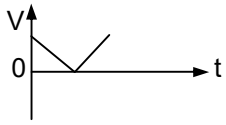
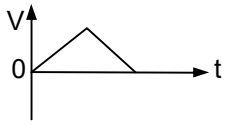
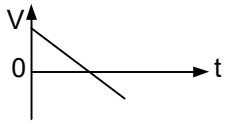
NEET (UG) – 2026

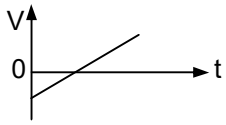
Code: 14 – Question Paper with Key, Hints & Solutions

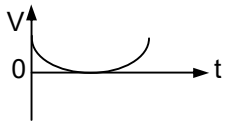
1. The following plots show variation of velocity (v) with time (t), of a ball thrown vertically upward, and falling back. Which of the following plots is/are correct?

A. 

B. 

C. 

D. 

E. 

(1) B only
(2) A and E only
(3) D only
(4) C only

Ans. (4)

Sol. Equation of motion, v = u – gt
While going up velocity will decrease, becomes zero at highest point and increase while coming down. Slope is negative.

2. For a metal of work function 6.6 eV, which of the following wavelengths of incident radiation does ***not*** give rise to photoelectric effect?
(Take Planck's constant as 6.6×10^{-34} J s)
(1) 50 nm
(2) 100 nm
(3) 150 nm
(4) 200 nm

Ans. (4)

Sol. Work function, $w = \frac{hc}{\lambda}$

$$w = \frac{1240\,nm}{6.6\,eV} = 187.87\,nm$$

Wavelengths less than this or equal to this wavelength only can emit electrons.
∴ 200 nm cannot emit electron.

3. The power of crane, which lifts a mass of 1000 kg to a height of 20 m in 10s is:
($g = 9.8\ m/s^2$)
(1) 39.2 kW
(2) 39.2 W
(3) 19.6 kW
(4) 19.6 W

Ans. (3)

Sol. Power

$$P = \frac{W}{t} = \frac{mgh}{t} = \frac{(10^3)(9.8)(20)}{10}$$

$P = 19.6 \times 10^3$ W
P = 19.6 kW

4. Match List I with List II:

	List I		List II
A.	E = hv	I.	de Broglie wavelength
B.	Diffraction and Interference	II.	Particle nature of light
C.	λ = h/p	III.	Wave nature of light
D.	Compton effect	IV.	Energy of photon

Choose the **correct** answer from the options given below:
(1) A – IV, B – I, C – II, D – III
(2) A – I, B – IV, C – III, D – II
(3) A – IV, B – III, C – II, D – I
(4) A – IV, B – III, C – I, D – II

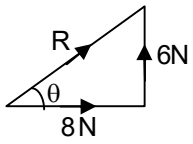
Ans. (4)

Sol. Based on wave and particle nature of both matter and radiation

5. The magnitude and direction of the acceleration produced in a body of mass 5kg when two mutually perpendicular forces 8N and 6N act on it, are respectively:
(1) 2 ms^{-2}, $\tan^{-1}$ (4/3) with 8N force
(2) 2 ms^{-2}, $\tan^{-1}$ (3/4) with 8N force
(3) 2ms^{-2}, $\tan^{-1}$ (3/4) with 6N force
(4) 20 ms^{-2}, $\tan^{-1}$ (4/3) with 8N force

Ans. (2)

Sol. F = ma



$R = \sqrt{8^2 + 6^2} = 10N$

$a = \frac{F}{m} = \frac{10}{5} = 2ms^{-2}$

$\tan(\theta) = \frac{6}{8} = \frac{3}{4}$

$\theta = \tan^{-1}(3/4)$ with 8 N

6. The sum of kinetic energy and potential energy of a simple pendulum bob is 0.02 joule. The speed of the simple pendulum bob at equilibrium position is approximately:
(Consider mass of the bob = 20g)
(1) 14.1 m/s (2) 1.41 m/s
(3) 2.0 m/s (4) 0.2 m/s

Ans. (2)

Sol. At equilibrium position, Potential energy U = 0.
KE + U= 0.02

$\frac{1}{2}mv^2 + 0 = 0.02$

$\frac{1}{2} \times 20 \times 10^{-3} \times v^2 = 0.02$

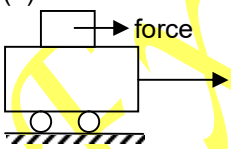
$v^2 = 2$

$v = \sqrt{2} = 1.41 m/s$

7. A box of mass 15 kg is kept on the floor of a stationary trolley. The coefficient of static friction between the box and the trolley is 0.12. Keeping the box in stationary state over the trolley, the maximum acceleration with which the trolley can be moved horizontally in ms^{-2} is :
($g = 10 m/s^2$)
(1) 1.2 (2) 1.8
(3) 1.5 (4) 2.1

Ans. (1)

Sol.



Force on the box before sliding.

$f_{max} = ma$

$a = \frac{\mu mg}{m} = \mu g = 0.12 \times 10$

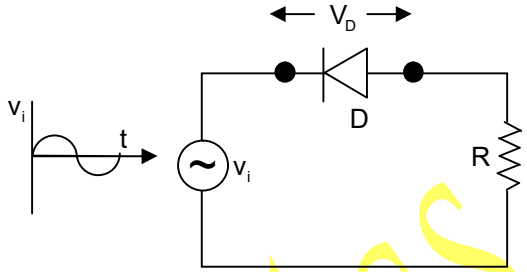
$a = 1.2 m/s^2$

8. The speed of light in vacuum is taken as unity. If light takes 6 min 40s to reach the Earth From the Sun, the distance between the Sun and the Earth in new unit is
(1) 500
(2) 3×10^8
(3) 400
(4) 3×10^{10}

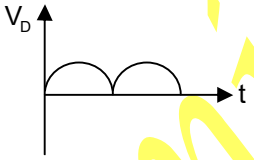
Ans. (3)

Sol. Distance = Speed × Time
= 1 × (400) = 400

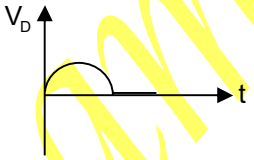
9. In the circuit shown below, the voltage appearing across the diode D will be of the form:



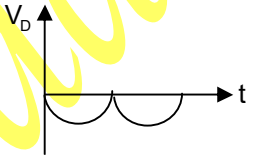
(1)



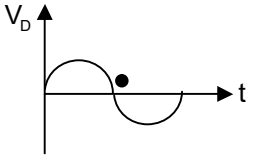
(2)



(3)

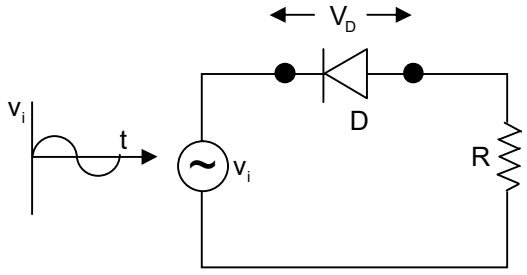


(4)

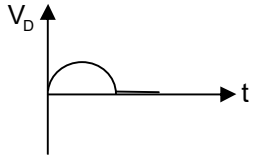


Ans. (2)

Sol.



First positive cycle diode is reverse biased.
Hence, the applied voltage drops across the diode.
In the negative cycle, the diode is forward biased.
Applied voltage drops across resistance R



10. A submarine is designed to withstand an absolute pressure of 100 atm. How deep can it go below the water surface?
(Consider the density of water = 1000 kg m^{-3}, 1 atm = 1×10^5 Pa and gravitational acceleration g = 10 m/s^2)
(1) 990 m (2) 9000 m
(3) 99 m (4) 9900 m

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Ans. (1)

Sol. $100\ P_{atm} = P_{atm} + \rho gh$

$\rho gh = 99P_{atm}$

$h = \frac{99\times10^5}{\rho g}$

h = 990 m

11. An electric heater supplies heat to a system at a rate of 100 W. If the system performs work at a rate of 75 J/s, then the rate at which internal energy increases will be :
(1) 125 W
(2) 75 W
(3) 100 W
(4) 25 W

Ans. (4)

Sol. $\Delta Q = 100$ W

$\Delta W = 75$ J/s $= 75$ W

$\Delta Q = \Delta U + \Delta W$

$\Delta U = 100 - 75$

$\Delta U = 25$ W

12. A 100 – turn closely wound circular coil of radius 5 cm has a magnetic field of 3.14×10^{-3} T at its centre. The current flowing through the coil, and the magnitude of the magnetic moment of this coil are, respectively :
(Take $\mu_0 = 4\pi \times 10^{-7}$ T m/A)
(1) 2A, 4 Am^2
(2) 2.5 A, 20 Am^2
(3) 2.5 A, 2 Am^2
(4) 2 A, 10 Am^2

Ans. (3)

Sol. $B = \frac{\mu_0 ni}{2R}$

$i = \frac{B(2R)}{\mu_0 n}$

$i = \frac{3.14\times10^{-3}\times2\times0.05}{4\times3.14\times10^{-7}\times100}$

i = 2.5 A

$M = NiA = Ni(\pi R^2)$

$M = 100 \times 2.5 \times 3.14 \times (0.05)^2$

M = 2 Am^2

13. In Young's double slit experiment, using monochromatic light of wavelength λ, the intensity of light at a point on the screen where the path difference is λ, is K units. The intensity of light at a point where the path difference is $\frac{\lambda}{3}$ will be :
(1) $\frac{K}{2}$
(2) 2 K
(3) $\frac{K}{4}$
(4) K

Ans. (3)

Sol. $\Delta\phi = \left(\frac{2\pi}{\lambda}\right)\Delta x$

$= \left(\frac{2\pi}{\lambda}\right)\left(\frac{\lambda}{3}\right)$

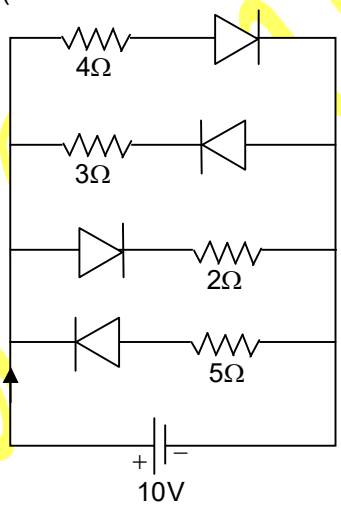
$\Delta\phi = \frac{2\pi}{3}$

$I' = K\cos^2\left(\frac{\Delta\phi}{2}\right)$

$I' = K\cos^2\left(\frac{2\pi/3}{2}\right) = K\cos^2\left(\frac{\pi}{3}\right)$

$I' = \frac{K}{4}$

14. The current I in the circuit shown below is :
(All diodes are ideal and identical)



(1) $\frac{5}{3}$A
(2) $\frac{5}{9}$A
(3) $\frac{15}{2}$A
(4) $\frac{1}{3}$A

Ans. (3)

Sol. $R_{eq} = \frac{2\times4}{4+2} = \frac{8}{6}$

$R_{eq} = 4/3$

$i = \frac{V}{R} = \frac{10}{4/3}$

$i = \frac{30}{4} = \frac{15}{2}$A

15. In a concave lens, a ray of light emanating from the object parallel to the principal axis of the lens, after refraction :
(1) passes through the second principal focus.
(2) appears to diverge from the first principal focus.
(3) emerges parallel to the principal axis.
(4) passes through 2F, which is the radius of curvature of the lens

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Ans. (2)

Sol. Appears to diverge from the first principal focus.

