Q1 .

The linear velocity of any point of the rim of a wheel 80 cm in diameter when the wheel is rotating at 90 revolutions per minute is

1) 0.6π m/s   2) 1.2π m/s   3) 1.5π m/s   4) 2.4π m/s

Q2 .

Moment of inertia of a body about two perpendicular axes X and Y in the plane of the lamina are 20 kg m² and 25 kg m² respectively. Its moment of inertia about an axis perpendicular to the plane of the lamina and passing through the point of intersection of X and Y axes is:

1) 5 kg m²   2) 45 kg m²   3) 12-5 kg m²   4) 500 kg m²

Q3.

A sphere is rotating about a diameter

1) The particle on the surface of the sphere do not have any linear acceleration

2) The particle on the diameter mentioned above do not have any linear acceleration

3) Different particles on the surface have different angular speeds about the axis of rotation

4) All the particles on the surface have same linear speed

Q4

A particle of mass m is projected with a speed u making an angle of 45° with the horizontal from a point O on the ground. The magnitude of the angular momentum of the particle about the point O when it is about to reach the ground is:

1) $u^3 m / \sqrt{2}g$ 2) $u^3\, m/g$ 3) $\sqrt{2}\, u^3\, m/g$ 4) $2\, u^3 m/g$

Q5

A cubical block of side length L rests on a rough horizontal surface having the coefficient of friction μ. A horizontal force F is applied on the block as shown. If the coefficient of friction is sufficiently high so that the block does not slide before toppling, the minimum force required to topple the block is:
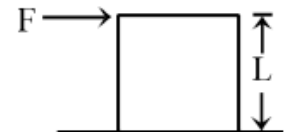
1) infinitesimal   2) $\frac{mg}{4}$ 3) $\frac{mg}{2}$ 4) $mg\,(1 - \mu)$

Q6

Moment of inertia of a body depend upon

1) distribution of mass of the body

2) position of axis of rotation

3) temperature of the body

4) All of the above

Q7

When a force is applied on a body, Newton's second law is applicable to

1) centre of mass   2) any part of the body   3) centre of gravity   4) None

Q8

A false balance has equal arms. An object weighs X when placed in one pan and Y when placed in the other pan, then the weight W of the object is equal to

1) $\sqrt{XY}$ 2) $\frac{X+Y}{2}$ 3) $\frac{X^2+Y^2}{2}$ 4) $\frac{2}{\sqrt{X^2+Y^2}}$

Q9

The velocity of the CM of a system changes from $\vec{v}_1 = 4\hat{i}$ m/s to $\vec{v}_2 = 3\hat{j}$ m/s during time $\Delta t = 2$ s. If the mass of the system is m is 10 kg, the constant force acting on the system is:

1) 25 N   2) 20 N   3) 50 N   4) 5 N

Q10

A rigid body consists of a 3 kg mass located at $\vec{r_1} = (2\hat{i} + 5\hat{j})$ m and a 2 kg mass located at $\vec{r_2} = (4\hat{i} + 2\hat{j})$ m. The position of the centre of mass is

1) $\frac{14}{5} + \frac{19}{5}m$ 2) $\frac{14}{5}\hat{i} + \frac{19}{5}\hat{j}m$ 3) $\frac{19}{5}\hat{i} + \frac{14}{5}\hat{j}m$ 4) 0

Q11

A particle is moving uniformly along a straight line as shown in the figure. During the motion of the particle from A to B, the angular momentum of the particle about O:

1) Decreases   2) First increases then decreases   3) Increases   4) Remain constant
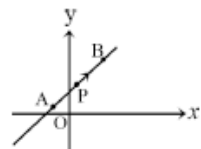
Q12

Identify the wrong equation.

1) $\vec{\tau} = \vec{r} \times \vec{F}$ 2) $\vec{a}_r = \vec{\omega} \times \vec{V}$ 3) $\vec{a}_t = \vec{\alpha} \times \vec{r}$ 4) $\vec{V} = \vec{r} \times \vec{\omega}$

Q13

A man hangs from a rope attached to a hot-air balloon. The mass of the man is greater than the mass of the balloon and its contents. The system is stationary in air. If the man now climbs up to the balloon using the rope, the centre of mass of the 'man plus balloon' system will:

1) remain stationary   2) move up   3) move down   4) first move up and then return to its initial position

Q14

L, m denote the angular momentum and mass of a particle and P its linear momentum. Which of the following can represent the kinetic energy of the particle moving in a circle of radius R?

1) $\frac{L^2}{2m}$ 2) $\frac{P^2}{m}$ 3) $\frac{L^2}{2mR^2}$ 4) $\frac{1}{2}mP^2$

Q15

A rigid body rotates about a fixed axis with a variable angular velocity equal to $(a - bt)$ at time t where a and b are constants. Find the angle through which it rotates before it comes to rest.

1) $\frac{a^2}{b}$ 2) $\frac{a^2}{2b}$ 3) $\frac{a^2}{4b}$ 4) $\frac{a^2}{2b^2}$

Q16

If $\vec{V_t}, \vec{\omega}$ and $\vec{r}$ represent tangential velocity, arial velocity and radial vector at an instant, then which of the following is the wrong option?

1) $\vec{V_t} = \vec{\omega} \times \vec{r}$ 2) $\vec{V_t} = \vec{r} \times \vec{\omega}$ 3) $\vec{V_t} \cdot \vec{\omega} = 0$ 4) $\vec{V_t} \cdot \vec{r} = 0$

Q17

A constant power is supplied to a rotating disc. The relationship between the angular velocity (ω) of the disc and number of rotations (n) made by the disc is governed by

1) $\omega \alpha n^{\frac{1}{3}}$ 2) $\omega \alpha n^{\frac{2}{3}}$ 3) $\omega \alpha n^{\frac{3}{2}}$ 4) $\omega \alpha n^2$

Q18

Two particles of masses, 2m and 3m are separated by some distance on the X-axis. The particle of mass 2m is moved through 6 cm towards the other particle. To keep the centre of mass of the system at the same location, the particle of mass 3m must be moved:

1) 9 cm towards the other particle
2) 9 cm away from the other particle
3) 4 cm towards the other particle
4) 4 cm away from the other particle

Q19

A uniform rod of mass 'm' and length 'l' is kept vertical with the lower end clamped. It is slightly pushed to let it fall down under gravity. Find its angular speed when the rod is passing through its lowest position. Neglect any friction at the clamp. what will be the linear speed of the free end at this instant?

1) $\sqrt{6gl}$ 2) $\sqrt{3gl}$ 3) $\sqrt{2gl}$ 4) $\sqrt{5gl}$

Q20

A hoop of radius 2 m weighs 100 kg. It rolls along a horizontal floor so that its centre of mass has a speed of 20 cm/s. To stop it, work that has to be done is

1) 2 J   2) 4 J   3) 6 J   4) 8 J

Q21

Three identical masses are kept at the corners of an equilateral triangle ABC. A moves towards B with a velocity V, B moves towards C with velocity V, and C moves towards A with the same velocity V. Then the velocity of the centre of mass of the system of particles is

1) V   2) Zero   3) 3V   4) $\frac{V}{3}$

Q22

Consider the following two statements:

(A) Linear momentum of the system remains constant

(B) Centre of mass of the system remains at rest

1) A implies B and B implies A	2) A does not imply B and B does not imply A	3) A implies B but B does not imply A	4) B implies A but A does not imply B

Q23

A disc and a sphere of the same radius but different masses roll off on two inclined planes of the same altitude and length. Which of the two objects gets to the bottom of the plane first?

1) Depends on their masses   2) Disc   3) Sphere   4) Both reach at the same time

Q24

Three objects, A (a solid sphere), B (a thin circular disc) and C (a circular ring), each have the same mass M and radius R. They all spin with the same angular speed ω about their own symmetry axes. The amounts of work (W) required to bring them to rest, would satisfy the relation:

1) $W_B > W_A > W_C$ 2) $W_A > W_B > W_C$ 3) $W_C > W_B > W_A$ 4) $W_A > W_C > W_B$

Q25
Centre of mass of a body

1) Always lies inside the body
2) Always lies outside the body
3) Always lies on the body surface of the body
4) May lie inside or outside the body

Q26
Statement A: If a uniform metal disc is remoulded into a solid sphere, then the moment of inertia about the axis of symmetry increases than that before.
Statement B: For a given body and for a given plane, the moment of inertia is minimum about an axis passing through the centre of mass.

