\\CN}}{CH_2}-\overset{\substack{CN\\|}}{CH_2} \xrightarrow{H_3O^+} \underset{\substack{|\\COOH}}{CH_2}-CH_2-COOH$$

65. (C)

HVZ reaction

66. (B)

67. (A)

Steric hindrance

68. (B)

Rate of esterification $\propto \dfrac{1}{\text{Steric} \rightleftarrows \text{crowding}}$.

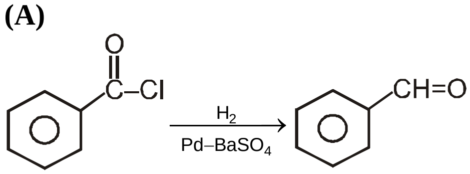
69. (D)

Correct reactivity order for nucleophilic addition reaction with PhMgBr

$$\begin{matrix}CH_3\\H\end{matrix}\!\!>C{=}O \;>\; \begin{matrix}CH_3\\CH_3\end{matrix}\!\!>C{=}O \;>\; \begin{matrix}Ph\\Ph\end{matrix}\!\!>C{=}O$$

(due to steric crowding).

70. (A)



71. (A)

$$\underset{(X)}{C_2H_5OH} + [O] \xrightarrow[\text{in } CH_2Cl_2]{PCC} \underset{(Y)}{CH_3CHO}$$

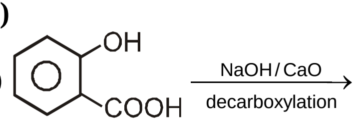
$$CH_3CHO + 4NaOH + 3I_2 \rightarrow \underset{\substack{\text{yellow ppt.}\\\text{(triiodomethane)}}}{CHI_3} + HCOONa + 3H_2O + 3NaI$$

72. (C)

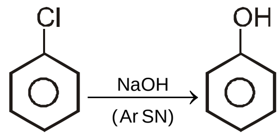
73. (A)

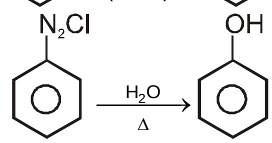
Basic Information.

74. (B)

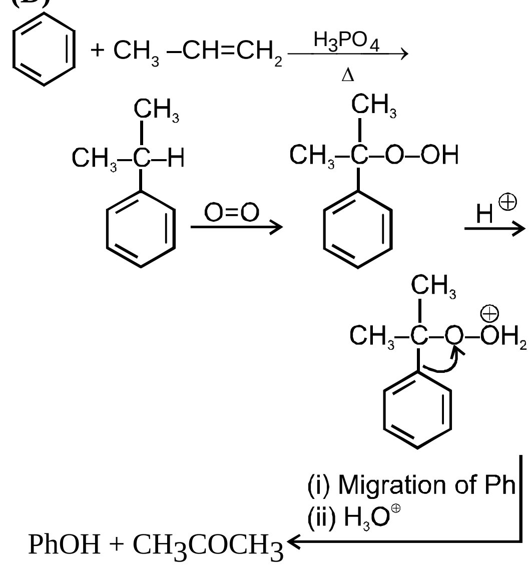
(1) 

(2) $C_6H_5MgBr \xrightarrow{H_3O^+} C_6H_6 + Mg\begin{matrix}Br\\OH\end{matrix}$

(3) 

(4) 

75. (D)



76. (D)

Basic Information.

77. (C)

Phenol is most activated towards electrophile because –OH group is electron releasing

78. (C)

Cinnanyl system is ortho-para directing group.

79. **(A)**

80. **(A)**

81. **(B)**

82. **(A)**

83. **(A)**

84. **(C)**

85. **(B)**

86. **(B)**

87. **(B)**

88. **(B)**

89. **(C)**

90. **(C)**

(Biology)

136. Functioning of kidney is efficiently regulated by

(A) ANF

(B) JGA

(C) Lungs

(D) Both (A) and (B)

137. Osmoregulation is the function of

(A) oxytocin

(B) ADH

(C) Prolactin

(D) Both (A) and (B)

138. The functioning of the kidneys is efficiently monitored and regulated by the hormonal fredback mechanism involving

(A) hypothalamus

(B) JGA

(C) Heart

(D) All of these

139. Plasma filtered / passed through kidneys per minute is normally

(A) 1100 to 1200 ml / min

(B) 650 to 680 ml / min.