16. A galvanometer of resistance 100 Ω gives full scale deflection for a current of 1 mA. It is converted into an ammeter of range 0 – 10 A. the shunt required is:

(1) 0.10 Ω (2) 0.001 Ω

(3) 1.0 Ω (4) 0.01 Ω

Ans. (4)

Sol. $S = \dfrac{G}{\frac{i}{i_g}-1} \Rightarrow S = \dfrac{100}{\frac{10}{1\times10^{-3}}-1}$

$S = \dfrac{100}{10^4-1} \Rightarrow S = \dfrac{100}{9,999}$

$S = 0.01\ \Omega$

17. in the first excited state of hydrogen atom, the energy of its electron is –3.4 eV. The radial distance of the electron from the hydrogen nucleus in this case is approximately.

(Take 1 eV = 1.6 × 10^{-19} J, e = 1.6 × 10^{-19} C and $\dfrac{1}{4\pi\varepsilon_0} = 9\times10^9 Nm^2/C^2$)

(1) 2.1 × 10^{-11} m (2) 2.1 × 10^{-10} m

(3) 2.1 × 10^{-9} m (4) 2.1 × 1-0^{-8} m

Ans. (2)

Sol. E = –3.4 eV

N = 2

$r_n = r_0\dfrac{n^2}{z}$

$r_n = 0.53\dfrac{(2)^2\times10^{-10}}{(1)}$

$r_n = 0.53\times4\times10^{-10}$

$r_n = 2.1\times10^{-10}m$

18. The amount of work done to raise a mass 'm' from the surface of the Earth to height equal to the radius of the Earth 'R', will be:

(1) mg R (2) 2 mg R

(3) mg $\dfrac{R}{4}$ (4) mg $\dfrac{R}{2}$

Ans. (4)

Sol. $U_i = -\dfrac{GMm}{R}$

$U_f = -\dfrac{GMm}{R+n} \quad (h=k)$

$U_f = -\dfrac{GMm}{2R}$

$W = V_f - V_i = -\dfrac{GMm}{2R} - \left(\dfrac{-4Mm}{R}\right)$

$= -\dfrac{GMm}{2R} - \dfrac{GMm}{R} \qquad g = \dfrac{GM}{R^2}$

$W = \dfrac{mgR}{2}$

19. An ac circuit contains a resistance of 1 kΩ, a capacitor of 0.1 μF and an inductor of 1 mH connected in series. The resonance frequency of the circuit is approximately

(1) 13.5 kHz

(2) 15.9 kHz

(3) 10.1 kHz

(4) 20.7 kHz

Ans. (2)

Sol. $f = \dfrac{1}{2\pi\sqrt{LC}}$

$f = \dfrac{1}{6.28\sqrt{10^{-10}}}$

$= \dfrac{10^5}{6.28} = 15.9$ kHz

20. Consider two uncharged capacitors of equal capacitance 200 pF. One of them is charged by a 100 V supply and disconnected. Now this capacitor is connected to the uncharged capacitor. The amount of electrostatic energy lost in the process is :

(1) 1.0 J (2) 0.5 J

(3) 1.0 × 10^{-6} J (4) 0.5 × 10^{-6} J

Ans. (4)

Sol. $\Delta v = \dfrac{1}{2}\dfrac{c_1c_2}{c_1+c_2}(v_1-v_2)^2$

$\Delta v = \dfrac{1}{2}\dfrac{200\times200}{200+200}\times10^{-12}(100)^2$

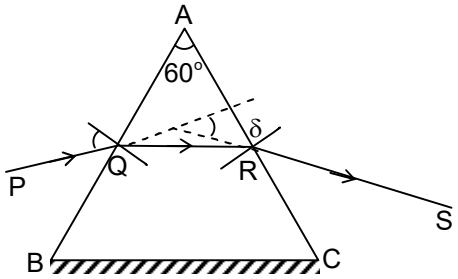
$\Delta v = \dfrac{1}{2}\dfrac{4\times10\times10}{400}\times10^{-12}\times10^4$

$\Delta v = \dfrac{1}{2}\times\dfrac{10^{-4}}{10^2}$

$\Delta v = \dfrac{1}{2}\times10^{-6}$

$\Delta v = 0.5\times10^{-6}J$

21. A ray monochromatic light is passing through an equilateral prism (ABC) as shown in the figure. The refracted ray (QR) is parallel to its base (BC) and the angle of incidence (i) is 50°. Then the angle of deviation (δ) is:



(1) 45° (2) 40°

(3) 35° (4) 55°

Ans. (2)

Sol. Under minimum deviation

$i = \dfrac{A+\delta}{2} \Rightarrow \delta = 40°$

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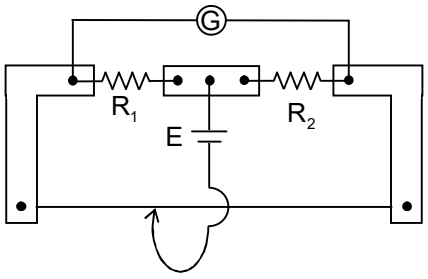
22. In a metre bridge experiment (see figure), the positions of the cell, E, and galvanometer, G, are interchanged. We shall observe in the galvanometer:



(1) Only the left–sided deflection
(2) Both right–sided and left–sided deflection and at balance point, no deflection
(3) Only the right–sided deflection
(4) There will be no deflection irrespective of the position of the jockey

Ans. (2)

Sol. Balancing condition is

Not affected by interchanging position of cell and Galvanometer.

So, No deflection in Galvanometer at balancing point. But on left side and right side of balancing point there will be deflection.

23. A flask contains argon and chlorine in the ratio of 2:1 by mass. The temperature of the mixture is 27°C. The ratio of root mean square speed of the molecules of the two gases $\left(\frac{v_{rms}^{Ar}}{v_{rms}^{Cl}}\right)$ is:

(Atomic mass of argon = 40.0 u and molecular mass of chlorine = 70.0 u)

(1) $\frac{7}{4}$

(2) $\frac{\sqrt{7}}{2}$

(3) $\frac{2}{\sqrt{7}}$

(4) $\frac{7}{2}$

Ans. (2)

Sol. $V_{Rms} = \sqrt{\frac{3RT}{M}}$

$V \propto \frac{1}{\sqrt{M}}$

$\frac{V_{Ar}}{V_{cl}} = \sqrt{\frac{M_{cl}}{M_{Ar}}} = \frac{\sqrt{7}}{2}$

24. Two statements are given below:

A. When the forward bias voltage across a p–n junction diode increases above a certain threshold voltage, the diode current increases significantly.

B. This current is called reverse saturation current.

Choose the **correct** answer from the options given below:

(1) Statement A is true, but Statement B is false
(2) Both Statement A and B are true
(3) Both Statement A and B are false
(4) Statement A is false, but Statement B is true

Ans. (1)

Sol. Statement A is true Statement B is false

25. For a travelling harmonic wave $y(x, t) = 2.0 \cos 2\pi(10\, t - 0.0080\, x + 0.35)$, where x and y are in cm and t in s. The phase difference between oscillatory motion of two points separated by a distance of 0.5 m is:

(1) 0.8 π rad
(2) 8 π rad
(3) 0.008 π rad
(4) 0.08 π rad

Ans. (1)

Sol. Phase difference of two points

$\Delta\phi = kx$

$= 0.8\pi$ rad

26. A rectangular wire loop of sides 8 cm and 3 cm with a small cut, is moving out of a region of uniform magnetic field of magnitude 0.3 T directed normal to the plane of the loop. The emf developed across the cut, if the velocity of the loop is 2 cm s^{-1}, in a direction normal to the shorter side of the loop, will be:

(1) $4.8 \times 1\text{-}0^{-4}$ volt (2) 1.3×10^{-4}volt
(3) 1.2×10^{-4} volt (4) 1.8×10^{-4} volt

Ans. (4)

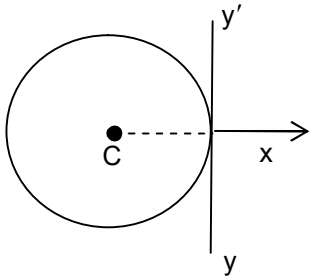
Sol. Emf developed $E = B\ell v$

ℓ = 3cm, B = 0.3T, V = 2 cm/s

$= 0.3 \times 3 \times 10^{-2} \times 2 \times 10^{-2}$

$= 1.8 \times 10^{-4}$ V

27. A thin wire of length 'L' and linear mass density 'm' is bent into a circular ring (in x–y plane) with centre 'C' as shown in figure. The moment of inertia of the ring about an axis yy' will be:



(1) $\frac{3mL^2}{8\pi}$

(2) $\frac{3mL^2}{8\pi^2}$

(3) $\frac{3mL^3}{8\pi}$

(4) $\frac{3mL^3}{8\pi^2}$

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Ans. (4)

Sol. Mass of the ring M = mL

$L = 2\pi R \Rightarrow R = \frac{L}{2\pi}$

According to parallel axes theorem

$I_{yy^1} = \frac{1}{2}MR^2 + MR^2$

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

$= \frac{3}{2}(mL)\left(\frac{L^2}{4\pi^2}\right)$

$= \frac{3mL^3}{8\pi^2}$

28. A resistor is connected to a battery of 12 V emf and internal resistance 2 Ω. If the current in the circuit is 0.6 A, the terminal voltage of the battery is:

(1) 10.8 V (2) 1.2 V

(3) 12 V (4) 10 V

Ans. (1)

Sol. V = E – i r

= 12 – (0.6)2

= 10.8 V

29. When a ruler falls vertically, 5 different persons catch it with different reaction times.

($g = 9.8\ ms^{-2}$)

A. Person A has reaction time of 0.20 s.

B. Person B has reaction time of 0.22 s.

C. Person C has reaction time of 0.18 s.

D. Person D has reaction time of 0.19 s.

E. Person E has reaction time of 0.21 s.

What is the **correct** order of the distance travelled by the ruler for each person?

(1) C > D > A > E > B

(2) C > D > A > B > E

(3) B > E > A > D > C

(4) B > E > A > C > D

Ans. (3)

Sol. $S = ut + \frac{1}{2}at^2$

$S \alpha t^2$

B > E > A > D > C

30. The angular speed of a flywheel is increased from 600 rpm t 1200 rpm in 10 s. The number of revolutions completed by the flywheel during this time is:

(1) 300 (2) 150

(3) 900 (4) 600

Ans. (2)

Sol. $\omega_i = 600\,rpm = \frac{600}{60} = 10\,rps$

$\omega_f = 1200\,rpm = \frac{1200}{60} = 20\,rps$

t = 10 sec

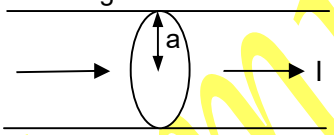
$\alpha = \frac{20-10}{10} = 1\ rad/s^2$

$\theta = \omega_i t + \frac{1}{2}\alpha t^2$

$= 10 \times 10 + \frac{1}{2} \times 1 \times 100$

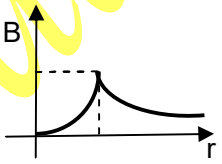
$= 150$

31. The figure given below shows a long straight solid wire of circular cross–section of radius 'a' carrying steady current I. The current is uniformly distributed across its cross–section. The plot which correctly represents the variation of magnetic field (B) with distance (r) from the axis of the conductor in the region is:

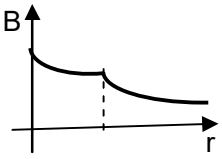


(1)

(2)



(3)



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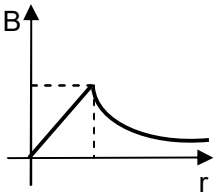

Ans. (4)

Sol. $B_{in} \alpha r$, $B_{out} \alpha \frac{1}{r}$

32. Four statements are given (A is mass number):

A. The volume of a nucleus is proportional to $A^{1/3}$.

B. The volume of a inucleus is proportional to A.

C. The difference in mass of an atom and its nucleus is called the mass defect.

D. The difference in mass of a nucleus and its constituents is called the mass defect.

Choose the correct answer from the options given below:

(1) A and D are true, but B and C are false

(2) B and C are true, but A and C are false

(3) B and D are true, but A and D are false

(4) A and C are true, but B and D are false

Ans. (2)

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Sol. B) The volume of a nucleus is proportional to A
D) The difference in mass of a nucleus and its constituents is called the mass defect.