1) Both A and B wrong
2) Both A and B are correct
3) A is correct and B is wrong
4) A is wrong but B is correct

Q27
A body is rotating non-uniformly about a vertical axis fixed in an inertial frame. The resultant force on a particle of the body not on the axis is

1) Vertical
2) Horizontal and skew with the axis
3) Horizontal and intersecting the axis
4) Vetical and intersecting with the axis

Q28
A uniform rod smoothly pivoted at one of its ends is released from rest. If it swings in vertical plane, the maximum speed of the end P of the rod is
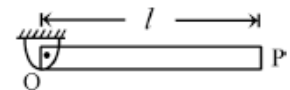
1) $2\sqrt{3gl}$ 2) $\sqrt{3gl}$ 3) $2\sqrt{2gl}$ 4) $\sqrt{gl}$

Q29
The centre of mass of a system is

1) at the centre of the system.
2) outside the system.
3) inside the system
4) either outside or inside the system.

Q30
Which of the following statements are correct?
(1) Center of mass of a body always coincides with the centre of gravity of the body
(2) Center of mass of a body is the point at which the total gravitational torque on the body is zero
(3) A couple on a body produces both translational and rotation motion in a body
(4) Mechanical advantage greater than one means that small effort can be used to lift a large load

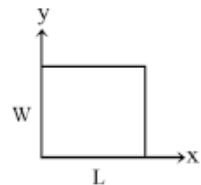1) (2) and (4)   2) (1) and (2)   3) (2) and (3)   4) (3) and (4)

Q31
Two rings of radius R and nR made up of same material have the ratio of moment of inertia about an axis passing through the centre as 1:8. Find n.

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

Q32

A uniform wire is bent into the form of a rectangle of length L and width W. The coordinates of its centre of mass are

1) $(0,0)$ 2) $\left(\frac{L}{2}, W\right)$ 3) $\left(L, \frac{W}{2}\right)$ 4) $\left(\frac{L}{2}, \frac{W}{2}\right)$

Q33

Point masses m_1 and m_2 are placed at the opposite ends of a rigid rod of length L, and negligible mass. The rod is to be set rotating about an axis perpendicular to it. The position of point P on this rod through which the axis should pass so that the work required to set the rod rotating with angular velocity ω_0 is minimum is given by:

1) $x = \dfrac{m_2 L}{m_1 + m_2}$ 2) $x = \dfrac{m_1 L}{m_1 + m_2}$ 3) $x = \dfrac{m_1}{m_2} L$ 4) $x = \dfrac{m_2}{m_1} L$
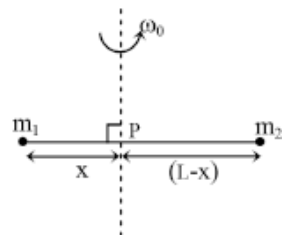
Q34

A solid sphere is rotating freely about its symmetry axis in free space. The radius of the sphere is increased keeping its mass same. Which of the following physical quantities would remain constant for the sphere?

1) Rotational kinetic energy 2) Moment of inertia 3) Angular velocity 4) Angular momentum

Q35

Consider the following statements and identify the correct answer:

A) In the process of an explosion, some changes may occur in momenta of individual fragments due to internal forces.

B) When a stationary body at rest explodes into two fragments, centre of mass of the system moves towards the fragment having heavier mass

C) The sum of moments on masses of the system about the centre of mass is 0 (CM is taken at origin)

1) Only A & C are true 2) Only A & B are true 3) Only B is true 4) A, B & C are true

Q36

A flywheel of radius 2 m and mass 8 kg rotates at an angular speed of 4 rad/s about an axis perpendicular to it through its centre. The kinetic energy of rotation is

1) 128 J 2) 196 J 3) 256 J 4) 392 J

Q37

A particle is moved in a circle with a constant angular velocity. Its angular momentum is L. If the radius of the circle is halved keeping the angular velocity same, the angular momentum of the particle will become:

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

Q38

In the figure shown, a ring A is initially rolling without sliding with a velocity v on the horizontal surface of the body B, of the same mass as A. All surfaces are smooth. B has no initial velocity. What will be the maximum height reached by A on B?
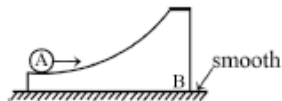
1) $\frac{3v^2}{4g}$ 2) $\frac{v^2}{4g}$ 3) $\frac{v^2}{2g}$ 4) $\frac{v^2}{3g}$

Q39

A solid sphere rolls without slipping on the roof. The ratio of its rotational kinetic energy and its total kinetic energy is:

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

Q40

Moment of inertia of a body is independent of

1) mass of the body   2) distribution of mass of the body   3) temperature of the body   4) angular velocity of the body

Q41

When a planet moves around the Sun

1) The angular momentum remains conserved   2) The angular speed remains constant   3) The linear velocity remains constant   4) The linear momentum remains constant

Q42

A torque 0.5 Nm required to drive a screw into a wooden frame with the help of a screwdriver. If one of the two forces of couple produced by screwdriver is 50 N, the width of the screwdriver is

1) 0.5 cm   2) 0.75 cm   3) 1 cm   4) 1.5 cm

Q43

The angular speed of a rotating rigid body is increased from 4ω to 5ω. The percentage increase in its KE is:

1) 20%   2) 25%   3) 125%   4) 56%

Q44

For a system to be in equilibrium, the torques acting on it must balance. This is true only if the torques are taken about

1) the centre of the system   2) the centre of mass of the system   3) any point on the system   4) any point on the system or outside it

Q45

A body weighs 8 g when placed in one pan and 18 g when placed on the other pan of a false balance. If the beam is horizontal when both the pans are empty, the true weight of the body is:

1) 13 g   2) 9 g   3) 22 g   4) 12 g

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

1)
$$r = 40 \, cm$$
$$r = 4 \times 10^{-1} m$$
$$r = 0.4 \, m$$
$$\omega = \cancel{9} \cancel{0} \times \frac{2\pi}{\cancel{60}}$$
$$\omega = 3\pi$$
$$v = r\omega$$
$$v = 0.4 \times 3\pi$$
$$v = 1.2\pi$$

2)
$$I_z = I_x + I_y$$
$$= 20 + 25$$
$$I_z = 45$$

3) A sphere is rotating about a diameter then the particle on the diameter mentioned above do not have any linear acceleration.

4)
$$L = \vec{r} \times \vec{p}$$
$$\vec{r} = R\hat{i}$$
$$= \frac{u^2 \sin 2\theta}{g}\hat{i} = \frac{u^2}{g}\hat{i} \quad [\theta = 45°]$$
$$\vec{p} = m\left[\left(u\cos\theta\hat{i} - u\sin\theta\hat{j}\right)\right]$$
[When it is about to reach ground]
$$L = \frac{u^2}{g} \times mu \times \frac{1}{\sqrt{2}} = \frac{mu^3}{g\sqrt{2}}$$

5) About point 'p'
$$\tau_F = \tau_{mg}$$
$$F \times L = mg\frac{L}{2}$$
$$F = \frac{mg}{2}$$

$F_{app} \leqslant F_L$ the block doesnot slide it will topple.
$$\therefore \frac{mg}{2} \leqslant \mu mg$$
$\therefore$ So the minimum force $F = \frac{mg}{2}$
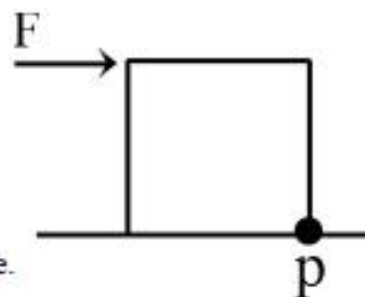
6) Moment of inertia of a body depend upon distribution of mass of the body,position of axis of rotation and temperature of the body.

7) When a force is applied on a body.Newton's second law is applicable to centre of mass because
$$F = Ma_{cm}$$

8)
$$Wa = aX \rightarrow (1)$$
$$Wa = aY \rightarrow (2)$$
add (1) & (2)
When false balance has equal arms then, $W = \frac{X+Y}{2}$

(Dia - 1)   (Dia - 2)

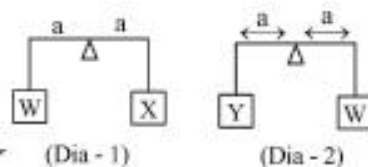9) $\Delta v = v_2 - v_1 = 3\vec{j} - 4\vec{i}$

$= \sqrt{9 + 16} = 5$

$F = m \cdot \frac{\Delta v}{\Delta t}$

$\Rightarrow F = 10 \cdot \frac{5}{2}$

$F = 25\,N$

10) Given,

$m_1 = 3\,kg, m_2 = 2\,kg$

$\vec{r_1} = (2i + 5j)\,m,$

$\vec{r_2} = (4i + 2j)\,m$

Position of centre of mass is $\left(\frac{m_1\vec{r_1} + m_2\vec{r_2}}{m_1 + m_2} \right)$

$= \frac{3(2i + 5j) + 2(4i + 2j)}{5}$

$= \frac{6i + 15j + 8i + 4j}{5} = \frac{14}{5}i + \frac{19}{5}j$

11) $\bar{L} = \bar{r} \times \bar{p}$

Here r, p are constant.