(C) 125 ml / min.

(D) both (A) and (B)

140. Reabsorption of water from the latter part of tubule is facilitated by

(A) Antidiuretic hormone

(B) Vasopressin

(C) renin

(D) both (A) and (B)

141. Reabsorption of water in DCT and CT part of nephron is function of

(A) prolactin

(B) oxytocin

(C) vasopressin

(D) luteinizing hormone

142. Autoregulation of GFR (Glomerulus Filtration Rate) takes place by

(A) renin angiotensin mechanism

(B) juxa-glomerulus apparatus

(C) vasopressin

(D) all of the above

143. Renin is released by

(A) hypothalamus

(B) posterior lobe or pituitary

(C) anterior lobe of pituitary

(D) JG cells

144. Which of the following does not favour the formation of large quantities of dilute urine?

(A) Alcohol

(B) Caffeine

(C) renin

(D) Atrial-natriuretic factor

145. The organ where urine is stored till a voluntary signal is given by CNS

(A) ureter

(B) urinary bladder

(C) urinary pouch

(D) None of the above

146. The process of release of urine is called

(A) micturition

(B) sweatening

(C) defeciation

(D) perspiring

147. Micturition reflex is a neural mechanism to

(A) release sweat

(B) formation of urine

(C) release urine

(D) release inorganic substance to the urine

148. What happens in micturition?

(A) Contraction of smooth muscles of bladder

(B) Relaxation of the urethral sphincter

(C) Release of urine

(D) All of the above

149. Which of the following causes an increase in sodium absorption in DCT.

(A) Increase in aldosterone levels

(B) Increase in antidiuretic hormone levels

(C) Decrease in aldosterone levels

(D) Decrease in antidiuretic hormone levels

150. Flame cells are excretory organs of

(A) all annelids

(B) insects

(C) rotifers and some annelids

(D) None of these

151. ANF mechanism checks on

(A) oxytocin-resin mechanism

(B) counter-current mechanism

(C) rennin-angiotensin mechanism

(D) oxytocin-angiotensin mechanism

152. Angiotensin-II increases glomerular blood pressure and GFR as it is a

(A) osmoregulator

(B) vasoconstrictor

(C) vasodilator

(D) none of the above

153. An adult human excretes on an average

(A) 2-3 liters of urine per day

(B) 1-1.5 liters of urine per day

(C) 2-5 liters of urine per day

(D) 4-5 liters of urine per day

154. On an average the amount of urea in gram excreted out per day is

(A) 25-30 gm (B) 30-35 gm

(C) 20-25 gm (D) 35-40 gm

155. Indicator of diabetes mellitus is/are

(A) the presence of glucose in urine

(B) the presence of ketone bodies in urine

(C) the presence of amino acid in urine

(D) both (A) and (B)

156. Other than kidney which other organs help in excretion

(A) lungs (B) skin

(C) spleen (D) both(A)and(B)

157. Terrestrial adaptation includes

(A) Uricotelism

(B) Ureotelism

(C) Metanephric kidneys

(D) All of these

158. Primary function of sweat in humans is

(A) excretion

(B) cooling of skin

(C) Both (A) and (B)

(D) removal of urea

159. Choose the correct statements.

(A) Sebaceous gland eliminate sterols, hydrocarbons, waxes

(B) Secretion of sebaceous gland provide oily protective covering of skin

(C) Small amount of nitrogenous wastes eliminated through saliva

(D) All of the above

160. Elimination rate of CO_2 by lungs is

(A) 125 ml / min

(B) 200 ml / min

(C) 1 - 1.5 L / day

(D) 25 to 30 ml / min.

161. In uremia, the urea can be removed by the process called

(A) haemolysis

(B) haemodialysis

(C) dialysis

(D) micturition

162. Renal calculi is

(A) soluble mass of crystallized salts in kidney

(B) soluble mass of protein in kidney

(C) insoluble mass of proteins in kidney

(D) insoluble mass of crystallized salts in kidney

163. Glomerulonephritis is

(A) transplantation of glomeruli of kidney

(B) the absence of glomeruli of kidney

(C) inflammation of glomeruli of kidney

(D) removal of glomeruli of kidney

164. Identify the correct statement.

(A) Kidney transplantation is the ultimate method in the correction of acute renal failures

(B) A functional kidney from a donor is used in the transplantation.