33. Savitha, a XI standard student, while conducting an experiment to determine the effective length of a simple pendulum L notes down the data of time taken to complete 30 oscillations as 60 s and hence calculates the length of the simple pendulum as:
(Take $\pi^2 = 9.8$ and g = 9.8 m/s^2)
(1) 2 m
(2) 1 m
(3) 0.75 m
(4) 1.5 m

Ans. (2)

Sol. Time period (T)$= \frac{60}{30} = 2\,\text{sec}$

$\pi^2 = 9.8$

g = 9.8

$T = 2\pi\sqrt{\frac{L}{g}}$

$T^2 = 4\pi^2\frac{L}{g}$

$4 = 4x9.8x\frac{L}{9.8}$

L = 1m

34. In a vernier calipers, 20 VSD coincide with 16 MSD (each division of length 1 mm). the least count of the vernier calipers is:
(1) 0.1 cm
(2) 0.02 cm
(3) 0.01 cm
(4) 0.2 cm

Ans. (2)

Sol. 20 VSD coincides with 16 MSD

20 VSD = 16 MSD

1 VSD = $\frac{16}{20}$ MSD=0.8 MSD

1 VSD= 0.8x1mm=0.8 mm

Least count (L.C)=1MSD–1VSD

= 1mm–0.8mm

= 0.2 mm

$\therefore$ L.C = 0.02cm

35. Each side of a metallic cube of mass 5.580 kg is measured to be 9.0 cm. Keeping the significant figures in view, the density of the material of the cube can be best expressed as X x 10^3 kg m^{-3}, where the value of X is:
(1) 7.654
(2) –7.6
(3) 7.65
(4) 7.7

Ans. (4)

Sol. Mass (m) = 5.580 Kg

Side length (a) = 9.0 cm = 9x10^{-2}m

Density $(\rho) = \frac{m}{V} = \frac{m}{a^3}$

$= \frac{5.580}{9\times9\times9\times10^{-6}}$

$= \frac{5.580}{729}\times10^6$

= 0.007654 x 10^6

= 7.654 x 10^3 kg/m^3

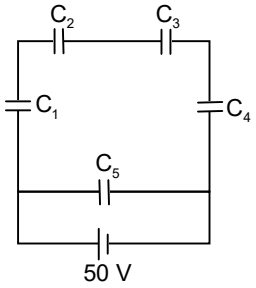
= 7.7 x 10^3 kg/m^3 according to significant figures

36. In interference and diffraction, the light energy is redistributed. If it reduces in one region, producing a dark fringe, it increases in another region, producing a bright fringe.
A. as there is no gain or loss of energy, these phenomena are consistent with the principle of conservation of energy.
B. Diffraction and interference are characteristics exhibited only by light waves.
Choose the correct answer from the options given below:
(1) A is false, but B is true
(2) A is true and B is also true
(3) A is true, but B is false
(4) Both A and B are false

Ans. (3)

Sol. Interference and diffraction takes place due to Re–distribution of energy. Hence opt Ais correct
Diffraction and interference can also be studied in sound waves Hence opt B is false

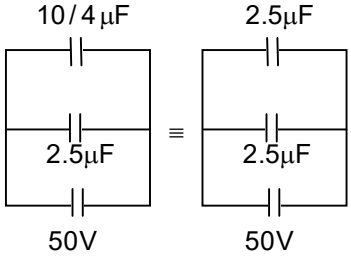
37. Five capacitors of capacitances $C_1=C_2=C_3=C_4=10\,\mu F$ and $C_5=2.5\,\mu F$ are connected as shown, along with a battery of 50 V.



The equivalent capacitance and the charges on each capacitor respectively are:
(1) 5 μ F, 125 μ C on C_1 to C_4 and 25 μ C on C_5
(2) 4 μ F, 250 μ C on C_1 to C_4 and 125 μ C on C_5
(3) 5 μ F, 250 μ C on all capacitors
(4) 5 μ F, 125 μ C on all capacitors

Ans. (4)

Sol.



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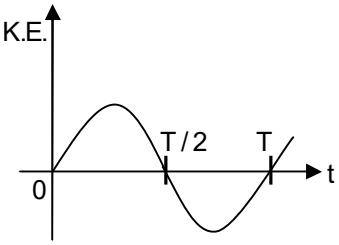
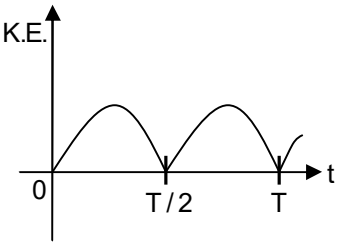
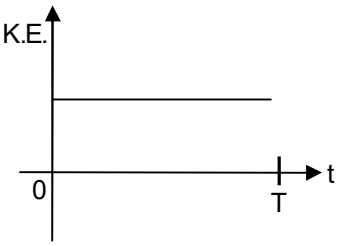
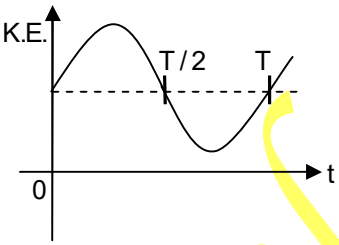
C_{eff} = 5μF
$Q_{net} = C_{eff} \times V$ = 250 μC
Here charge energy distribution C_1, C_2, C_3, C_4, C_5
$\therefore C_1 = C_2 = C_3 = C_4 = C_5$ = 125 μC

38. For a simple pendulum, having time period T, the variation of kinetic energy (K.E) with time(t) is represented by:

(1) 

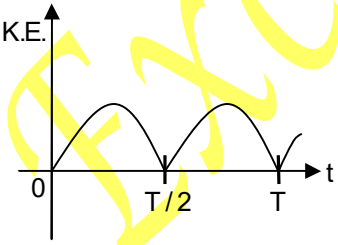
(2) 

(3) 

(4) 

Ans. (2)

Sol. $KE = \frac{1}{2}m\omega^2A^2\sin^2\omega t$ if particle performing SHM from extreme position.



39. A room heater is rated 400 W, 220V. IF the supply voltage drops to 200 V, what will be the power consumed (approximately)?
(1) 121 W
(2) 200 W
(3) 400 W
(4) 331 W

Ans. (4)

Sol. P_0=400 watt
V_0=220 volt
Operataly voltage and power
V_C=voltage consumed is = 200 V
P_C=?

$$P_0 = \frac{V_0^2}{R}$$

$$P_C = \frac{V_C^2}{R}$$

$$R = \frac{220 \times 220}{400}$$

$$= \frac{200 \times 200}{121}$$

$E = 121\,\Omega$
P_C= 331 watt

40. The peak value of an alternating current is 5 A and frequency is 60 Hz. How along will the current, starting from zero, take to reach the peak value
(1) $\frac{1}{60}$s
(2) $\frac{1}{240}$s
(3) $\frac{1}{30}$s
(4) $\frac{1}{120}$s

Ans. (2)

Sol. i_0=5A
F = 60Hz
t = ?

$t = 0$ to $t = \frac{T}{4}$

$I = I_0 \sin\omega t$

$5 = 5\sin\frac{2\pi}{T}t$

$\sin^{-1}(1) = \frac{2\pi}{T}t$

$\frac{\pi}{2} = \frac{2\pi}{T}t$

$T = \frac{1}{f} = \frac{1}{60}$

$t = \frac{T}{4} = \frac{1}{240}$sec

41. Which of the following statements are correct?
A. Inside a conductor the electrostatic field is zero
B. Electric field at the surface of a charged conductor does not depend on its surface charge density.
C. The interior of a charged conductor can have no excess charge in the static situation.
D. AT the surface of a charged conductor, the electrostatic field must be normal to the surface at every point
E. The electrostatic potential is zero everywhere inside a charged conductor.

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Choose the correct answer form the options given below:

(1) A, C and D only (2) A, C and E only

(3) E, D and E only (4) A, B and D only

Ans. (1)

Sol. **A)**: Free electrons redistribute themselves until they cancel internal Electric Field

C): According to Gauss law

D): If electric field has tangential the charge will move. So, the electric field is always perpendicular to surface.

42. Match List I with List II

	List I (Electromagnetic wave)		**List II (Production)**
A	Microwave	I	Electrons in atoms emit light when they move form a higher energy level to a lower energy level
B	Visible light	II	Radioactive decay of nucleus
C	Gamma rays	III	Vibration of atoms and molecules
D	Infra–red rays	IV	Klystron valve or magnetron valve

(1) A–III, B–I, C–II, D–IV

(2) A–III, B–IV, C–I, D–II

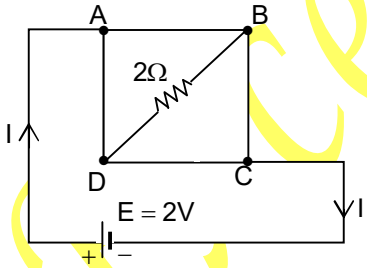
(3) A–IV, B–I, C–II, D–III

(4) A–IV, B–III, C–II, D–I

Ans. (3)

Sol. A–IV, B–I, C–II, D–III

43. A uniform metallic wire having resistance $4\,\Omega$ is bent to form a square loop (ABCD) (see figure). A resistance of $2\ \Omega$ is connected between points A and D and a battery of 2 V is connected across points A and C as shown in the figure. Now the value of current (I) is:

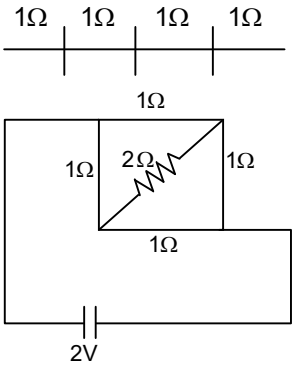


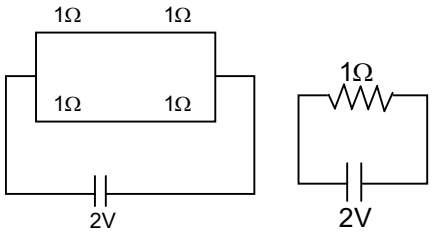
(1) 4 A (2) 8 A

(3) 4.5 A (4) 2 A

Ans. (4)

Sol.





$$I = \frac{V}{R} = \frac{2}{1} = 2A$$

44. An unknown nucleus has a nuclear density of 2.29×10^{17} kg/m^3 and mass of 19.926×10^{-27} kg. Its mass number A is approximately:

(Take $R_0 = 1.2 \times 10^{-15}$m, $4\pi = 12.56$)

(1) 12 (2) 16

(3) 19 (4) 20

Ans. (1)

Sol. $\rho = \frac{m}{v} \Rightarrow v = \frac{m}{\rho}$

$$\frac{4}{3}\pi R_0^3 . A = \frac{m}{\rho} \Rightarrow A = \frac{m \times 3}{\rho . 4\pi \times R_0^3}$$

$$\frac{19.926 \times 10^{-27} \times 3}{2.29 \times 10^{17} \times 12.56 \times [1.2 \times 10^{-15}]^3}$$

$$= \frac{59.778 \times 10^{-27}}{49.701 \times 10^{-28}} = 12.02$$

45. Match List I and List II:

	List I		**List II**
A	Young's Modulus	I	$\frac{\Delta d}{\Delta L}\left(\frac{L}{d}\right)$
B	Compressibility	II	$\frac{FL}{A(\Delta L)}$
C	Bulk Modulus	III	$-\frac{I}{\Delta P}\left(\frac{\Delta V}{V}\right)$
D	Poisson's Ratio	IV	$-P\left(\frac{V}{\Delta V}\right)$

Choose the correct answer from the options given below:

(1) A–II, B–III, C–IV, D–I

(2) A–III, B–II, C–I, D–IV

(3) A–I, B–IV, C–III, D–II

(4) A–IV, B–I, C–II, D–III

Ans. (1)

Sol.