L = constant

12) $\vec{a_r} = \vec{w} \times \vec{v}$ [Invalid]

13) because Net force on the system is zero.

14) $KE = \frac{1}{2}I\omega^2 = \frac{1}{2}\frac{I^2\omega^2}{I} = \frac{L^2}{2(mR^2)}$

15) $\omega = a - bt$

At time $t = 0, \omega = \omega_0 = a$

$\alpha = \frac{d\omega}{dt} = -b$

$\omega^2 = \omega_0^2 + 2\alpha\theta$

If ω is zero

$0 = \omega_0^2 + 2\alpha\theta$

$\theta = -\frac{\omega_0^2}{2\alpha} = \frac{a^2}{2b}$

17) Comparing this with linear motion, power P=FU, we have

$P = \tau \cdot \omega$

$\alpha \left(\omega \cdot \frac{d\omega}{d\theta} \right)\omega = P$

$\Rightarrow \omega^2 d\omega = \frac{P}{\alpha}d\theta$

On integration, we find that

$\Rightarrow \omega \alpha\, \theta^{\frac{1}{3}}$

$\Rightarrow \omega \alpha\, (n)^{\frac{1}{3}}$

18) $m_1\Delta x_1 = -m_2\Delta x_2$

$(2m) \times (6) = -3m\,\Delta x_2$

$-4\,cm = \Delta x_2$

i.e., towards other particle.

19) Weight of rod acts at COM of rod and causes it to rotate about one end.

$\tau_{avg} = I\alpha_{avg}$

$\dfrac{Mgl}{2} = \dfrac{ml^2}{3}\alpha \Rightarrow \alpha = \dfrac{3g}{2l}$

We know , $a = R\alpha$

$\therefore$ Acceleration of free end $'a' = \dfrac{3g}{2l} \times l = \dfrac{3g}{2}$

Free end travels a linear displacement of '2l' to reach lower end.

$v = \sqrt{2ah} = \sqrt{2\left(\dfrac{3g}{2}\right)(2l)}$

$= \sqrt{6gl}$

20) $R = 2\,m$, $M = 100\,kg$,

$V = 20\,cms^{-1} = 20 \times 10^{-2}\,ms^{-1}$

Total kinetic energy of loop

$= K_T + K_R$

$= \frac{1}{2}MV^2 + \frac{1}{2}I\omega^2$ [For a hoop $I = MR^2$]

$= \frac{1}{2}MV^2 + \frac{1}{2}MR^2\omega^2$

$= \frac{1}{2}MV^2 + \frac{1}{2}MV^2$

$= MV^2$

$\therefore$ Work done required to stop the hoop = Total kinetic energy of hoop

$= MV^2 = (100\,kg)(20 \times 10^{-2}\,m/s)$

$= 4\,J$

21)
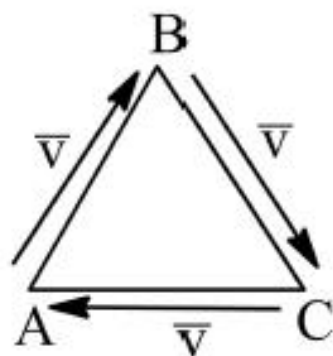
22) (A) Linear momentum of the system remains constant.

(B) Centre of mass of the system remains at rest.

'B' implies A but A does not imply B.

23) $V \propto \dfrac{1}{\beta}$

$Disc\,(\beta) = \dfrac{1}{2},\ sphere\,(\beta) = \dfrac{2}{5}$

$\beta = 0.5, \beta = 0.4$

For sphere β is less than disc , when they are rolled the sphere comes first $\left[\because V \propto \dfrac{1}{\beta}\right]$

24) A circular ring need more amount of work (w) when compared to thin circular disk and a solid sphere.

So, $W_C > W_B > W_A$

25) C.M of a body may be inside (or) out side of the body.

26) For matallic disc moment of inertia is $\frac{MR^2}{2}$ and for solid sphere moment of inertia is $\frac{2MR^2}{S}$ when compared in both the cases 1 decreases from case 1 to 2 for a given body, moment of inertia is minimum about an axis passing through centre of mass.

27) The body has both a_t and a_c.

∴ The net acceleration moves changing angle with the axis of rotation.

28) $$\frac{1}{2}\left(\frac{ml^2}{3}\right)\omega^2 + \left(-mg\frac{l}{2}\right) = 0$$

$$\omega = \sqrt{\frac{3g}{l}}$$

$$v = \omega l = \sqrt{3gl}$$

29) The center of mass of a system is either outside the system or inside the system because it does not depends on coordinate system.

30) i) In irregular bodies centre of mass and centre of body will not coincide-wrong

ii) Centre of mass of a body is the point at which the total gravitational torque on the body is zero-correct

iii) A couple an a body produce both translational and rotational motion in a body -wrong

iv) Mechanical advantage greater than one means friction is less. Therefore small effort can be used to lift a large load-correct

31) For Ring, $I = MR^2 = (\lambda \times 2\pi R)R^2$

$\Rightarrow I = 2\pi\lambda R^3$ (where, λ=linear density)

$\therefore \frac{I_1}{I_2} = \left(\frac{R_1}{R_2}\right)^3 \Rightarrow \frac{1}{8} = \left(\frac{R}{nR}\right)^3 \Rightarrow n = 2$

32) Centre of mass lies at the centre of square i.e midpoint of the diagonals =

$\left(\frac{L+0}{2}, \frac{W+0}{2}\right)$

$= \left(\frac{L}{2}, \frac{W}{2}\right)$

33) The position of point P on rod through which the axis should pass so that the work required to set the rod rotating with minimum angular velocity ω_0 is their centre of mass

so $m_1 x = m_2(L - x) \Rightarrow x = \frac{m_2 L}{m_1 + m_2}$

34) Angular momentum of the sphere is remains constant (According to L.C. L.M)

35) 1) $p_{cm} = p_1 + p_2 + - - - - - + p_n$

$p_{cm} = \Sigma p_i$

2) COM of system remains stationary because no external force is acting

3) $\Sigma m_i x_i = 0$
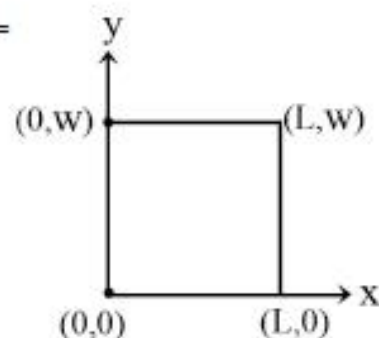
36) $r = 2m, \omega = 4\,rad/s, m = 8\,kg$

$$KE = \frac{1}{2}I\omega^2$$

$$I = \frac{1}{2}mr^2$$

$$I = \frac{1}{\cancel{2}} \times 8 \times \cancel{4}^{2} = 16\,kg.m^2$$

$$K.E = \frac{1}{\cancel{2}} \times \cancel{16}^{8} \times 16$$

$$K.E = 128\,J$$

37) $L = I\omega$

$$\therefore \frac{L_2}{L_1} = \frac{I_2}{I_1} \quad [If\ \omega = const.]$$

$$or\ \ \frac{L_2}{L_1} = \frac{m\left(\frac{r}{2}\right)^2}{mr^2} = \frac{1}{4}$$

$$\Rightarrow L_2 = \frac{L}{4}$$

38) Let v_0 be the velocity when leaving A.

$$mv = (m + m)v_0$$

$$v_0 = \frac{v}{2}$$

Energy at A = energy at B

$$v^2 - u^2 = 2gh$$

When the surface becomes vertical both ring and wedge have same velocity.

$$\frac{v^2}{2} - \frac{v^2}{4} = gh$$

$$h = \frac{v^2}{4g}$$

39)
$$\frac{KE_{Rot.}}{KE_{Total}} = \frac{\frac{1}{2}mv^2\frac{K^2}{R^2}}{\frac{1}{2}mv^2\left(1 + \frac{K^2}{R^2}\right)} = \frac{K^2/R^2}{1 + \frac{K^2}{R^2}}$$

$$= \frac{2/5}{1 + 2/5} = \frac{2}{7}$$

40) $I = \sum m\,r^2$, m = mass of the body

r = distance of the mass from axis of rotation. So I depends on mass distribution of mass (which is turn changes with temperature)

But angular velocity does not affect the moment of inertia of the body.