(C) A donor can be related or not but matching is done to minimize the chances of rejection by host's immune system

(D) All of the above

165. Which statement is correct regarding the haemodialysis procedure?

(A) Haemodialysis is the ultimate method in the correction of acute renal failure

(B) Blood is drained from a convenient artery and pumped into dialyzing fluid

(C) The dialyzing unit have a coiled paraffin tube surrounded by dialyzing fluid

(D) The composition of dialyzing fluid is different from that of plasma

166. I. Reabsorption of water occurs passively in the initial segment of nephron.

II. Nitrogenous waste are absorbed by active transport

III. Conditional reabsorption of Na^+ and water takes place in DCT.

IV. DCT reabsorbs glucose.

V. DCT is capable of selective secretion of H^+, K^+ and NH_3 to maintain pH and Na^+ - K^+ balance in blood.

VI. Substances like glucose, amino acids, Na^+, etc., in the filtrate are reabsorbed actively.

Choose the option with incorrect statements.

(A) I and II (B) III and IV

(C) V and VI (D) II and IV

167. Out of the four parts given below, which play significant role in forming concentrated urine in human?

I. Loop of Henle

II. Glomerulus

III. Bowman's capsule

IV. Vasa recta

The correct option is

(A) I and II (B) III and IV

(C) II and III (D) I and IV

168. Osmoreceptors in the body is activated by the changes in

I. blood volume

II. Body fluid volume

III. Ionic concentration

The option containing correct statements is

(A) I and II (B) I and III

(C) III and II (D) All of these

169. I. Excess loss of water from body

II. Hypothalamus

III. Osmoreceptors

IV. ADH

V. Neurohyupophysis

VI. Water reabsorption DCT and CT

VII. Prevention of diuresis

Arrange the given processes in correct sequence for regulation in kidney.

(A) I – II – III – IV – V – VI – VII

(B) VII – VI – V – IV – III – II – I

(C) I – III – II – V – IV – VI – VII

(D) I – III – II – IV – V – VII – VI

170. Identify the wrong statements about human excretory system and choose the correct option accordingly.

I. Kidney are reddish-brown and bean-shaped structure.

II. Kidney are situated between the last thoracic and third lumber vertebra.

III. Each kidney of an adult human measures 10-12 cm in length, 5-7 cm in width, 2-3 cm thickness and average weight 120-170 gram