A.	Young's Modulus	II.	$\frac{FL}{A.\Delta L}$
B.	Compressibility	III.	$-\frac{1}{.\Delta P}\left[\frac{\Delta V}{V}\right]$
C.	Bulk Modules	IV.	$-P\left[\frac{V}{\Delta V}\right]$
D.	Poisson's Ratio	I.	$\frac{\Delta d}{\Delta L}.\frac{L}{d}$

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46. The correct statement with regard to the secondary structure of DNA/RNA is
(1) DNA possesses a single strand helix structure and contains uracil as one of the four bases.
(2) DNA possesses a double strand helix structure and contains thymine as one of the four bases
(3) RNA possesses and double strand helix structure and contains uracil as one of the four bases
(4) RNA possesses a single strand helix structure and contains thymine as one of the four bases.

Ans. (2)

Sol. DNA possesses a double strand helix structure and contains thymine as one of the four bases.

47. Match List I with List II

	List I (Quantum Numbers) 'n'	'l'		List II (Orbitals)
A.	2	1	I.	3d
B.	4	0	II.	2p
C.	5	3	III.	4s
D.	3	2	IV.	5f

Choose the correct answer from the options given below:
(1) A-II, B-III, C-I, D-IV
(2) A-II, B-III, C-IV, D-I
(3) A-IV, B-II, C-III, D-I
(4) A-I, B-II, C-III, D-IV

Ans. (2)

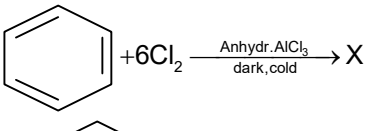
Sol. n=2, l=1 $\Rightarrow$ 2p
n=4, l=0 $\Rightarrow$ 4s
n=5, l=3 $\Rightarrow$ 5f
n=3, l=2 $\Rightarrow$ 3d

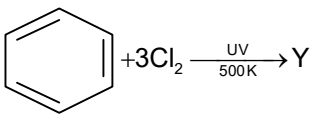
48. During Lassaigne's test, the elements present in an organic compound are converted from:
(1) covalent form to ionic form
(2) covalent form to covalent form
(3) ionic form to ionic form
(4) ionic form to covalent form

Ans. (1)

Sol. organic compounds are covalent in nature
N, S, P, X present in the compound are converted into their respective ionic form
Na + C + N $\rightarrow$ NaCN
Na + S $\rightarrow$ Na_2S
Na + P $\rightarrow$ Na_3P
Na + X $\rightarrow$ NaX

49. The number of chlorine atoms present in the organic products X and Y of the following reactions, respectively are

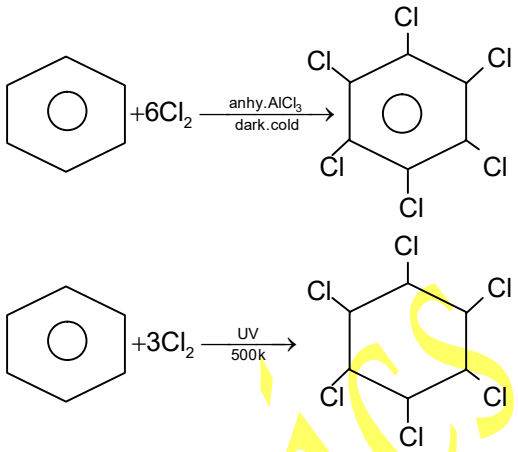




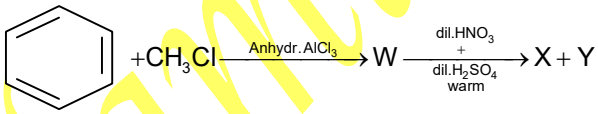
(1) 3 and 6 (2) 6 and 3
(3) 3 and 3 (4) 6 and 6

Ans. (4)

Sol.



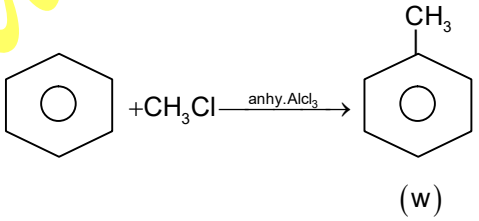
50. Two products X and Y are formed in the following reaction sequence.



The suitable method that can be used for the separation of products X and Y is:
(1) Sublimation
(2) Differential extraction
(3) Continuous extraction
(4) Fractional distillation

Ans. (4)

Sol:



Ortho nitro toluene (222°C) and para nitro toluene (238^0C) can be separated by Fractional distillation.

51. Identify the correct statement about ClF_3 from the following options:
(1) It has T-shaped geometry with three lone pairs on Cl atom.
(2) It has a planar trigonal geometry with two lone pairs on Cl atom.
(3) It has T-shaped geometry with two lone pairs on Cl atom.
(4) It has a trigonal pyramidal geometry with two lone pairs on Cl atom.

Ans. (3)

Sol. ClF_3 has T-shaped with two lone pairs on Cl atom.

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52. The functional group that can be identified through phthalein dye test is
(1) Alcohol
(2) Aldehyde
(3) Phenolic
(4) Carboxylic acid

Ans. (3)

Sol. Phthalein dye test in shown by phenolic group.

53. A solution of copper sulphate is electrolysed for 10 minutes with a current of 1.5 amperes. The mass of copper deposited at cathode is :
(Given : Molar mass of Cu = 63 g mol^{-1};
1F = 96487 C mol^{-1})
(1) 0.2938 g
(2) 1.7018 g
(3) 2.4036 g
(4) 0.5876 g

Ans. (1)

Sol.Given,

$I = 1.5A$

$I = 10x60 = 600\,sec$

$E = \frac{A}{n_f} = \frac{63.5}{2}$.

$W = \frac{E}{96500}It = \frac{63.5}{2} x \frac{1.5x10x60}{96500}$

$W = 0.2938\,g$

54. Match List I with List II:

List I (Transition metal/ compound/ complex)		List II (Catalytic Role)	
A.	V_2O_5	I.	Preparation of ammonia from N_2/H_2 mixture
B.	Fe	II.	Polymerisation of alkynes
C.	$PdCl_2$	III.	Preparation of H_2SO_4 from SO_2
D.	Ni complex	IV.	Oxidation of ethyneto ethanal

Choose the **correct** answer from the options given below:
(1) A-III, B-I, C-IV, D-II
(2) A-III, B-IV, C-I, D-II
(3) A-IV, B-I, C-III, D-II
(4) A-II, B-I, C-IV, D-III

Ans. (1)

Sol. A) Manufacture of sulphuric acid by contact process

Step 1: $SO_2 + O_2 \xrightarrow{V_2O_5} SO_3$

Step 2: $SO_3 + H_2O \longrightarrow H_2SO_4$

B) Manufacture of ammonia by Haber's process

$N_2 + 3H_2 \xrightarrow{Fe} 2NH_3$

C) Wacker's process

$C_2H_2 + [O] \xrightarrow{Pdcl_2} CH_3CHO$

D) Polymerisation of alkynes takes place in the presence of Ni complex.

55. Match List I with List II:

List I (Complex/ion)		List II (Shape/geometry)	
A.	$[Pt(Cl_2)(NH_3)_2]$	I.	Octahedral
B.	$[Co(NH_3)_6]Cl_3$	II.	Trigonalbipyramidal
C.	$[NiCl_4]^{2-}$	III.	Square planar
D.	$[Fe(CO)_5]$	IV.	Tetrahedral

Choose the correct answer from the options given below:
(1) A-IV, B-I, C-III, D-II
(2) A-III, B-I, C-IV, D-II
(3) A-I B-III, C-IV, D-II
(4) A-III, B-V, C-I, D-II

Ans. (2)

Sol. 1) $[PtCl_2(NH_3)_2] \rightarrow dsp^2$ hybridization $\rightarrow$ square planar complex

2) $[Co(NH_3)_6]cl_3 \rightarrow d^2sp^3$ hybridization $\rightarrow$ octahedral complex

3) $[NiCl_4]^{2-} \rightarrow sp^3$hybridization $\rightarrow$ Tetrahedral complex

4) $[Fe(CO)_5] \rightarrow$ dsp^3hybridization $\rightarrow$ Trigonalbipyramidal complex

56. Identify the **incorrect** statement from the following:
(1) The IUPAC name of the element with atomic number 107 is Unnilseptium.
(2) The oxidation state and covalency of Al in $[AlCl(H_2O)_5]^{2+}$ are 3 and 6 respectively.
(3) The largest and the smallest species among Mg, Mg^{2+}, Al and Al^{3+} are Al and Mg^{2+} respectively.
(4) The similarity in behavior of Li with Mg is referred to as 'diagonal relationship'.

Ans. (3)

Sol. 1) Atomic No.:107; IUPAC name - Unnilseptium
2) $[AlCl(H_2O)_5]^{2+}$: Oxidation number = +3
Coordination number = 6
3) Mg is bigger in size than Al, Al^{3+} is smaller in size than Mg^{2+}
4) Li and Mg shows diagonal relationship.

57. Given below is an expression for the rate constant of a first order reaction occurring at a certain temperature, T(K).

$\ln k = 14.34 - \frac{1.25 \times 10^4}{T}$

The energy of activation in kcal mol^{-1} for the reaction is:
(Given: k is s^{-1}, R=1.987 cal mol^{-1} K^{-1})
(1) 14.34
(2) 18.63
(3) 24.84
(4) 12.42

Ans. (3)

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Sol. $\ln k = \ln A - \frac{Ea}{RT}$

$\ln k = 14.34 - \frac{1.25x10^4}{T}$

$\frac{Ea}{R} = 1.25x10^4$

$Ea = 1.25 \times 10^4 \times R$

$= 1.25 \times 10^4 \times 1.987$

$Ea = 24.84$ kcal

58. Phenolphthalein is used as an indicator for the titration of sodium hydroxide solution against a standard solution of oxalic acid. The colour change that is observed at an alkaline pH close to the equivalence point during this titration is:
(1) colourless to pink
(2) pinkish red to yellow
(3) pink to colourless
(4) yellow to pinkish red

Ans. (1)

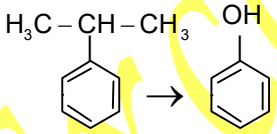
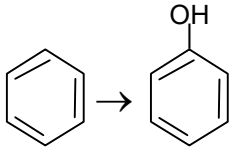
Sol. Phenolphthalein is combines with alkali and it turns to pale pink from colourless. It shows the completion of the reaction.