41) Net torque due to internal forces is zero and gravitational force is central force hence angular momentum is conserved

42) $T = 0.5Nm$

$F = 50N$

$T = F.d$

$$d = \frac{T}{F} = \frac{0.5}{50}$$

$$= \frac{1}{100}m$$

$$= 1cm$$

43)
$$K.E. = \frac{1}{2}I\omega^2 \Rightarrow K.E. \propto \omega^2$$

% increase $K.E. = \dfrac{(KE)_f - (KE)_i}{(KE)_i} \times 100$

$$= \frac{(5\omega)^2 - (4\omega)^2}{(4\omega)^2} \times 100$$

$$= \frac{9}{16} \times 100 = 56\%$$

44) For a system to be in equilibrium , the torques acting on it must balance. This is true only if the torques are atken about any point on the system or outside it.

45) Case (i) :

$$8g \times l_2 = w \times l_1$$

$$\frac{l_2}{l_1} = \frac{18}{8} \quad \frac{w}{8}$$

$$\frac{l_2}{l_1} = \frac{w}{8}$$

Case (ii) :

$$18\,l_1 = w\,l_2$$

$$\frac{l_1}{l_2} = \frac{w}{18} \quad \frac{w}{8}$$

$$w = \sqrt{18 \times 8}$$

$$w = \sqrt{144}$$

$$w = 12\,g$$

Q46

In cell fluid the most abundant Alkali metal cation is

1) Na^+ 2) K^+ 3) Cs^+ 4) Mg^{2+}

Q47

Which of the following does not give metal oxide on heating

1) $MgCO_3$ 2) Li_2CO_3 3) K_2CO_3 4) $ZnCO_3$

Q48

Separation of H_2O and D_2O by fractional distillation is possible because D_2O has

1) higher density than that of H_2O 2) higher B.P. than that of H_2O 3) D_2O has higher freezing point   4) lower dielectric constant than that of H_2O

Q49

The pair of compounds which cannot exist together in solution is:

1) $NaHCO_3$ and NaOH   2) Na_2CO_3 and $NaHCO_3$ 3) Na_2CO_3 and NaOH   4) $NaHCO_3$ and NaCl

Q50

Which of the following fumes in moist air?

1) $BeCl_2$ 2) $CaCl_2$ 3) $SrCl_2$ 4) $BaCl_2$

Q51

Which of the following elements do not form hydrides?

(I) Noble gases

(II) Elements of groups 7th, 8th and 9th

(III) Mo and W

1) (I) only   2) (I) and (II)   3) (I) and (III)   4) All (I), (II) and (III)

Q52

Which pair of substances gives the same gaseous product on reaction with water?

1) Ca and CaH_2 2) Na and Na_2O_2 3) K and KO_2 4) Ba and BaO_2

Q53

Heavy water is a compound of:

1) Hydrogen and heavier isotope of oxygen   2) Heavier isotope of hydrogen and heavier isotope of oxygen   3) Oxygen and heavier isotope of hydrogen   4) None of the above

Q54

Identify the correct statement

1) Gypsum contains a lower percentage of calcium than plaster of Paris   2) Gypsum is obtained by heating plaster of Paris   3) Plaster of Paris can be obtained by hydration of gypsum   4) Plaster of Paris is obtained by partial oxidation of gypsum

Q55

The metal which plays role in cell membrane integrity and blood coagulation is

1) Mg   2) Ca   3) Sr   4) Be

Q56

Which of the following statement is false?

1) Mg^{2+} ions are important in the green parts of plants.

2) Mg^{2+} ions form a complex with ATP.

3) Ca^{2+} ions are important in blood clotting.

4) Ca^{2+} ions are not important in maintaining the regular beating of the heart.

Q57

Which of the following substance is used as dehydrating agent in laboratory?

1) Calcium chloride   2) Sodium chloride   3) Sodium carbonate   4) Potassium nitrate

Q58

Which is quick lime?

1) $Ca(OH)_2$ 2) CaO   3) $CaCO_3$ 4) $Ca(OH)_2 + H_2O$

Q59

In the hardening stage of plaster of paris, the compound formed is

1) $CaSO_4$ 2) Orthorhombic $CaSO_4.2H_2O$ 3) $CaSO_4 H_2O$ 4) Monoclinic $CaSO_4.2H_2O$

Q60

Which one of the following is the correct statement?

1) $B_2H_6. 2NH_3$ is known as 'inorganic benzene'

2) Beryllium exhibits coordination number of six

3) Boric acid is a protonic acid

4) Chlorides of both beryllium and aluminium have bridged chloride structures in solid phase

Q61

The correct match is

LIST-I	LIST-II
A)Na	1)Brick red
B)Li	2)Golden yellow
C)Ba	3)Apple green
D)Ca	4)Crimson red

The correct match is

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

Q62

The final product of setting of plaster of Paris is

1) Gypsum   2) Anhydrite   3) Cement   4) Mortar

Q63

Which pair of elements has same chemical properties

1) 13, 22   2) 3, 11   3) 4, 24   4) 2, 4

Q64

Which of the following pairs can be distinguished by action of heat?

1) Na_2CO_3 and $CaCO_3$

2) $MgCl_2.6H_2O$ and $CaCl_2.6H_2O$

3) $Ca(NO_3)_2$ and $NaNO_3$

1) 1 and 2   2) 1,2 and 3   3) 1 and 3   4) 1 only

Q65

$CuSO_4.5H_2O$ is represented as:

1) $[Cu(H_2O)_4]SO_4$ 2) $[Cu(H_2O)_3SO_4].2H_2O$ 3) $[Cu(H_2O)_4]SO_4.H_2O$ 4) $[Cu(H_2O)_5]SO_4$

Q66

Which of the property of alkali metals is not listed correctly ?

1) the least electronegative metal : Cs

2) A natural radioactive metal : Fr

3) The alkali metal with lowest density : K

4) The most abundant alkali metal in earth's crust : Na

Q67

Which one of the following has a polarizing power close to that of Mg

1) Li   2) Na   3) K   4) Rb

Q68

Glauber's salt is

1) $Na_2SO_4 . 10H_2O$ 2) $Na_2S_2O_3 . 5H_2O$ 3) $CuSO_4 . 5H_2O$ 4) $Na_2B_4O_7 . 10H_2O$

Q69

Hydrogen finds a place in VII A group of periodic table because

1) it is a light element

2) H - atom has only one electron in its valence shell

3) it forms hydride of the type NaH

4) it has 7 isotopes

Q70

The polarizing power of which of the following pair is similar

1) Li, Mg   2) Li^+, Mg^{+2} 3) Li^{+2}, Mg^{+2} 4) Li^+, Mg^+

Q71

Mg burns in CO to produce

1) MgO_2 2) $MgCO_3$ 3) $Mg_2C + O_2$ 4) $MgO + C$

Q72

$A + Na_2CO_3 \rightarrow B + C$

$A \xrightarrow{CO_2} \underset{milkyness}{C}$
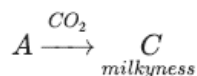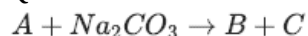
The compounds A, B, and C are respectively

1) $Ca(OH)_2$, $NaOH$, $CaCO_3$

2) $NaOH$, $Ca(OH)_2$, $CaCO_3$

3) $Ca(OH)_2$, $CaCO_3$ and $NaOH$

4) CaO, $NaOH$

Q73

Which of the following gives covalent compounds?

1) Be   2) Ca   3) Ba   4) Sr

Q74

Oxide with relatively more percentage in Portland cement

1) SiO_2 2) MgO   3) Al_2O_3 4) CaO

Q75

Heavy water (D_2O) is

1) a product of oxygen and hydrogen.

2) water of mineral springs.

3) water obtained by repeated distillation and condensation.

4) ordinary water containing dissolved salts and heavy metals.

Q76

Which of the following is an alum?

1) $FeSO_4.(NH_4)_2SO_4.6H_2O$

2) $NaAlO_2$

3) $Na_2SO_4.Al(SO_4)_3.24H_2O$

4) $KCl.MgCl_2.6H_2O$

Q77

On heating which of the following releases CO_2 most easily ?

1) $MgCO_3$ 2) $CaCO_3$ 3) K_2CO_3 4) Na_2CO_3

Q78

Which of the following alkaline earth metal nitrate does not have water of crystallisation?

1) $Ca(NO_3)_2$ 2) $Mg(NO_3)_2$ 3) $Sr(NO_3)_2$ 4) $Ba(NO_3)_2$

Q79

Aluminium reacts with caustic soda to form

1) Aluminium hydroxide

2) Aluminium oxide

3) Sodium meta-aluminate

4) Sodium tetra aluminate

Q80

Sodium carbonate solution on adding to magnesium sulphate solution forms

1) Soluble magnesium bicarbonate

2) insoluble magnesium bicarbonate

3) insoluble magnesium carbonate

4) insoluble basic magnesium bicarbonate

Q81

Which of the following is the most suitable test to identify water?