(A) I and II (B) II and III

(C) III and I (D) None of these

171. Choose the correct statement.

I. Renal artery transport blood to kidney.

II. Loop of Henle concentrates urine

III. Podocytes occur in wall of Glomerulus.

IV. Ultrafiltrate is blood plasma minus protein

(A) I, II and III (B) I, III and IV

(C) I, II and IV (D) All of these

172. During haemodialysis process

I. blood drained from a convenient artery

II. removal of nitrogenous waste from blood

III. Blood is passed through a coiled porous cellophane membrane of tube bathing in dialysis fluid.

IV. Blood is mixed with antiheparin and passed into vein. Arrange the steps.

(A) I – II – III – IV (B) IV – III – II – I

(C) I – III – II – IV (D) I – IV – II

173. Bicarbonate absorption occurs in this segment?

I. PCT

II. Loop of Henle

III. DCT

Choose the correct option

(A) I and II (B) II and III

(C) I and III (D) None

174. Ureotelism is found in

(A) Only terrestrial organism

(B) Only aquatic organisms

(C) both

(D) None

175. Choose the correct ones.

I. Afferent arteriole carries the blood away from the glomerulus toward renal vein.

II. Efferent arteriole carries the blood to glomerulus.

III. Podocytes form minute spaces (slit pores) for the filtration of blood into the Bowman's capsule.

IV. In Henle's loop is maximum reabsorption of the major substances from the glomerular filtrate.

The correct option is

(A) I, II and III (B) III and IV

(C) Only III (D) Only IV

176. Choose the correct ones.

I. Vasa recta is lacking in juxta medullary nephrons.

II. Maximum number of nephrons in kidney are juxta-medullary type.

III. DCT of single nephron open into one collecting tubule.

IV. During summer when body loses lot of water by evaporation, the release of ADH is suppressed.

V. When someone drinks lot of water, ADH release is suppressed.

VI. An increase in glomerular blood flow stimulates formation of angiotensin-II.

The correct statement is

(A) I and IV (B) V and VI

(C) I and V (D) Only V

177. Match the following columns.

	Column I		Column II
A.	Ascending limb of loop of Henle	1.	Permeable to H_2O
B.	Disal convoluted tubule	2.	Reabsorption most of the electrolytes
C.	Descending limb of loop of Henle	3.	Permeable to electrolytes
D.	Proximal convoluted tubule	4.	Reabsorbed Na^+ and water

Codes

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

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

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

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

178. Filtration of the blood takes place at

(A) PCT

(B) DCT

(C) Collecting ducts

(D) Malpighian body

179. We can produce a concentrated / dilute urine. This is facilitated by a special mechanism. Identify the mechanism.

(A) Reabsorption from PCT

(B) Reabsorption from collecting duct

(C) Reabsorption / secretion in DCT

(D) Counter-current mechanism in Henle's loop/vasa recta

180. Which one of the following statement is incorrect?

(A) The medullary zone of kidney is divided into a few conical masses called medullary pyramids projecting into the calyces

(B) Inside the kidney the cortical region extends in between the medullary pyramids as renal pelvis

(C) Glomerulus along with Bowman's capsule is called the renal corpuscle

(D) Renal corpuscle, Proximal Convoluted Tubule (PCT) and Distal Convoluted Tubule (DCT) of the nephron are situated in the cortical region of kidney.

ANSWERS

136. (D)
137. (B)
138. (D)
139. (B)
140. (D)
141. (C)
142. (D)
143. (D)
144. (C)
145. (B)
146. (A)
147. (C)
148. (D)
149. (A)
150. (C)
151. (C)

152. (B)
153. (B)
154. (A)
155. (D)
156. (D)
157. (D)
158. (B)
159. (D)
160. (B)
161. (B)
162. (D)
163. (C)
164. (D)
165. (B)
166. (D)
167. (D)

168. (D)
169. (C)
170. (D)
171. (C)
172. (C)
173. (C)
174. (C)
175. (C)
176. (D)
177. (B)
178. (D)
179. (D)
180. (B)

Hints and Solutions

136. (D)

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137. (B)

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138. (D)

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139. (B)

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140. (D)

NCERT 11th page no. 297

141. (C)

NCERT 11th page no. 297

142. (D)

NCERT 11th page no. 297

143. (D)

NCERT 11th page no. 297

144. (C)

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145. (B)

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146. (A)

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147. (C)

NCERT 11th page no. 298

148. (D)

NCERT 11th page no. 298

149. (A)

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150. (C)

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151. (C)

NCERT 11th page no. 297

152. (B)

NCERT 11th page no. 297

153. (B)

NCERT 11th page no. 298

154. (A)

NCERT 11th page no. 298

155. (D)

NCERT 11th page no. 298

156. (D)

NCERT 11th page no. 298

157. (D)

NCERT 11th page no. 290

158. (B)

NCERT 11th page no. 298

159. (D)

NCERT 11th page no. 298

160. (B)

NCERT 11th page no. 298

161. (B)

NCERT 11th page no. 298

162. (D)

NCERT 11th page no. 299

163. (C)

NCERT 11th page no. 299

164. (D)

NCERT 11th page no. 299

165. (B)

NCERT 11th page no. 299

166. (D)

NCERT 11th page no. 294

167. (D)

NCERT 11th page no. 295 / 296

168. (D)

NCERT 11th page no. 297

169. (C)

NCERT 11th page no. 297

170. (D)

NCERT 11th page no. 291

171. (C)

NCERT 11th page no. 291 / 293

172. (C)

NCERT 11th page no. 298 / 299

173. (C)

NCERT 11th page no. 295

174. (C)

NCERT 11th page no. 290

175. (C)

NCERT 11th page no. 292 / 293

176. (D)

NCERT 11th page no. 298

177. (B)