59. Methane reacts with steam at 1273 K in the presence of nickel catalyst to form:
(1) CO and H_2
(2) CO_2 and H_2
(3) CO and H_2O
(4) CO_2 and H_2O

Ans. (1)

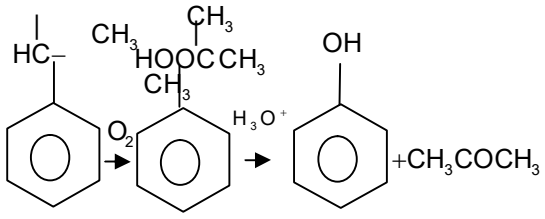
Sol. $CH_4 + H_2O \xrightarrow[1273K]{Ni} CO + 3H_2$

60. Match List I with List II:

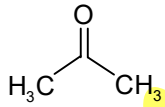
	List I	List II
A.		I. (i) oleum; (ii) NaOH, Δ; (iii) H^+
B.	$CH_3COOH \rightarrow CH_3CH_2OH$	II. (i) O_2 (ii) H_2O / H^+
C.	$CH_3CH_2OH \rightarrow CH_3 - CH(OH) - CH_3$	III. (i) CH_3OH, H^+ (ii) H_2, catalyst
D.		IV. (i) conc. H_2SO_4, Δ; (ii) H^+ / H_2O

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

Ans. (3)

Sol. 

A - Cumene method
B - Reduction of –COOH into –CH
C - Isomeritation of Alcohol
D - Kolbe's method.

61. The pair of molecules that are metamers among the following is :
(1) $CH_3OCH_2CH_2CH_3$ and $CH_3\ CH_2OCH_2CH_3$
(2) $CH_3CH_2CH_2CH_2CH_3$ and $(CH_3)_2CHCH_2CH_3$
(3)  and $H_3C - CH_2 - C(=O) - H$
(4) $CH_3CH_2CH_2OH$ and $CH_3 - CH(OH) - CH_3$

Ans. (1)

Sol. $CH_3OCH_2CH_2CH_3$ and $CH_3\ CH_2OCH_2CH_3$
Both differ by alkyl chain (metamers)

62. Match List I with List II

	List I (Complex)		List II (Type of isomerism)
A	$[Pt(NH_3)_2Cl_2]$	I	Optical
B	$[Co(en)_3]^{3+}$	II	Solvate
C	$[Co(NH_3)_5NO_2]Cl_2$	III	Geometrical
D	$[Cr(H_2O)_6]Cl_3$	IV	Linkage

Choose the **correct** answer from the options given below:
(1) A – II, B – IV, C – III, D – I
(2) A – III, B – I, C – II, D – IV
(3) A – I, B – III, C – II, D – IV
(4) A – III, B – I, C – IV, D – II

Ans. (4)

Sol. A – Square planar (Geometrical)
B – No plane of symmetry (Optical)
C – NO_2 ambidentate Ligand (Linkage)
D – H_2O Ligand (Solvate)

63. The number of hydrogen atoms present in 5.4 g of urea is
(Given : Molar mass of urea : 60 g mol^{-1}
N_A : 6.022×10^{23} particles mol^{-1})
(1) 2.168×10^{22}
(2) 2.168×10^{23}
(3) 1.084×10^{22}
(4) 1.084×10^{23}

Ans. (2)

Sol. Urea = $NH_2.CO\ NH_2$

No. of H atoms = $\frac{5.4}{60} \times \left(6.022 \times 10^{23}\right) \times 4$

$= 2.168 \times 10^{23}$

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64. The calculated 'spin – only' magnetic moment of $Ti^{2+}(3d^2)$ is :
(1) 3.87 BM
(2) 5.92 BM
(3) 4.90 BM
(4) 2.84 BM

Ans. (4)

Sol. $Ti^{2+} = 22$

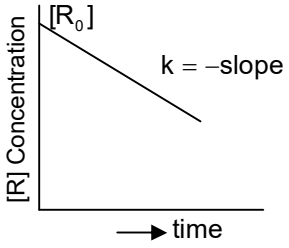
$[Ar\} = d^2$

$\mu = \sqrt{n(n+2)}$

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

$= \sqrt{8} = 2.84\,BM$

65. For a certain reaction R → Product, the plot of concentration [R] vs time has a negative slope as shown. The order of reaction is:



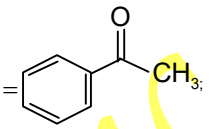
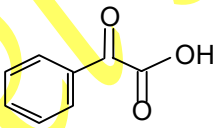
(1) 1 (2) 2
(3) 2.5 (4) 0

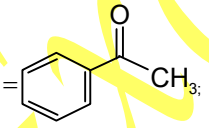
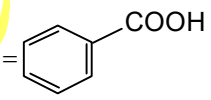
Ans. (4)

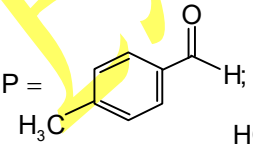
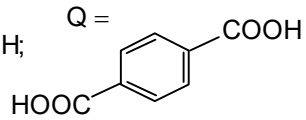
Sol. Equation : $[R\} = [R]_0^{-kt}$

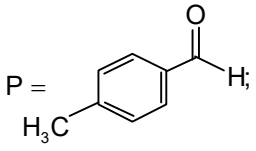
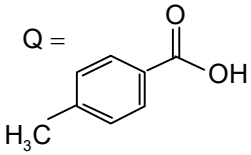
It is a zero order reaction.

66. Compound P (C_8H_8O) gives a red orange precipitate with 2,4 – DNP reagent and it does not reduce Fehling's reagent. On drastic oxidation with chromic acid, P gives an aromatic product Q that produces effervescence on treating with aq. $NaHCO_3$. Compounds P and Q, respectively, are

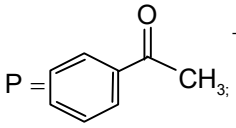
(1) P =  Q = 

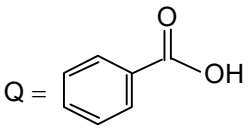
(2) P =  Q = 

(3) P =  Q = 

(4) P =  Q = 

Ans. (2)

Sol. 



67. Match List I with List II:

	List I (order of reaction)		List II (Unit of rate constant)
A	Zero order	I	$mol^{-1}\,L\,s^{-1}$
B	First order	II	$mol^{-2}\,L^2\,s^{-1}$
C	Second order	III	s^{-1}
D	Third order	IV	$mol\,L^{-1}\,s^{-1}$

Choose the **correct** answer from the options given below:
(1) A – IV, B – III, C – II, D - I
(2) A – IV, B – III, C – I, D - II
(3) A – IV, B – II, C – I, D - III
(4) A – I, B – II, C – III, D - IV

Ans. (2)

Sol. [n^{th} order reaction] unit of k → $mol^{1-n}.\,Lt^{n-1}.\,Sec^{-1}$

68. Although +3 oxidation state is most common in lanthanoids, cerium still shows +4 oxidation state because:
(1) After losing one more electron, it acquires 4f° electronic configuration.
(2) Its atomic number is 61.
(3) After losing one more electron, it acquires 4f° electronic configuration
(4) Its nearest inert gas is Radon

Ans. (3)

Sol. $Ce_{(Z=58)} : [Xe_{(z=54)}]\,4f^1\,5d^1\,6s^2$

$Ce^{+4} : [Xe_{(z=54)}]\,4f^0$

69. In a test tube containing a salt, a few drops of dilute H_2SO_4 was added, which gave colourless vapours having the smell of vinegar. The vapours turned the blue litmus paper red.
Identify the **Correct** anion from the following:
(1) Carbonate, CO^{2-}_3
(2) Sulphate, SO^{2-}_4
(3) Acetate, CH_3COO^-
(4) Sulphide, S^{2-}

Ans. (3)

Sol. $H_3C - COO^- \xrightarrow{dil.H_2SO_4} H_3C - COO$

Acetate [smell of vinegar]

70. Calculate emf of the half cell given below:

$Pt(s)|H_2(g, 2atm)|HCl(aq, 0.02M)$

$E^0_{H_2/H^+} = 0V$

$\left(Given : \frac{2.303RT}{F} = 0.059, \log 2 = 0.3010\right)$

(1) 0.035 V (2) -0.035 V
(3) -0.109 V (4) 0.109 V

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Ans. (4)

Sol. $emf = E^\circ_{cell} - \frac{0.059}{n}\log_k$

$= 0.0 - \frac{0.059}{2}\log(2\times10^{-4})$

$= 0.0 - \frac{0.059}{2}(-3.699) \quad = +0.109\ V$

$H_2 \rightleftharpoons 2H^{\oplus}$

$k = \frac{[H^+]^2}{P_{H_2}}$

$k = \frac{(2\times10^{-2})^2}{2}$

$k = 2\times10^{-4}$

71. At 298 K, a certain buffer solution contains equal concentrations of X^- and HX, K_b for X^- is 10^{-10}. What is the pH of this buffer solution?
(1) 4 (2) 6
(3) 2 (4) 10

Ans. (1)

Sol. Acidic buffer

$P^H = P^{ka} + \log\frac{[Salt]}{[Acid]} = 4 + \log_{10}{}^1 = 4$

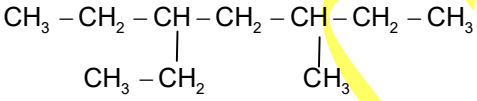
$K_b = 10^{-10}$

Then Ka = 10^{-4}

$P^{ka} = 4$

$[Hx] = [x^-]$

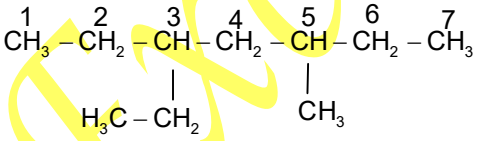
72. The correct IUPAC name of the following compound is:



(1) 3 – methyl – 5 - ethylheptane
(2) 3 – ethyl – 5- methylheptane
(3) 3,5 - diethylhexane
(4) 2,4 - diethylhexane

Ans. (2)

Sol.



3 – ethyl – 5 – methyl heptane

73. The following two reactions give the same foul smelling product z,

$C_2H_5Cl \xrightarrow{X} Z$

$C_2H_5\overset{\overset{O}{\|}}{C}NH_2 \xrightarrow{Br_2,NaOH} Y \xrightarrow[\Delta]{CHCl_3/\text{ethanolicKOH}} Z$

X and Z, respectively, are:
(1) X = AgCN; Z = C_2H_5CN
(2) X = KCN; Z = C_2H_5CN
(3) X = KCN; Z = C_2H_5NC
(4) X = AgCN; Z = C_2H_5NC

Ans. (4)

Sol. $C_2H_5Cl \xrightarrow[(X)]{AgCN} C_2H_5NC$

$C_2H_5 - CONH_2 \xrightarrow{Br_2/NaOH} C_2H_5NH_2(Y) \xrightarrow{CHCl_3/alc.koH} C_2H_5NC(Z)$

$\therefore X = AgCN$

$Z = C_2H_5NC$

74. Mixture of chloroform and acetone forms a solution with negative deviation from Raoul's law due to
(1) increase in escaping tendency of molecules of each component.
(2) Repulsive forces.
(3) Stronger intermolecular forces between chloroform molecules than those between chloroform and acetone molecules.
(4) Formation of hydrogen bonding between acetone and chloroform.

Ans. (4)

Sol. $Cl_3CH + O = C(CH_3)_2 \rightarrow$ Hydrogen bonding

75. Identify the correct statements:
A. The molality of 2.5 g of ethanoic acid (Molar mass : 60 g mol^{-1}) in 75 g of benzene solution is 0.556 m.
B. The molarity of a solution containing 5 g of NaOH (molar mass : 40 g mol^{-1}) in 450 mL of solution is 0.278 M at 298 K.
C. Aquatic species are more comfortable in cold water.
D. The solubility of gas increases with decrease in pressure.
E. For a binary mixture of A and B, the number of moles of A and B are n_A and n_B respectively. The mole fraction of B will be respectively. The mole fraction of B will be

$X_B = \frac{n_A}{n_A + n_B}$

Choose the **correct** answer from the options given below:
(1) A and B only (2) A, D and E only
(3) A, B and C only (4) A and C only

Ans. (3)

Sol. D & E incorrect

76. Idenitfy the incorrect statement from the following:
(1) ECl_3 (E = B and Al) is a monomer when E = B and dimer when E = Al.
(2) The order of catenation property of Group 14 elements is C >> Si >Ge ≈ Sn.
(3) Oxygen exhibits only – 2 oxidation state.
(4) Carbon has the ability to form $p\pi - p\pi$ multiple bond with itself.