1) Smell the liquid

2) Anhydrous copper sulphate turns into blue with few drops of water

3) It changes colour of litmus paper

4) $K_2Cr_2O_7$ gives blue colour with few drops of water

Q82

Among CaH_2, NH_3, NaH and B_2H_6 which are covalent hydrides

1) NH_3 and B_2H_6 2) CaH_2 and B_2H_6 3) NaH and CaH_2 4) NaH and NH_3

Q83

The alkaline earth metal that does not lose its metallic lustre when exposed to air is

1) Ba   2) Mg   3) Be   4) Ca

Q84

The ion helpful for controlling heart beating and muscle contraction is

1) Mg^{2+} 2) Ca^{2+} 3) Fe^{2+} 4) Fe^{3+}

Q85

The compound that produces two gaseous products on decomposition

1) $NaNO_3$ 2) $LiNO_3$ 3) $CaCO_3$ 4) Na_2CO_3

Q86

Pure anhydrous magnesium chloride can be prepared from hydrated salt by

1) heating the hydrate to red heat in the atmosphere of HCl gas   2) melting the hydrate   3) heating the hydrate with coke   4) heating the hydrate with Mg ribbon

Q87

Which of the following forms a nitride very easily

1) K   2) Li   3) Na   4) Cs

Q88

Pick out the false statement

1) the electropostive character of alkali metals decreases with increase in atomic number   2) lithium is a hard metal and cannot be cut with a knife   3) Alkali metals are strong reducing agents   4) the electronegativities of alkali metals remain the same

Q89

The hydride having highest electrical conductance is

1) LiH   2) BeH_2 3) CaH_2 4) TiH_2

Q90

Aqueous sodium hydroxide reacts with white phosphorous to form phosphine and

1) NaH_2PO_2 2) P_2O_5 3) Na_3PO_3 4) P_2O_3

46) 2	47) 3	48) 2	49) 1	50) 1	51) 4	52) 1	53) 3	54) 1
55) 2	56) 4	57) 1	58) 2	59) 4	60) 4	61) 4	62) 1	63) 2
64) 2	65) 3	66) 3	67) 1	68) 1	69) 3	70) 2	71) 4	72) 1
73) 1	74) 4	75) 3	76) 3	77) 1	78) 4	79) 3	80) 3	81) 2
82) 1	83) 3	84) 2	85) 2	86) 1	87) 2	88) 1	89) 4	90) 1

46) Potassium is the most abundant alkali in cell fluid where they activate some enzymes and also have a role in the oxidation of glucose to ATP. K^+ ions also have a role in protein synthesis.

47) Except Li_2CO_3 other carbonates of alkali metals are stable and they are not decomposed on heating.

48) D_2O has a higher moleculer weight and has a higher boiling point.

49) $NaHCO_3$ (acidic salt) & $NaOH$ is (strong base) cannot exist together.

50) In moist Air $BeCl_2$ gets hydrolysed to give HCl, which appears in the form of fumes.

$BeCl_2 + 2H_2O \rightarrow Be(OH)_2 + HCl$, HCl released in the reaction appears in the form of fumes.

51) I) Noble gases do not form any hydride

due to non reactive nature

II) Elements of groups 7, 8 and 9 do not form any hydride - hydride gap

III) Mo and W do not form any hydride

52) $Ca + 2H_2O \rightarrow Ca(OH)_2 + H_2$

$CaH_2 + 2H_2O \rightarrow Ca(OH)_2 + 2H_2$

53) Heavy water is a compound of $D_2 + \frac{1}{2}O_2 \rightarrow D_2O$

Oxygen and heavier isotope of hydrogen (D_2)

54) $CaSO_4.2H_2O \xrightarrow{\Delta}$

$CaSO_4.1/2H_2O + \frac{3}{2}H_2O$

55) Ca plays role in cell membrane integrity and blood coagulation

56) Calcium ion affects a property called membrane potential, which has the effect of heart contraction.

57) $CaCl_2$ because it is hygroscopic

58) CaO – (quick lime)

$Ca(OH)_2$ – (slaked lime)

$Ca(OH)_2 + H_2O$ – an aqueous suspension of $Ca(OH)_2$ in water is called lime water.

$CaCO_3$ (lime stone).

59)

$$CaSO_4 . \tfrac{1}{2}H_2O + \tfrac{3}{2}H_2O \xrightarrow{\text{setting stage}} \underset{\substack{\text{Orthorhombic} \\ \text{di hydrate}}}{CaSO_4 . 2H_2O}$$

$$\underset{\substack{\text{Orthorhombic} \\ \text{di hydrate}}}{CaSO_4 . 2H_2O} \xrightarrow{\text{Hardening stage}} \underset{\substack{\text{monoclinic} \\ \text{di hydrate}}}{CaSO_4 . 2H_2O}$$
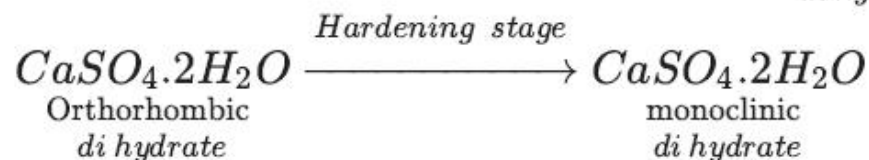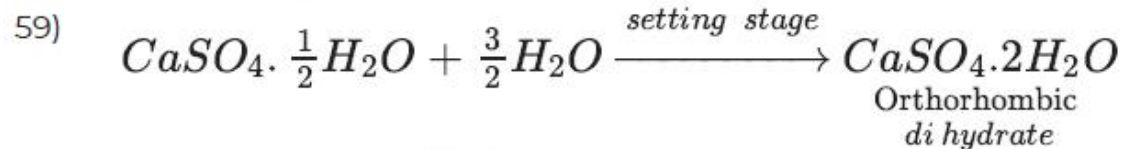
60) 1. Inorganic benzene is $'B_3N_3H_6'$ but not $'B_2H_6 . 2NH_3'$

2. Beryllium exhibits maximum co-ordination number of four

3. Boric acid is not a protonic acid beacuse when dissolved in water it donot take H^+

$$B(OH)_3 + H_2O \rightarrow \left[B(OH)_4\right]^- + H^+$$
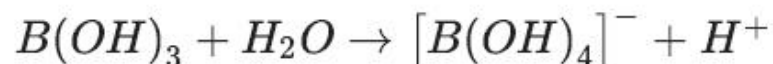
4. $BeCl_2$ and $AlCl_3$ in solid phase exist as dimer(polymer) similarly

$AlCl_3$ also contain bridged chlorides

5. Both Be and Al attain octet by bridge formation

61) When the element kept in flame, due to excitation and de-excitation of valency electrons they show flame colouration.

62)

$$CaSO_4 . \frac{1}{2}H_2O + \frac{3}{2}H_2O \rightarrow \underset{Gypsum}{CaSO_4 . 2H_2O}$$

(*Plaster of Paris*)
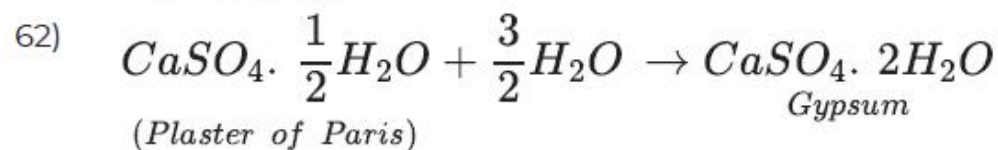
When the dry plaster powder is mixed with water it reforms gypsum, after setting.

63) Because they belong to same group.

64) 1)Among Na_2CO_3 and $CaCO_3$, only $CaCO_3$ decomposed on heating.

2)Among $MgCl_2.6H_2O$ and $CaCl_2.6H_2O$, only $CaCl_2.6H_2O$

dehydrated whereas $MgCl_2.6H_2O$ gives HCl due to hydrolysis during heating.

3) $Ca(NO_3)_2 \xrightarrow{\Delta} CaO + 2NO_2 + \frac{1}{2}O_2$

$NaNO_3 \xrightarrow{\Delta} NaNO_2 + \frac{1}{2}O_2$
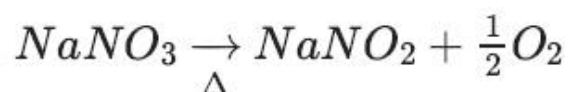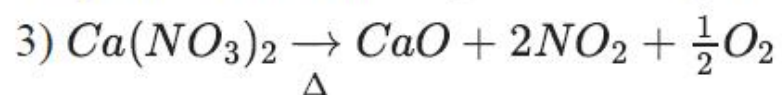
65) $CuSO_4.5H_2O$ is represent as only one H_2O molecule which is outside the coordination sphere the other 4 molecules of H_2O coordinated with copper cation [Inside the coordination sphere]

$CuSO_4.5H_2O \equiv \left[Cu(H_2O)_4\right] SO_4 H_2O$

66) Lithium has least density potassium is more denser than lithium.