NCERT 11th page no. 294 / 295

178. (D)

NCERT 11th page no. 293

179. (D)

NCERT 11th page no. 296

180. (B)

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Practice Test- 06

91. Mark the incorrect statement-
(A) Cells in G_0 stage remain metabolically active but no longer proliferate
(B) Plants can show mitotic divisions in both haploid and diploid cells
(C) M-phase is the most dramatic period of the cell cycle, involving a major reorganisation of virtually all components of the cell
(D) The complete disintegration of the nuclear envelope marks the start of the First phase of mitosis

92. Mark the incorrectly matched-
(A) S-phase – centriole duplication
(B) G_2 phase – Transcription
(C) M-phase - protein synthesis occur
(D) G_1 phase – DNA damage repair

93. Nucleolus and golgibodies may be disappear in which of the phase-
(A) M-phase (B) S- phase
(C) G_1 phase (D) G_2-phase

94. In which of the following phase one centromere can have two chromatid-
(A) G_2 phase (B) G_1 phase
(C) Telophase (D) Anaphase

95. Which of the following notoccur in phase after M-phase –
(A) Nucleus/ cytoplasm ratio increase
(B) Two daughter cell from
(C) Amount of DNA become half
(D) DNA condense to form chromosome

96. Mitotic division normally not occur in -
(A) Haploid plant cell
(B) Diploid plant cell
(C) Diploid animal cell
(D) Haploid animal cell

97. G_0 phase cell show all feature except-
(A) Metabolically active
(B) ShowGrowth activity
(C) Living cell
(D) Quiescent cell

98. Centriole starts to move at opposite pole in-
(A) Prophase (B) Metaphase
(C) Telophase (D) Anaphase

99. Two chromatids of chromosome visible in ………….. phase of M-phase-
(A) Prophase (B) Metaphase
(C) Telophase (D) Anaphase

100. Chromosome is clearly visible under the microscope……………Phase of M-phase–
(A) Prophase (B) Metaphase
(C) Telophase (D) Anaphase

101. Spindle fibre attach with kinetochore in-
(A) Prophase (B) Metaphase
(C) Telophase (D) Anaphase

102. Chromosome start migration to opposite pole in ………. Phase of cell cycle
(A) Prophase (B) Metaphase
(C) Anaphase (D) Telophase

103. Number of spindle fibre attach onone chromosome at metaphase of mitosis-
(A) one (B) two
(C) three (D) four

104. Number of spindlefibre attach on one chromosome at metaphase I of meiosis I-
(A) one (B) two
(C) three (D) four

105. Consider the following statements

S-I-In an animal cell, this is achieved by the appearance of a furrow in the cell wall

S-II-The growth of multicellular organisms is due to mitosis.

(A) only S-I is correct

(B) only S-II is correct

(C) both S-I and S-II is correct

(D) both S-I and S-II is wrong

106. In anaphase splitting of centromere result in –

(A) splitting of chromosome arm

(B) splitting result in formation of daughter chromosome

(C) spindle fibre degenerate

(D) unequal division of genetic material

107. In meiosis variation occur in –

(A) prophase II (B) anaphase I

(C) pachytene (D) both B and C

108. Terminilization of chaismata occur in –

(A) diakinesis (B) diplotene

(C) pachytene (D) zygotene

109. If APC is not functional then which of the following is possible-

(A) polyploidy occur (B) polyteny occur

(C) sister chromatid not get separated

(D) both B and C

110. Which of the following phase of cell cycle have amount of DNA changing –

(A) M phase

(B) G_1 to S phase transition

(C) G_2 to M transition

(D) M and S -phase

111. Mark the correct-

(A) Meiosis occur in both haploid and diploid

(B) Meiosis II occur only in diploid

(C) Meiosis I occur only in diploid cell

(D) Mitosis can not occur in haploid cell of plants

112. Which of the following not occur in metaphase I

(A) Double metaphasic plate visible

(B) One Homologus Chromosome pair have two chromosomal fibre

(C) Each Chromosome have chromosomal fibre attach to opposite pole

(D) Homologus chromosome are together at metaphasic plate

113. In a maize plant number of chromosome are (2n=20) than number of bivalent and tetrad are in zygotene are respectively –