Ans. (3)

Sol. B has small size absent of vacant d orbitals des not dimerised

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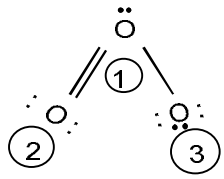
77. 

The correct formal charges on oxygen atoms numbered 2, 1 and 3 respectively are:

(1) -1, 0, +1 (2) 0, 0, 0
(3) 0, +1, -1 (4) +1, 0, -1

Ans. (3)

Sol. The formals charge is measured with Lewis dot geometry.

78. At a certain temperature, T(K), during a process 500 J is absorbed by the system and work of 200 J is one by the system. Then change in internal energy of the system is:

(1) 500 J (2) 400 J
(3) 300 J 4) 700 J
(4)

Ans. (3)

Sol. $\Delta U = q - w$

79. Consider the following reaction:

$2A(g) + B(g) \rightarrow 2D(g)\ \Delta U^{\circ} = -10\,kJmol^{-1}$ and

$\Delta S^{\circ} = -44\,JK^{-1}$ at 298 K.

Identify the correct option with ΔG° for the reaction and spontaneity of the reaction at 298 K.(Given: R = 8.31 J $mol^{-1}K^{-1}$)

(1) -0.63568 kJ mol^{-1} spontaneous
(2) +0.63568 kJ mol^{-1} non-spontaneous
(3) -1.635 kJ mol^{-1} spontaneous
(4) +1.635 kJ mol^{-1} non-spontaneous

Ans. (2)

Sol. $(\Delta H = \Delta U + \Delta nRT)$

$= -10 + (-1 \times 8.314 \times 10^{-3})\ 298$

$= -12.477$

$\Delta G = \Delta H - T\Delta S$

$= -12.477 - (298 \times -44 \times 10^{-3}$

+0.63568 kJ mol^{-1} non-spontaneous

80. Select the reagents that reduce nitriles to primary amines:

A. (i) Li AlH_4;(ii) H_2O
B. Sn + HCl
C. H_2 / Ni
D. Na(Hg) / C_2H_5OH
E. Br_2 / aq.NaOH

Choose the **correct** answer from the option given below:

(1) A, C and D only (2) A, B and C only
(3) B, D and E only (4) A, D and E only

Ans. (1)

Sol. Be – 4 – $1s^2 2s^2$ – 2nd period

Na mg, si, P – 3rd period

In periods : Atomic site ↓ es - L – R

→ Metaliccharacles ↓ es

In 2nd group Be,mg} more metallic than "B'e'

81. Which one of the following is an ambidentate ligand?

(1) Oxalate
(2) Ethylendiaminetetraacetate ion
(3) Thiocyanate
(4) Ethan -1, 2- diamine

Ans. (3)

Sol. Thiocyanacte $SCN^{-}\pi$ can bindto a metal through $N(\pi)S$

82. A bulb is rated at 150 watt, converting 8 % energy into ligt. If energy of one photon is 4.42×10^{-19} J, how many photons are emitted by the bulb per second?

(1) 1.35×10^{19} (2) 2.71×10^{19}
(3) 27.2×10^{19} (4) 4.06×10^{19}

Ans. (2)

Sol. E = nh ν

83. Identify the incorrect statement from the following:

(1) Nitrogen can form $p\pi - p\pi$ multiple bonds with itself.
(2) $P(C_2H_5)_3$ and $As(C_6H_5)_3$ form $d\pi - d\pi$ with transition metals.
(3) Nitrogen can form $d\pi - p\pi$ with Oxygen.
(4) Phosphorus, arsenic and antimony show catenation property.

Ans. (3)

Sol. Nitrogen can form $d\pi - p\pi$ with Oxygen.

Nitrogen can form $d\pi - p\pi$ with Oxygen. Is incorrect due to lack of d-orbitals in its valency sheet n cannot form a perid metallic character decreases in a $d\pi - p\pi$ bonds

84. The correct order of increasing metallic character of Na, Be, P, Mg and Si is:

(1) P< Si< Be< Mg < Na
(2) Be < Si < P < Mg < Na
(3) P < Si < Na < Mg < Be
(4) P < Mg < Be < Si < Na

Ans. (1)

Sol. In a period metallic character decreases in a group increases.

85. In a qualitative analysis, Bi^{3+} is detected by appearance of precipitate of BiO(OH)(s). Calculate pH when the following equilibrium exists at 298 K:

$BiO(OH)(s) \rightleftharpoons BiO^{+}(aq) + OH^{-}(aq),\ K = 4 \times 10^{-10}$

(Given: log 2 = 0.3010)

(1) 4.699 (2) 9.301
(3) 5.286 (4) 8.714

Ans. (2)

Sol. $BIO(OH) \rightleftharpoons BiO^{+} + OH^{-}$

$K_{(eq)} = [Bio^{+}][OH^{-}] = 4 \times 10^{-10} = S \cdot S$

$S^2 = 4 \times 10^{-10}$

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$S^2 = 4\times10^{-10}$ $S = \sqrt{4\times10^{-10}} = 2\times10^{-5}$

$P^{OH} = -\log\left[OH^-\right]$

$= -\log\left(2\times10^{-5}\right) = 5 - \log 2 = 5\text{-}0.3010$

$= 9.6990 = 19 - P^{OH} = 19\text{-}4.699 = 9.301$

86. Match List I with List II

A.	C_2H_4	I.	3σ bonds, 2π bonds
B.	C_2H_2	II.	3σ bonds, one lone pair
C.	CH_4	III.	4σ bonds
D.	NH_3	IV.	5σ bonds, 1π bond

Choose the correct answer from the options given below:

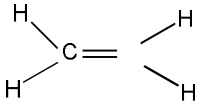
(1) A-I, B-II, C-IV, D-III

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

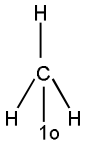
(3) A-III, B-IV, C-II, D-I

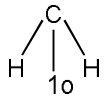
(4) A-IV, B-I, C-III, D-II

Ans. (4)

Sol. A. C_2H_4  , 5σ bonds, 1π bond

B. C_2H_2 $B-C\equiv C-H$ $3\sigma, 2\pi$ bond

C. CH_4  4π bond

D. NH_3  3σ bonds, one lone pair

87. Given below are certain reactions. Identify the reaction for which $K_p \neq K_c$.

(1) $N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$

(2) $H_2O(g) + CO(g) \rightleftharpoons H_2(g) + CO_2(g)$

(3) $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$

(4) $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$

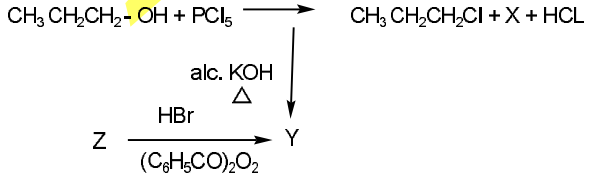
Ans. (4)

Sol. $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$

$\Delta n = 2 - 4 = -2$

$\Delta n = -ve.\ K_p < K_c$

88. In the following reaction sequence, X and Z, respectively are:



(1) $X = H_3PO_3$; $Z = CH_3 - \underset{\underset{Br}{|}}{CH} - CH_3$

(2) $X = POCl_3$; $Z = CH_3 - \underset{\underset{Br}{|}}{CH} - CH_3$

(3) $X = H_3PO_3$; $Z = CH_3CH_2 - Br$

(4) $X = POCl_3$; $Z = CH_3CH_2CH_2 - Br$

Ans. (4)

Sol. $X = POCl_3$; $Z = CH_3CH_2CH_2 - Br$

89. The major product Z formed in the following sequence of reactions is

$C_2H_6 \xrightarrow[\text{UV light}]{Cl_2} \underset{\text{(monochlorinated product)}}{X} \xrightarrow{NH_3} Y \xrightarrow[(ii)H_2O]{(i)NaNo_2\,HCl} Z$

(1) $C_2H_5NO_2$ (2) $C_2H_5 - \equiv N - OH$

(3) $C_2H_5NH_2$ (4) C_2H_5OH

Ans. (4)

Sol. Reaction $C_2H_6 \xrightarrow[U.V.light]{Cl_2} \underset{(X)}{CH_3 - CH_2 - Cl}$

$CH_3 - CH_2 - Cl \xrightarrow{NH_3} CH_3 - CH_2 - NH_2$

$CH_3 - CH_2 - NH_2 \xrightarrow[ii)H_2O]{1)NaNO_2+HCl} \underset{(Z)}{CH_3 - CH_2 - O}$

90. When 1 dm^3 of CO_2 gas is passed over hot coke, the volume of gaseous mixture after complete reaction at STP becomes 1.4 dm^3. The compositions of the gaseous mixture at STP is:

(1) 0.6 dm^3 of CO 0.8 dm^3 of CO_2

(2) 0.6 dm^3 of CO, 0.4 dm^3 of CO_2

(3) 0.8 dm^3 of CO, 0.8 dm^3 of CO_2

(4) 0.8 dm^3 of CO, 0.6 dm^3 of CO_2

Ans. (4)

$CO_{2(g)} + C_{(s)} \rightarrow 2CO_{(g)}$

Sol. (1) (2)

$(1-x)dm^3$ $2xdm^3$

Total volume = (1–x) + 2x = 1.4 dm^3

1) 1+X = 1.4 $\Rightarrow$ x= 0.4 dm^3

Then 1) Volume of CO = 2(0.4) = 0.8 dm^3

2) Volume of CO_2 = 1– 0.4 = 0.6 dm^3

91. Match List I with List II

	List I (Phase of cell cycle)		List II (Activity)
A	G_1 phse	I	Actual cell division occurs
B	S phase	II	Cell is metabolically active and continuously grows but does not replicate its DNA
C	G_2 phase	III	Synthesis of DNA occurs and the amount of DNA per cell doubles
D	M phase	IV	Proteins are synthesized while cell growth continues

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Choose the **correct** answer from the options given below:

(1) A–II, B–III, C–IV, D–I
(2) A–IV, B–I, C–II, D–III
(3) A–III, B–IV, C–I, D–II
(4) A–I, B–II, C–III, D–IV

Ans. (1)

Sol. A–II, B–III, C–IV, D–I

92. Match List I with List II

List I (Phase of cell cycle)		List II (Activity)	
A	Incomplete dominance	I	Human skin colour
B	Co– dominance	II	Inheritance of flower colour in Antirrhinum sp.
C	Pleiotropy	III	Phenylketonuria disease in humans
D	Polygenic inheritance	IV	ABO blood groups

Choose the correct answer from the options given below:

(1) A–II, B–IV, C–III, D–I
(2) A–I, B–IV, C–III, D–II
(3) A–I, B–III, C–II, D–IV
(4) A–II, B–I, C–III, D–IV

Ans. (1)

Sol. A–II, B–IV, C–III, D–I

93. Which of the following statements are correct?

A. The Amazon rainforest being cut and cleared for cultivation of soyabeans is an example of habitat loss.
B. Steller's sea cow and passenger pigeon became extinct due to over–exploitation by humans
C. The Nile perch introduced into Lake Victoria in East Africal helped in population growth of cichlid fish in the lake.
D. Water hyacinth is an invasive species
E. When a species becomes extinct, the plant and animal species associated with it are not affected.