67) Due to same ionic size and same elctro negativity Mg and Li have same polarising power.

68) Glauber's salt is $Na_2SO_4.10H_2O$ [Salt cake]

69) Na^+H^- is a formula.It has one value electron and three isotopes of only.

70) Polarizing power $= \dfrac{\text{charge}}{\text{size}}$. Al^{3+} has a higher positive charge than Li^+. But Al^{3+} is smaller than Li^+. The effects of charge and size are that both have the same value of the ratio.

71) Magnesium burns in CO to produce

$Mg + CO \rightarrow MgO + C$

72)

$$Ca(OH)_2 + Na_2CO_3 \rightarrow 2NaOH + CaCO_3$$

    A   B   C

$$Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$$

    A   C
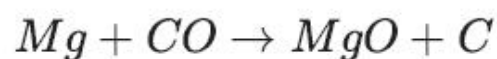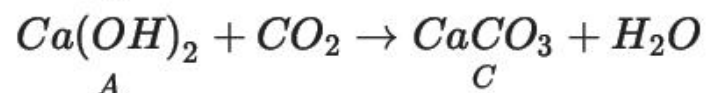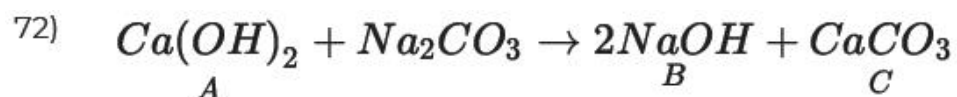
73) Be gives covalent compounds remainings elements of IIA group gives ionic compounds due to high polarising power and small size

74) CaO is present for about 50-60%

75) The boiling point of D_2O is slightly higher than H_2O. D_2O and H_2O can be separated from each other by repeated fractional distillation.

76) The term alum is used for all the double sulphates having the composition, $M_2SO_4.M_2(SO_4)_3.24H_2O$, where M stands for monovalent basic radicals such Na^+, K^+ etc. and M for trivalent basic radicals such as Al^{3+}, Cr^{3+} etc.

77) Thermal stability order

$$K_2CO_3 > Na_2CO_3 > CaCO_3 > MgCO_3$$
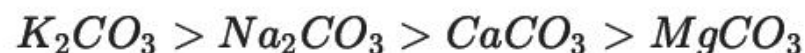
Therefore $MgCO_3$ releases CO_2 most easily

$$MgCO_3 \xrightarrow{\Delta} MgO + CO_2$$
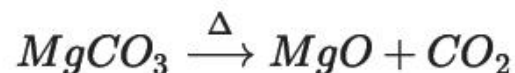
78) Because of low polarization power of Ba^{2+} ion

79) Aluminium reacts with caustic soda to form sodium meta aluminate.

$$2Al + 2NaOH + 2H_2O \rightarrow \underset{\text{Sodium meta aluminate}}{2NaAlO_2} + 3H_2 \uparrow$$
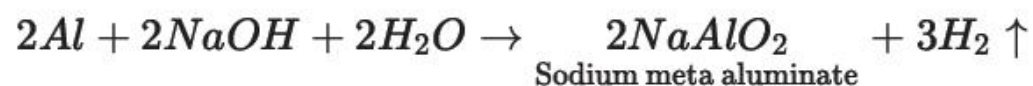
80) K_{sp} of $MgCO_3$ is very low hence it is insoluble.

81)

$$CuSO_4 + 5H_2O \rightarrow \underset{\text{Blue}}{[Cu(H_2O)_4]SO_4.H_2O}$$
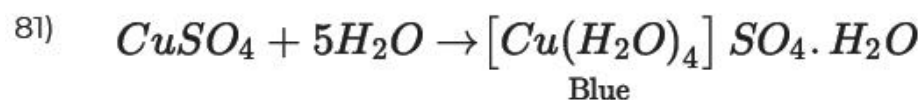
82) Be, Mg & P-block elements form covalent hydrides

Therefore $NH_3 \& B_2H_6$: Covalent hydrides

83) Ba, Mg and Ca are all fairly reactive and form oxides on their surface due to reaction with atmospheric oxygen and surface rapidly loses its shine. But beryllium is rather unreactive and does not react with air.

84) Ca^{+2} ion helpful for controlling heart beating and muscle contraction

85) $$4LiNO_3 \longrightarrow 2Li_2O + \underbrace{4NO_2 + O_2}_{\text{gaseous product}}$$

86) In presence of HCl gas, hydrated $MgCl_2$ does not undergo hydrolysis.

87) In Alkali metals Li only forms Nitride on heating in presence of air $6Li + N_2 \rightarrow 2Li_3N$

88) As atomic number increases the size of alkali metal also increases. The valency e^- are loosely as atomic size increases and hence electropositive nature increases.

89) Although TiH_2 is the general formula, the correct compound is TiH_{2-x}. It is an interstitial hydride and has vacant sites and electron which can cause conduction.

90) $P_4 + 3NaOH + 3H_2O \rightarrow PH_3 + 3NaH_2PO_2$

Q91

Who discovered nucleus?

1. Robert Brown

2. Schleiden and Schwann

3. Rudolf Virchow

4. Leeuwenhoek

Q92

Who proposed cell theory?

1. Anton Von Leeuwenhoek

2. Robert Brown

3. Schleiden and Schwann

4. Rudolf Virchow

Q93

Name the smallest living organism

1. Bacteria

2. Mycoplasma

3. Algae

4. Human red blood cells

Q94

Name the largest living cell

1. Egg of an Ostrich   2. Human red blood cells   3. Bacteria   4. Mycoplasma

Q95

Why is a capsule advantageous to a bacterium?

1. It allows the bacterium to attach to the surface

2. It protects the bacterium from desiccation

3. It provides means of locomotion

4. It allows bacterium "hide" from host's immune system

Q96

The most likely method used to determine the ultra structure of a cell organelle is

1. Autoradiography

2. Microdisection

3. Electron microscopy

4. Phase contrast microscopy

Q97

Different cells have different sizes. Arrange the following cells in an ascending order

i. Mycoplasma   ii. Ostrich egg   iii. Human RBC   iv. Bacteria

1. i, iv, iii, ii   2. i, ii, iii, iv   3. ii, i, iii, iv   4.iii, iv, i. ii

Q98

What is true about genetic material of a Prokaryotic cell?

1. Lacks histones

2. Not enveloped by nuclear membrane

3. Composed of a single circular DNA molecules   4.All of these

Q99

In bacteria, a cellular component that resembles eukaryotic cell is

1. Ribosomes   2. Cell wall   3. Plasma membrane   4.Nucleus

Q100

--------- are an exception to cell theory

1. Bacteria   2.Viruses   3. Fungi   4. Lichens

Q101

Prokaryotic cells are characterized by

1. Presence of distinct nuclear membrane

2. Presence of distinct chromosome

3. Absence of nuclear membrane

4. Absence of chromatin material

Q102

Which of the following dyes is best suited for staining chromosomes?

1. Basic Fuchsin   2. Safranin   3. Methylene blue   4. Acetocarmine

Q103

Mesosomes are

1. Extensions of plasma membrane in the cell

2. Extensions of plasma membrane in the prokaryotic cell

3. Infolding of inner membrane in mitochondria

4. Extensions of plasma membrane in cyanobacteria

Q104

Match the following

A. Leeuwenhoek   (i) First saw and described a living cell

B. Robert Brown   (ii) Presence of cell wall is unique to plant cells

C. Schleiden   (iii) discovered the nucleus

D. Schwann   (iv) All plants are composed of different kind of cells

1.A-(i), B- (iii), C- (iv), D- (ii)   2.A-(i), B- (iii), C- (ii), D- (iv)

3.A-(iii), B- (i), C- (iv), D- (ii)   4.A-(i), B- (iv), C- (ii), D- (iii)

Q10 5

Hook, filament and basal body are parts of

1. Mitochondria   2.Cilia   3.Flagella   4.Golgi Complex

Q106

Bacterial cell wall is made up of

1. Cellulose   2. Hemicellulose   3.Peptidoglycan   4. Glycogen

Q107

Which of the following is not true for a eukaryotic cell?