(A) 20 and 20 (B) 20 and 10

(C) 10 and 10 (D) 10 and 20

114. Metacentric chromosome can show inverted V shape visible in-

(A) Metaphase (B) Anaphase I

(C) Anaphase (D) both B and C

115. Which is incorrect about plant cell-

(A) Anastral spindle formation

(B) Cell plate method of cytokinesis

(C) Mitosis in haploid cell

(D) Centriole double in S-phase

116. Which of the following occur in Zygotene-

(A) Synapsis occur

(B) Bivalent form

(C) Pairing of homologus chromosome occur

(D) all of the above

117. Consider the following statements

S-I-Exchange between chromatid of non-homologus pair is called translocation

S-II-Exchange between chromatid of Homologus pair is called crossing over

(A) only S-I is correct

(B) only S-II is correct

(C) both S-I and S-II is correct

(D) both S-I and S-II is wrong

118. The four chromatids of each bivalent chromosomes becomes distinct and clearly appears as tetrads in–

(A) Zygotene (B) Pachytene

(C) Diplotene (D) Diakinesis

119. Segregation of homologus chromosome occur in-
(A) Anaphase I (B) Anaphase II
(C) Anaphase (D) Both A and C

120. Segregation of sister chromatid occur in -
(A) Anaphase I (B) Anaphase II
(C) Anaphase (D) both B and C

121. Segregation of sister chromatid which are non-identical occur in
(A) Anaphase I (B) Anaphase II
(C) Anaphase (D) Both A and C

122. In oocytes of some vertebrates, …………….can last for months or years
(A) Mitosis (B) Meiosis I
(C) Anaphase I (D) Meiosis II

123. Which of the following is responsible for Aneuoploidy-
(A) Non-disjunction (B) Spindle absence
(C) Non-segregation of sister chromatid
(D) Non-formation of synaptonemal comples

124. Chaismata Appear in phase –
(A) diakinesis (B) diplotene
(C) pachytene (D) zygotene

125. In ………. Phase of meiosis I ,chromosome pair is connected to opposite pole by spindle fibre -
(A) Prophase I
(B) Metaphase I
(C) Metaphase
(D) both A and B

126. In a haploid cell amount of DNA in G_2 phase is –
(A) 2c (B) c
(C) 4c (D) 8c

127. Which type of chromosome appear in anaphase as inverted j shape-
(A) Metacentric (B) Submetacentric
(C) Telocentric (D) Acrocentric

128. Which phase of cell cycle , show maximum growth-
(A) G_1 (B) G_0
(C) S (D) G_2

129. During ………… phase the chromosomes are fully condensed and the meiotic spindle is assembled to prepare the homologous chromosomes for separation–
(A) Metaphase I (B) Anaphase I
(C) Diakinesis (D) Diplotene

130. Recombination between homologous chromosomes is completed by the end of pachytene, leaving the chromosomes linked at the sites of …………
(A) Synapsis (B) Crossing over
(C) Centromere (D) All

131. The microtubules from the opposite poles of the spindle attach to the kinetochore of homologous chromosomes
(A) Anaphase I (B) Anaphase II
(C) Anaphase (D) Metaphase I

132. During anaphase II the sister chromatids separate are –
(A) Belong to same chromosome
(B) Genetically same always
(C) Part of two different chromosome
(D) Both A and B

133. How many maximum number of seed can form after 20 meiosis in a bisexual plant , if all gamete which form can get fertilize –
(A) 20 seed (B) 16 seed
(C) 30 seed (D) 10 seed

134. The compaction of chromosomes continues throughout ………………. Phase of meiosis
(A) Zygotene (B) Prophase
(C) Leptotene (D) Pachytene

135. ……………. corresponds to the interval between mitosis and initiation of DNA replication –
(A) G_2 phase (B) G_1 phase
(C) S-phase (D) M-phase