Choose the correct answer from the options given below.

(1) B, C and D only
(2) A, B and D only
(3) A, B and E only
(4) C, D and E only

Ans. (2)

Sol. The Nile perch introduced into Lake Victoria in East Africal helped in population extinction of cichlid fish in the lake.

When a species becomes extinct, the plant and animal species associated with it are affected.

94. Which of the following statements are correct with reference to a transcription unit?

A. A transcription unit in DNA is defined primarily by three regions : promoter, structural gene and terminator.
B. The promoter is said to be located towards the 5'– end of the structural gene.
C. The promoter is a DNA sequence that provides binding site for RNA polymerase.
D. The promoter defines the template and coding strands
E. The terminator is located towards the 3' – end of the coding strand and it defines the end of the process of transcription.

Choose the **correct** answer from the options given below:

(1) A, C, D and E onlly
(2) A, B, C, D and E
(3) A, B, C and D onlly
(4) B, C, D and E onlyl

Ans. (2)

Sol. A. A transcription unit in DNA is defined primarily by three regions : promoter, structural gene and terminator.
B. The promoter is said to be located towards the 5'– end of the structural gene.
C. The promoter is a DNA sequence that provides binding site for RNA polymerase.
D. The promoter defines the template and coding strands
E. The terminator is located towards the 3' – end of the coding strand and it defines the end of the process of transcription.

95. Which of the following statements are true with reference to the sex–determination in honeybees

A. An offspring formed from the union of a sperm and an egg, develops as a female (queen or worker)
B. An unfertilized egg develops as a male by parthenogenesis
C. A male has half the number of chromosomes than that of a female
D. Males produce sperms by meiosis
E. Honeybees have a haplodiploid sex–determination system

Choose the **correct** answer from the options given below:

(1) A, B,C and E only (2) B,C,D and E only
(3) A, B,C and D only (4) A,B,D and E only

Ans. (1)

Sol. D. Males produce sperms by mitosis

96. Match List I with List II

List I (Process)		**List II (Location)**	
A	Glycolysis	I	Inner mitochondrial membrane
B	ETS	II	Mitochondrial matrix
C	Accumulation of protons	III	Cytoplasm
D	Krebs' cycle	IV	Intermembrane space

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Choose the correct answer from the options given below.
(1) A–IV, B–II, C–I, D–III
(2) A–I, B–IV, C–III, D–II
(3) A–II, B–III, C–IV, D–I
(4) A–III, B–I, C–IV, D–II

Ans. (4)

Sol. A–III, B–I, C–IV, D–II

97. How many ATP and NADPH molecules are required to make one molecule of glucose through the Calvin pathway
(1) 18 ATP and 12 NADPH
(2) 6 ATP and 12 NADPH
(3) 24 ATP and 18 NADPH
(4) 12 ATP and 18 NADPH

Ans. (1)

Sol. 18 ATP and 12 NADPH

98. Match List I with List II

	List I		List II
A	Genetically modified organism	I	Agrobacterium tumefaciens
B	Thermostable DNA polymerase	II	Bt cotton
C	Ti plasmid	III	Thermus aquaticus
D	pBR322	IV	Escherichia coli

Choose the correct answer from the options given below:
(1) A–II, B–III, C–I, D–IV
(2) A–I, B–IV, C–III, D–II
(3) A–I, B–II, C–IV, D–III
(4) A–II, B–I, C–IV, D–III

Ans. (1)

Sol. A–II, B–III, C–I, D–IV

99. In which one of the following, the ovules are not enclosed by an ovary wall and remain exposed?
(1) Funaria
(2) Pinus
(3) Selaginella
(4) Wolffia

Ans. (2)

Sol. Pinus (Gymnosperm)– naked ovule

100. The enzyme required for carboxylation in the Calvin cycle is
(1) Carboxypeptidase
(2) PEP carboxylase
(3) RuBP carboxylase – oxygenase
(4) Hexokinase

Ans. (3)

Sol. RUBP carboxylase – oxygenase

101. Match List I with List II

	List I		List II
A	Trypsin	I	Intercellular ground substance
B	Morphine	II	Lectin
C	Concanavalin A	III	Enzyme
D	Collagen	IV	Alkaloid

Choose the **correct** answer from the options given below:
(1) A–III, B–IV, C–II, D–I
(2) A–III, B–II, C–IV, D–I
(3) A–I, B–II, C–III, D–IV
(4) A–IV, B–III, C–II, D–I

Ans. (1)

Sol. A–III, B–IV, C–II, D–I

102. Which of the following statements are correct regarding amino acids?
A. They are substituted methanes
B. Serine is an aromatic amino acid
C. Valine is a neutral amino acid
D. Lysine is an acidic amino acid
Choose the correct answer from the options given below
(1) C and D only (2) A and C only
(3) B and C only (4) A and B only

Ans. (2)

Sol. Serine is neutral amino acid
Lysine is basic amino acid

103. Which one of the following disorders is caused by the substitution of Glutamic acid (Glu) by Valine (Val) at the sixth position of the beta globin chain of the haemoglobin molecule?
(1) Thalassemia
(2) Haemophilia
(3) Sickle–cell anaemia
(4) Phenylketonuria

Ans. (3)

Sol. Sickle–cell anaemia

104. Which one of the following is the site for active ribosomal RNA synthesis?
(1) Kinetochore (2) Centrosome
(3) Chromatin (4) Nucleolus

Ans. (4)

Sol. Nucleolus

105. Which one of the following statements is not true about the universal rules of binomial nomenclature?
(1) Both the words in a biological name, when handwritten, are separately underlined or printed in italics.
(2) Biological names are generally in Latin
(3) The specific – epithet in the biological name starts with a small letter
(4) The first word in the biological name represents the specific epithet, while the second component denotes the genus

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Ans. (4)

Sol. The first word in the biological name represents the genus, while the second component denotes the specific epithet

106. Match List I with list II:

	List I (Growth Regulator)		List II (Function/Effect)
A.	2,4 -D	I.	Brewing industry
B.	GA3	II.	Stimulation of stomatal closure
C.	Kinetin	III.	Herbicide
D.	ABA	IV.	Nutrient mobilisation

Choose the **correct** answer from the options given below.

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

Ans. (4)

Sol. Match the following

107. Match list I with list II

	List I		List II
A.	Conjunctive tissue	I.	Specialised cells in the vicinity of guard cells
B.	Casparian strips	II.	Endodermal cells rich in starch
C.	Subsidiary cells	III.	Tissue between xylem and phloem
D.	Starch sheath	IV.	Endodermal cells with suberin deposition from the options given

Choose the correct answer from the options given below:

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

Ans. (1)

Sol. Match the following

108. Which one of the following types of pollination brings genetically different types of pollen grains to the stigma?

(1) Cleistogamy (2) Auatogamy
(3) Geitonogamy (4) Xenogamy

Ans. (4)

Sol. Xenogamy is genetically and structurally cross pollination

109. Heterophyllous development in response to environment is an example of which of the following phenomena?

(1) Plasticity
(2) Dedifferentiation
(3) Redifferentiation
(4) Elasticity

Ans. (1)

Sol. Presence of different types of leaf shows phenomenon called heterophylly.

110. Which of the following statements are **not** true regarding restriction endonucleases?

A. They are called molecular scissors.
B. These are the enzymes responsible for restricting the growth of bacteriophages in E. *coli*
C. They cut the DNA only at the center of the palindromic sites.
D. They remove nucleotides only from the ends of DNA fragments.
E. They recognize specific palindromic base-pair sequences.

Choose the answer from the options given below.

(1) A and E only
(2) D and E only
(3) A and B only
(4) C and D only

Ans. (4)

Sol. They don't always s cut DNA from the centre of palindromic sequence.

111. Arrange the following steps of DNA fingerprinting in a correct sequence.

A. Isolation of DNA and its digestion by restriction endonucleases.
B. Hybridisation using a labelled VNTR probe.
C. Transferring of separated DNA fragments to synthetic membranes.
D. Detection of hybridised DNA fragments by autoradiography.
E. Separation of DNA fragment by electrophoresis

Choose the correct answer from the options given below:

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

Ans. (2)

Sol. A, E, C, B, D

112. Find the ***incorrect*** statement(s) about photosynthesis from the following:

A. The water splitting complex Is associated with PS I.
B. C_4 Plants use the C_3 pathway of CO_2 fixation as the man I biosyntheticpathway.
C. In C_4 plants, photorespiration does not occur
D. C_3 plants exhibit 'Kranz' anatomy.
E. ATP synthesis in chloroplast occurs through chemiosmosis

Choose the answer from the options given below:

(1) B and C only
(2) B only
(3) A and D only
(4) B and E only

Ans. (3)

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Sol. Water splitting complex is associated with PS II and C_4 plants has kranz anatomy

113. Arrange the following steps of somatic hybridization in a correct sequence.
A. Digestion of cell walls.
B. Isolation of naked protoplasts.
C. Fusion of protoplasts to get hybrid protoplast.
D. Isolation of single cells from two different varieties of plants.
E. Growing of hybrid protoplast to form a new plant.
Choose the **correct** answer from the options given below:
(1) E, A, B, C, D
(2) D,B,A,E,C
(3) E,B,A,D,C
(4) D,A,B,C,E
Ans. (4)
Sol. D.A,B,C,E.

114. The main function of bulliform cells in grasses is:
(1) To make the leaf impermeable to fungal spores.
(2) To perform photosynthesis.
(3) To minimize water loss during water stress.
(4) To transport water.
Ans. (3)
Sol. The main function of Bulliform cells in grasses is to minimize water loss during water stress.

115. Arrange the following in the correct developmental sequence related to microsporogenesis:
A, Microspore tetrads
B, Sporogenous tissue
C, Pollen grains
D, Pollen mother cells
Choose the correct answer from the options given below:
(1) D, A, C, B
(2) B, D, C, A
(3) A, D,C, B
(4) B, D, A, C
Ans. (4)
Sol. B $\rightarrow$ D $\rightarrow$ A $\rightarrow$ C
Sporogenous tissue $\rightarrow$ Pollen mother cells $\rightarrow$ Microspore tetrad $\rightarrow$ Pollengrains

116. Which oof the following is an ***in situ*** conservation method ?
(1) Seed Banks
(2) Wildlife Safari Parks
(3) Botanical Gardens
(4) Sacred Groves
Ans. (4)
Sol. In nany culture, tracts of forest were set aside and all the trees and wildlife within were venerated & given total protection.

117. Which one of the following is a triploid cell ?
(1) Zygote
(2) Central cell
(3) Primary endosperm cell
(4) Synergrid
Ans. (3)
Sol. Primary endosperm cell is triploid, which is product of triple fusion.

118. Since the origin and diversification of life on Earth, there have been five episodes of mass extinction of species. How id the sixth extinction, which in progress, different from the previous episodes ?
(1) The current species extinction rates are far ower than those in previous episodes.
(2) The current species extinction rate is nearly 10 times faster then that in previous episodes.
(3) The presenr net species extinction rare is zero.
(4) The present species extinction rates are 100 to 1000 times faster than in the pre- human times.
Ans. (4)
Sol. The present species extinction rates are 100 to 1000 times faster than in the pre– human times

119. In the lac operon the z gene codes for:
(1) permease
(2) the repressor of lac operon
(3) transacetylase
(4) beta-galactosidase
Ans. (4)
Sol. 'Z' gene code for beta galactosidase enzyme

120. In racemose inflorescence,
(1) flowers are borne in an acropetal succession
(2) flowers are solitary
(3) the growth is limited
(4) the main axis terminates in a flower
Ans. (1)
Sol: Flowers are borne in an acropetal succession

121. The main criteria used for Five Kingdom Classification proposed by R.H.Whittaker (1969) included:
(A) Cell structure
(B) Body organization
(C) Presence of flagellum
(D) Reproduction
(E) Phylogenetic relationships
Choose the correct answer from the options given below:
(1) A, B, C, D and E
(2) A, B, D and E only
(3) B, C and D only
(4) A, B and E only
Ans. (2)
Sol. Presence of flagellum is not under five kingdom classification criteria.