1. It has 80 S type of ribosome present in the mitochondria

2. It has 80 S type of ribosome present in the cytoplasm

3. Mitochondria contains circular DNA

4. Membrane bound organelles are present

Q108

Mesosomes are the infoldings of cell membrane, which

i) Are present in both prokaryotic and eukaryotic cells

ii) Help in cell wall formation, DNA replication

iii) Increase the surface area of plasma membrane

The correct statements are

1. (i) and (ii)   2. (ii) and (iii)   3.(i) and (iii)   4. (i), (ii), (iii)

Q109

Sub unit in prokaryotic ribosome is
1. 60 S - 40 S   2. 40 S – 30 S   3. 50 S – 30 S   4. 50 S – 20 S

Q110

Several ribosomes attach to a single mRNA and form a chain called
1. Polysome   2. Sphaerosome
3. Metachromatic granules   4. Gycogen granules

Q111

Glycocalyx (mucilage sheath) of a bacterial cell may occur in the form of a loose sheath called ------- -
----- or it may be thick and tough called -----------
1. Capsule, slime layer   2. Slime layer, capsule
3. Mesosome, slime layer   4. Mesosome, capsule

Q112

Correct sequence of layers of bacterial cell envelop is
1. Cell wall → Glycocalyx → All membrane
2. Cell membrane → Glycocalyx → Cell wall
3. Glycocalyx → Cell wall → Cell membrane
4. Glycocalyx → Cell membrane → Cell wall

Q113

Which of the following statements are not true for the plasma membrane?
a) It is not present in both plant and animal cells
b) Lipid is present as a bilayer in it
c) Proteins are present integrated as well as loosely associated with the lipid bilayer
d) Carbohydrates are not present in it
1. Only 'a'   2. 'a' and 'b'   3.Only 'c'   4. 'd'

Q114

Phospholipids are important cell membrane constituents because they
1. Contain glycerol   2. Combine covalently with protein
3. Contain both polar and non polar proteins   4. Can form bilayer in water

Q115

Fluid mosaic model was proposed by
1. Singer and Nicolson   2. Watson and Crick
3. Davidson and Paneilli   4.Robertson

Q116

A plasmid

1. Can not replicate   2.Shows independent assortment

3. Can replicate independently   4. Lies together with chromosomes

Q117

Which one of these is not a eukaryote?

1. *Euglena*   2. *Anabaena*   3.*Spirogyra*   4.*Agaricus*

Q118

Cell wall exhibits

1. Semi permeability   2. Differential permeability

3. Complete permeability   4. Impermeability

Q119

Which organelle helps in the synthesis of lipid, cholesterol, steroids and visual pigments in epithelial cells of retina?

1. Golgi bodies   2.RER   3. SER   4.Mitochondria

Q120

Which of the following is not a function of the cell wall?

1. Provides shape to the cell   2. Provides barrier to undesirable macromolecules

3. Helps in cell- cell interactions   4.Has high concentration of proteins and minerals

Q121

Choose the incorrect statement regarding cell membrane

1. Generally smaller molecules pass easily and readily than large molecules

2. Water soluble substance pass through it less readily than lipid soluble substances

3. Membranes are selectively permeable

4. None of these

Q122

Endoplasmic reticulum is in continuation with

1. Golgi complex   2. Nucleus   3. Nuclear wall   4. Cell wall

Q123

One of the chief functions of smooth endoplasmic reticulum is

1. Protein synthesis   2. Enzyme production

3. Lipid synthesis   4. None of these

Q124

An interconnected membranous network of the cell composed of vesicles, flattened sac and tubules is

1.Mitochondria   2. Endoplasmic reticulum   3.Golgi complex   4.Nucleus

Q125

Cell wall materials are synthesized by

1. Dictyosomes   2. Ribosomes   3. Lysosomes   4.Centrosomes

Q126

As they release hydrolases that digest old and damaged cells, the term suicide bags in aptly used by cell biologists for --------

1.Golgi complex.   2. Lysosomes   3. Lomasomes   4. Glyoxysomes.

Q127

Which of these is not a function of Golgi apparatus?

1. Site of synthesis of glycoproteins and glycolipids   2. Secretion

3. Membrane transformation   4. Site of protein synthesis

Q128

. Match column I with column II and select the correct option from the codes given below

Column I	Column II
A. Nucleolus	(i) Lipid storage
B. Sphaerosomes	(ii) Glycolate metabolism
C. Peroxisomes	(iii) Transport of macromolecules
D. Plasmodesmata	(iv) RNA synthesis

1. A- (iv), B- (i), C- (iii), D- (ii)   2.A- (i), B- (ii), C- (iv), D- (iii)

3.A- (iv), B- (i), C- (ii), D- (iii)   4.A- (i), B- (ii), C- (iii), D- (iv)

Q129

Lysosomes are the membrane bound vesicular structure by the ------------

1. Splitting of vacuole

2. Accumulation of enzymes in vacuoles

3. Packaging in Golgi apparatus

4. Internal lysis of cell ognanelles

Q130

The space limited by the inner membrane of the chloroplast is called

1. Inter membrane space   2. Matrix   3. Stroma   4. Lumen

Q131

Match the following

Column I	Column II
A. Lysosomes	(i) Protein synthesis
B. Ribosomes	(ii) Hydrolytic activity
C. Smooth E R	(iii) Steroid synthesis
D. Centriole	(iv) formation of spindle

1. A- (ii), B- (i), C- (iii), D- (iv)   2. A- (i), B- (iii), C- (iv), D- (ii)

3. A- (i), B- (iv), C- (iii), D- (ii)   4. A- (iv), B- (iii), C- (i), D- (ii)

Q132

Match the following

A. Karyolymph	1. Nucleolus
B. Ribonucleoprotein	2. Nucleus
C. Spindle fibres	3. DNA
D. Genes	4. Centriole

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

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

Q133

Match the following

a. Thylokoids	p. Disc shaped sacs in Golgi apparatus
b. Cristae	q. Condensed structure of DNA
c. Cisternae	r. Flat membranous sacs in stroma
d. Chromatin	s. Infoldings in mitochondria

1.a-r, b-s, c-q, d-p   2. a-s, b-r, c-p, d-q   3. a-r, b-s, c-p, d-q   4. a- r, b-p. c-s, d-q.

Q134

The vacuole is bound by a single membrane is called

1. Plasma membrane   2. Tonoplast   3. Cristae   4. Membrane sheath

Q135

In chloroplasts, chlorophyll is present in the

1. Outer membrane   2. Inner membrane   3.Thylakoids   4. Stroma

Q136

Which one of the following has its own DNA?

1. Peroxisome   2. Mitochondria   3. Dictyosome   4. Lysosome

Q137

Mitochondria are semi – autonomous as they possess

1. DNA   2. DNA + RNA   3. DNA + RNA+ ribosomes   4. Protiens

Q138

Which of the cell organelle lacks membrane

1. Mesosome   2. ER   3. Ribosome   4. Liposome

Q139

Pigment containing membranous extensions in some cyanobacteria are

1. Basal bodies   2. Pneumatophores   3. Chromatophores   4. Heterocysts

Q140

An elaborate network of filamentous protein tubular structures forming skeleton of a cell in cytoplasm are

1. Thylakoid   2. E. R   3. Plasmalemma   4. Microtubules

Q141

Axoneme having 9+2 doublet microtubule arrangement is found in

1. Cilia   2.Flagella   3. Cilia & Flagella   4. Centriole

Q142

.   Match the List I and List II and select the correct answer using the code given below the list:

List I	List II
a. Lysosome	1. Bacteria without cell walls
b. Mycoplasma	2. A virus that infects bacterial cells
c. Thylakoid	3. Flattened sacs in a chloroplast
d. Bacteriophage	4. A vesicle in which hydrolytic enzymes are stored

Code:

	a	b	c	d
1.	3	1	2	4
2.	4	1	3	2
3.	2	3	4	1
4.	1	4	2	3

Q143

Identify the correct match between types of chromosomes and their descriptions.

	Chromosomes		Position of centromere
A.	Metacentric	1	At the tip
B.	Submetacentric	2	Almost near the tip
C.	Acrocentric	3	At the middle
D.	Telocentric	4	Slightly away from the middle

Description

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

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

Q144

The mitochondrial matrix possess

1. Single circular DNA molecule   2. Components required for protein synthesis

3. Ribosomes of 70 S type   4. All of these

Q145

Bright colour of petals is due to the presence of

1. Chloroplast   2. Anthocyanin   3. Chromoplast   4. Leucoplast

Q146

Condensation of chromosome become completed during ....

1. Prophase   2. Metaphase   3. Anaphase   4. Telophase

Q147
Distribution of cell organelle like mitochondria and chloroplast in daughter cell during mitosis occur in
......
1. Telophase   2. Prophase   3. Cytokinesis   4. G_1 phase

Q148
Chromosomal structure which are attached to each other through centromere during meiosis I is known as ...
1. Homologous chromosome   2. Sister chromatid   3. Daughter chromosome   4. 2 & 3

Q149
A cell having 2n =4 chromosome. Chromosome number and DNA content of this cell in different stage of cell cycle and cell division is given below. Which of the cell stage is correctly marched with the number of chromosome and DNA molecules?