ANSWERSKEY

91. (D)
92. (C)
93. (A)
94. (A)
95. (D)
96. (D)
97. (B)
98. (A)
99. (A)
100. (B)
101. (B)
102. (C)
103. (B)
104. (A)
105. (B)
106. (B)
107. (D)
108. (A)
109. (D)
110. (D)
111. (C)
112. (D)
113. (C)
114. (C)
115. (D)
116. (D)
117. (C)
118. (B)
119. (A)
120. (D)
121. (B)
122. (B)
123. (A)
124. (B)
125. (B)
126. (A)
127. (D)
128. (A)
129. (C)
130. (B)
131. (D)
132. (A)
133. (B)
134. (C)
135. (B)

Hints and Solutions

91. (D)
NCERT PG.NO 165
The complete disintegration of the nuclear envelope marks the start of the second phase of mitosis, hence the chromosomes are spread through the cytoplasm of the cell

92. (C)
NCERT PG.NO 163-164
The M Phase -karyokinesis and cytokinesis occur

93. (A)
NCERT PG NO 165
M phase -Prophase which is the first stage of mitosis

94. (A)
NCERT PG NO163 G2 phase

95. (D)
NCERT PG.NO 165
metaphase

96. (D)
NCERT PG.NO 164
In animals, mitotic cell division is only seen in the diploid somatic cells.

97. (B)
NCERT PG.NO 164
Cells in this stage remain metabolically active but no longer proliferate

98. (A)
NCERT PG.NO 164
prophase

99. (A)
NCERT PG.NO 164
Prophase-Chromosomes are seen to be composed of two chromatids attached together at the centromere

100. (B)
NCERT PG.NO 165
Metaphase-condensation of chromosomes is completed
and they can be observed clearly under the microscope

101. (B)
NCERT PG.NO 165
Metaphase

102. (C)
NCERT PG.NO 165
Anaphase

103. (B)
On one chromosome two spindle fibre attached which s connected to opposite pole

104. (A)
In metaphase I of meiosisI , One Homologus Chromosome pair have two chromosomal fibre

105. (B)
NCERT PG.NO 166
Cytokinesis -In an animal cell, this is achieved by the appearance of a furrow in the plasma membrane

106. (B)
NCERT PG.NO 165
In mitotic Anapha se

107. (D)
NCERT PG.NO 168 -169
crossing over occurs between non-sister chromatids of the homologous chromosomes

108. (A)
NCERT PG.NO 168
he final stage of meiotic prophase I is diakinesis. This is marked by terminalisation of chiasmata

109. (D) polyteny

110. (D)
NCERT PG.NO 163
S-phase -During this time the amount of DNA per cell double

111. (C)
NCERT PG NO 164
The plants can show mitotic divisions in both haploid and diploid cells

112. (D)
NCERT PG.NO 168

113. (C) Ncert pg no 168

114. (C)
Metacentric chromosome has middle centromere forming two equal arms of the chromosome.

115. (D)
Centriole absent in plant cell

116. (D)
NCERT PG.NO 168
Meiosis I – In Prophase I- second stage of prophase I called zygotene. Homologous chromosomes start pairing together and this process of association is called synapsis

117. (C) ncert pg no 168

118. (B)
NCERT PG.NO 168

119. (A)
NCERT PG.NO 169
anaphase I

120. (D)
NCERT PG.NO 169

121. (B) Anaphase II

122. (B)
NCERT PG.NO 168
In oocytes of some vertebrates, diplotene can last for months or years

123. (A)
Non-disjunction

124. (B)
NCERT PG.NO 168
prophase I - Diplotene

125. (B)
NCERT PG.NO 168
Metaphase I -The microtubules from the opposite poles of the spindle attach to the pair of homologous chromosomes.

126. (A) NCERT PG NO 163

127. (D)
Acrocentric

128. (A)
NCERT PG.NO 163
During G1 phase the cell is metabolically active and continuously grows but does not replicate its DNA

129. (C)
NCERT PG.NO 168

130. (B)
NCERT PG NO 168
Recombination between homologous chromosomes is completed by the end of pachytene, leaving the chromosomes linked at the sites of crossing ove

131. (D)
NCERT PG.NO 168
Metaphase I -The microtubules from the opposite poles of the spindle attach to the pair of homologous chromosomes

132. (A)
NCERT PG NO 169

133. (B) 16 seed

134. (C)
NCERT PG.NO 168
prophase-I leptotene

135. (B)
NCERT PG NO 163
G1 phase corresponds to the interval between mitosis and initiation of DNA replication