	Cell stage	No. of chromosome	No. of DNA
1	Metaphase I	4	4
2	Telophase I	4	2
3	G1 phase	4	4
4	Metaphase II	4	8

Q150

Read the following statements
A. In animals mitotic cell division is generally seen in the diploid somatic cell.
B. In plant mitotic division is seen in haploid and diploid cell both
C. Meiotic division always occurs in diploid cell
D. Meiotic division can occur in haploid cell as well as in diploid cell
1. All four are correct   2. A, B, C are correct   3. A, C, D are correct 4. A, B, D are correct

Q151

Which of the following statement is true?
1. Chromosome are well visualized during interphase
2. Duration of cell cycle vary from organism to organism but not cell to cell
3. M phase represent cell division phase of mitosis
4. Inter phase is arresting phase between two s phase

Q152
Reciprocal exchange of genetic material between non sister chromatid of homologous chromosome is known as .... and it occur during ....
1. Crossing over and pachytene   2. Chaismata and pachytene
3. Crossing over and diplotene   4. Synapsis and zygotene

Q153

Some times cytokinesis does not take place after karyoinesis this leads to formation of
1. Multinucleate cell   2. Polyploidy   3. Endoreduplication 4.1 & 3 both

Q154

Constant replacement of blood cells and gut lining is carried out by ......
1. Mitosis   2. Amitosis   3. Meiosis   4. 1 & 2 both

Q155

Different type of cell in organism are given in column I and type of division are given in column II.
Match the column I with column II and select the correct option given below.

	Column – I (Cell type)		Column – II (division)
A	Bacterial cell	P	Mitosis
B	Megaspore mother cell in angiosperm	Q	Binary fission
C	Microspore in angiosperm	R	Meiosis
D	Zygote in Ulothrix		

1. A – Q, B – R, C – P, D – R   2. A – Q, B – R, C – r, D – P
3. A – Q, B – P, C – R, D – R   4. A – Q, B – R, C – R, D – R

Q156
Read the following statements
A. In animals and plant cell mitosis occur only in diploid cell
B. Meiotic division cannot occur in haploid cell
C. Two sequential cycle of nuclear and cell division occur in meiosis
D. Four daughter cells formed in meiosis are generally different to each other.
1. A, C & D are wrong   2. B, C & D are true   3. A is true   4. A, B, C & D are true

Q157
Which of the following holds true about meiosis?
I. It ensures the production of haploid phase in the life cycle of sexually reproducing organism where fertilization restores the diploid phase.
II. It involves the two sequential cycle of nuclear and cell division called meiosis I and II but only a single cycle of DNA replication.
III. It involves the pairing of homologous chromosomes and recombination between them.
IV. Four haploid cells are formed at the end of meiosis.
1. I, II, IV only   2. IV only   3. I and III only   4. All of these

Q158
Synaptonemal complex forms in
1. Zygotene   2. Pachytene   3. Diplotene   4. Diakinesis

Q159

Which of the following statement is incorrect?

1. Prophase II is simpler than prophase I
2. Prophase I is longer and complex than prophase of mitosis
3. Nuclear membrane reappears in telophase I
4. Anaphase II is not characterized by the splitting of centromere

Q160

Identify A, B and C in the below diagram.

1. A – Interphase, B – Telophase, C – Anaphase
2. A – Anaphase, B – Telophase, C – Interphase
3. A – Telophase, B – Interphase, C – Anaphase
4. A- Interphase, B – Anaphase, C – Telophase
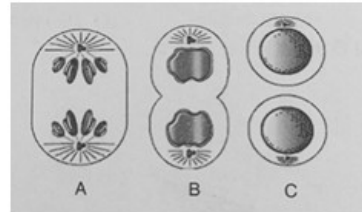
Q161

The cells which do not divide enter ……… phase

1. S – phase   2. Directly G2 – phase   3. G_0 – phase   4. Any one of these

Q162

G_0 phase is characterized by

1. DNA duplication   2. Active metabolism   3. S – phase   4. M – phase

Select the incorrect statement from the following

Q163

Select the incorrect statement from the following

1. In animals, mitotic cell division is only seen in the diploid somatic cells
2. Plants can show mitotic division in both haploid and diploid cells
3. In an adult's heart, the cells does not divide
4. All organisms start their life cycle from multiple cell

Q164

Mitosis is further divided in …….. stages of cytoplasmic division

1. 1.   2. 2   3. 3   4. None of these

Q165

Prophase is characterize by

1. Initiation of condensation of chromosomal material
2. Centrioles moving towards opposite pole
3. Initiation of the assembly of mitotic spindle   4. All of these

Q166

Cells at the end of prophase, when viewed under the microscope, do not show

1. Golgi body and ER   2. Nucleolus   3. Nuclear envelop   4. All of these

Q167

Which of the following initiates the start of metaphase?

1. Completion of bivalent formation   2. Assemblage of microtubules of nucleoplasm
3. Complete disintegration of nuclear envelope   4. Duplication of chromosome

Q168

Metaphase is not characterized by,

1. Complete condensation of chromosome
2. Alignment of chromosome on metaphase plate
3. Attachment of spindle fibre to kinetochore   4. Splitting of chromosome

Q169

Identify A,B,C and D in the below mitosis diagram

1. A – transition of metaphase, B – metaphase, C – early prophase, D – late prophase

2. A – late prophase, B – transition to metaphase, C – metaphase, D – early prophase

3. A – early prophase, B – late prophase, C – transition to metaphase, D – metaphase

4. A – metaphase, B – early prophase, C – late prophase, D – transition to metaphase
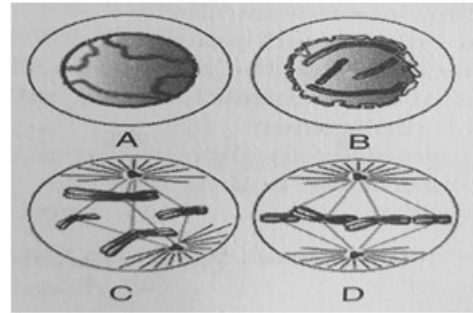
Q170

Anaphase is characterized by

1. Splitting centromere   2. Separation of chromatid
3. Movement of chromatid to opposite pole   4. All of these

Q171

Events of telophase are

1. Chromosomes cluster at opposite spindle poles and their identity is lost as discrete elements

2. Nuclear envelope assembles around the chromosome cluster

3. Nucleolus, Golgi complex and ER reforms   4. All the above

Q172

Furrow formation does not occur in plant cell during cytokinesis because of

1. Extensible cell wall   2. Inextensible cell wall
3. Extensible plasma membrane   4. Inextensible plasma membrane

Q173

Select the total number of correct statement

I. Cell – plate formation occurs in plant cell during cytokinesis

II. During cytokinesis, mitochondria and plastid get distributed between two daughter cells in mitosis

III. Liquid endosperm in coconut is syncytium

IV. Furrow formation occurs in animal cell during cytokinesis

1. 1   2. 2   3. 3   4. 4

Q174

Cell which divides by mitosis is …..

1. Upper layer of epidermis   2. Cells lining gut
3. Stem cells   4. All of these

Q175

Spindle apparatus is formed during which stage of mitosis

1. Prophase   2. Metaphase   3. Anaphase   4. Telophase

Q176

Which is not the character of mitosis?

1. Leptotene   2. Zygotene   3. Pachytene   4. All of these

Q177

Synaptonemal complex is formed during

1. Meiosis   2. Amitosis   3. Mitosis   4. Cytokinesis

Q178

Recombinant nodules are found during which of the following stage?
1. Anaphase I   2. Prophase I   3. Telophase I   4. Metaphase I

Q179

Repulsion of homologous chromosomes takes place in
1. Zygotene   2. Leptotene   3. Diakenesis   4. Diplotene

Q180

Exchange of segments between non – sister chromatid of homologous chromosome is............
1. Translocation   2. Linkage   3. Crossing over   4. Inversion

TOPIC: CELL: UNIT OF LIFE AND CELL CYCLE AND CELL DIVISION
UNIT NO: B-04
ANSWER KEY

Q. No.	Ans.	Q. No.	Ans.	Q. No.	Ans.	Q. No.	Ans.	Q. No.	Ans.
91	1	92	3	93	2	94	1	95	2
96	3	97	1	98	4	99	3	100	2
101	3	102	4	103	2	104	1	105	3
106	3	107	1	108	2	109	3	110	1
111	2	112	3	113	4	114	3	115	1
116	3	117	2	118	3	119	3	120	4
121	4	122	3	123	3	124	2	125	1
126	2	127	4	128	3	129	3	130	1
131	1	132	3	133	3	134	2	135	3
136	2	137	3	138	3	139	3	140	2
141	3	142	2	143	4	144	4	145	2
146	2	147	3	148	2	149	3	150	2
151	3	152	1	153	1	154	1	155	1
156	2	157	4	158	1	159	4	160	2
161	3	162	2	163	3	164	4	165	4
166	4	167	3	168	4	169	3	170	4
171	4	172	2	173	4	174	4	175	2
176	4	177	1	178	2	179	4	180	3