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122. "The Evil Quartet" of biodiversity loss includes which of the following?
(1) Habitat loss and fragmentation; over-exploitation; Alien species invasions: Co-extinctions
(2) Over-exploitation; Alien species invasions; Air pollution; Co-extinctions
(3) Habitat loss and fragmentation; Air pollution; Water pollution; Co-extinctions
(4) Over-exploitation; Alien species invasions; Soil pollution; Co-extinctions

Ans. (1)
Sol. Habitat loss and fragmentation; over-exploitation; Alien species invasions: Co- extinctions.

123. Identify the **correct** sequence of steps in each cycle of Polymerase Chain Reaction:
(1) Annealing → Denaturation → Extension
(2) Extension → Annealing → Denaturation
(3) Denaturation → Extension → Annealing
(4) Denaturation → Annealing → Extension

Ans. (4)
Sol. Denaturation → Annealing → Extension

124. $2(C_{51}H_{98}O_6)+145O_2 \rightarrow 102\ CO_2+98\ H_2O+\text{energy}$
The Respiratory Quotient (RQ) of a biomolecule used for respiration, as per the above eqution, would be:
(1) 1.0
(2) Less than 0.5
(3) Between 0.5 and 0.95
(4) Between 1.25 and 2

Ans. (3)
Sol. RQ=0.7

125. Exploring molecular, genetic and species-level diversity for products of economic importance is called:
(1) Biomagnification (2) Bioremediation
(3) Biofortification (4) Bioprospecting

Ans. (4)
Sol. Exploring molecular, genetic and species-level diversity for products of economic importance is called bioprospecting

126. Match List I with List II:

	List I		List II
A.	Decomposition	I.	Accumulation of dark coloured amorphous colloidal substance
B.	Detritus	II.	Release of inorganic nutrients by the activity of microbes in soil
C.	Mineralisation	III.	Breaking down of complex organic matter into inorganic substances
D.	Humification	IV.	Dead remains of plants and animals including fecal matter

Choose the correct answer from the options given below:
(1) A-III, B-II, C-I, D-IV
(2) A-I, B-II, C-III, D-IV
(3) A-IV, B-III, C-I, D-II
(4) A-III, B-IV, C-II, D-I

Ans. (4)
Sol. Matching type

127. Identify the correct statements about biomolecules.
A. Lipids are generally water soluble.
B. Proteins are polypeptides
C. Polysaccharides are long chains of sugars.
D. Adenine and guanine are substituted pyrimidines.
E. Almost all enzymes are proteins.
Choose the **correct** answer from the options given below:
(1) C, D and E only
(2) B, C and E only
(3) B, D and E only
(4) A, B and C only

Ans. (2)
Sol. Lipids are generally water insoluble.
Adenine and guanine are purines not pyrimidines.

128. In angiosperms, root hairs arise from which one of the following regions of the root?
(1) The region of meristematic activity
(2) The root cap zone
(3) The region of maturation
(4) The region of elongation

Ans. (3)
Sol. In angiosperms, root hairs arise from the region of maturation.

129. Which one of the following is **not** a characteristic of plant cells in the phase of elongation?
(1) Large conspicuous nuclei
(2) Increased vacuolation
(3) Cell enlargement
(4) New cell wall deposition

Ans. (1)
Sol. Large conspicuous nuclei is a character of meristematic region

130. Which of the following floral formula is the correct floral formula of Solanaceae family?
(1) $\oplus\ \female\ K_{(5)}\overbrace{C_{(5)}A_5}\underline{G}_{(2)}$
(2) $\oplus\ \female\ K_5\overbrace{C_{(5)}A_5}\underline{G}_{(2)}$
(3) $\oplus\ \female\ K_5C_5A_5\underline{G}_{(2)}$
(4) $\oplus\ \female\ K_5C_{(5)}A_5\underline{G}_{(2)}$

Ans. (1)
Sol. It is a floral formula of Solanaceae family.

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131. Which of the following statements are correct with reference to packaging of DNA helix?
A. Histones are organized to form a unit of eight molecules called histone octamer
B. Histones are negatively charged basic proteins.
C. Histones are rich in the basic amino acid residues –lysine and arginine.
D. The positively charged DNA is wrapped around the histone octamer to form nucleosome.
E. The packaging of chromatin at higher levels requires an additional set of proteins called non-histone chromosomal proteins.
Choose the **correct** answer from the options given below:
(1) A, B and D only
(2) B, D and E only
(3) A, C and E only
(4) C, D and E only
Ans. (3)
Sol. Histones are positively charged basic proteins.
The Negatively charged DNA is wrapped around the histone octamer to form nucleosome.

132. Which of the following statements are correct with respect to DNA separation, isolation and visualization ?
A. The cutting of DNA is done by molecular scissors.
B. The DNA fragments separate according to their size in an agarose gel, upon electrophoresis.
C. The separated DNA fragments can be seen without staining when exposed to UV light.
D. The separated DNA fragments, when stained with ethidium bromide can be seen in visible light.
Choose the **correct** answer from the options given below:
(1) B and C only
(2) B and D only
(3) A and B only
(4) A and D only
Ans. (3)
Sol. The separated DNA fragments can be seen with staining when exposed to UV light.
The separated DNA fragments, when stained with ethidium bromide can be seen in UV light.

133. Alpha-helix is found in which level of protein structure?
(1) Tertiary structure
(2) Quaternary structure
(3) Secondary structure
(4) Primary structure
Ans. (3)
Sol. Alpha-helix is secondary structure. Right handed folding leading to secondary structure.

134. Match List I with List II:

	List I		List II
A.	Productivity	I	Gross primary Productivity minus respiration losses
B.	Net primary Productivity	II.	Rate of formation of new organic matter by consumers
C.	Gross primary Productivity	III.	Rate of biomass Production
D.	Secondary Productivity	IV.	Rate of production of organic matter during photosynthesis

Choose the **correct** answer from the options given below:
(1) A-III, B-I, C-IV, D-II
(2) A-I, B-II, C-III, D-IV
(3) A-III, B-I, C-II, D-IV
(4) A-I, B-III, C-IV,D-II
Ans. (1)
Sol. Matching type

135. Match List I with List II.

	ListI (Placentation)		List II (Example)
A.	Marginal	I.	Mustard
B.	Axile	II.	Pea
C	Parietal	III.	Marigold
D.	Basal	IV.	Lemon

Choose the **correct** answer from the options given below:
(1) A-I, B-III, C-II, D-IV
(2) A-IV, B-II, C-I, D-III
(3) A-II, B-IV, C-I, D-III
(4) A-III, B-I, C-IV, D-II
Ans. (3)
Sol. Matching type.

136. Choose the correct statements regarding frog's anatomy:
A. Hepatic portal system is the special venous connection between liver and intestine.
B. There are twelve pairs of cranial nerves arising from the brain.
C. The ureters and oviducts open separately into the cloaca in female frogs.
D. Hind-brain consists of cerebellum, medulla oblongata and optic lobes.
E. Sinus venosus joins the right atrium of heart.
Choose the correct answer from the options given below:
(1) B and D only
(2) A, B and C only
(3) A, C and E only
(4) B and C only
Ans. (3)
Sol. B – Wrong (frogs have 10 pairs, not 12)

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D – Wrong (hindbrain includes cerebellum + medulla, but optic lobes are midbrain)

137. The flightless bird with forelimbs modified as paddle-like structures suited for swimming is known as:
(1) *Aptenodytes*
(2) *Neophron*
(3) *Psittacula*
(4) *Struthio*

Ans. (1)

Sol. Aptenodytes (Penguin)

138. Male frogs can be distinguished from female frogs due to the presence of:
A. Bulging eyes
B. Vocal sacs
C. Webbed digits in feet
D. Copulatory pad on first digit of forelimbs
E. Olive green-coloured skin with dark irregular spots

Choose the correct answer from the options given below:
(1) B and D only
(2) B and C only
(3) A and B only
(4) C and E only

Ans. (1)

Sol. Vocal sacs, Copulatory (nuptial) pads

139. A group of researchers produced some fish-like animals upon investigation the following characters were observed:
A. Endoskeleton was made of cartilage.
B. Ectoparasitic; as they were found attached on fish skin with their circular sucking mouth.
C. Paired fins and scales were absent, but 7 pairs of gill slits were present.

Which one of the following species of animals did they consider to fit best with these characters?
(1) *Petromyzon* sp
(2) *Branchiostoma* sp
(3) *Scoliodon* sp
(4) *Exocoetus* sp

Ans. (1)

Sol. *Petromyzon* (Lamprey)

140. In humans, respiration occurs in the following steps. Arrange these steps in the correct order.
A. Diffusion of O_2 and CO_2 between blood and tissues
B. Diffusion of O_2 and CO_2 across alveolar membrane
C. Pulmonary ventilation by which atmospheric air is drawn in and CO_2 rich alveolar air is released out
D. Cellular respiration
E. Transport of gases by the blood

Choose the correct answer from the options given below:
(1) A, B, C, D, E
(2) E, A, C, D, B
(3) C, B, E, A, D
(4) C, A, B, E, D

Ans. (3)

Sol. 1. Ventilation
2. Alveolar diffusion
3. Gas transport
4. Tissue diffusion
5. Cellular respiration

141. Non-membrane bound cell organelles found in both prokaryotic and eukaryotic cells are _____.
(1) Mitochondria
(2) Lysosomes
(3) Centrosomes
(4) Ribosomes

Ans. (4)

Sol. Ribosomes

142. Choose the correct statement regarding GIFT to overcome infertility:
(1) Ova collected from a female donor are transferred to the uterus of an infertile female.
(2) Early embryos with up to 8 blastomeres are transferred into the fallopian tube of an infertile female.
(3) It is the transfer of an ovum collected from a donor into the fallopian tube of another female who cannot produce ovum but can provide suitable environment for fertilization and development.
(4) Early embryos with up to 8 blastomeres are transferred to the uterus of an infertile female.

Ans. (3)

Sol. Transfer of ovum into fallopian tube of another female

143. Choose the correct statements regarding muscle contraction:
A. A motor neuron carries a signal sent by the Central Nervous System (CNS) to the sarcolemma of the muscle fibre.
B. The neural signal generates an action potential which causes the release of Ca^{2+} into sarcoplasm.
C. Increase in Ca^{2+} inactivates the actin for breaking cross bridges.
D. Actin binds to the myosin head to form a cross bridge.
E. Shortening of sarcomere takes place by pulling actin filaments towards the centre of 'A' band.

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Choose the **correct** answer from the options given below:
(1) C and E only
(2) A, B, D and E only
(3) A and B only
(4) C and D only

Ans. (2)

Sol. A – Signal by motor neuron
B – Ca^{2+} release
D – Cross-bridge formation
E – Sarcomere shortening
C – Incorrect

144. Insertion of a foreign DNA at BamHI site in an *E. coli* cloning vector pBR322 results in the loss of antibiotic resistance towards:
(1) Ampicillin and tetracycline
(2) Tetracycline
(3) Ampicillin
(4) Gentamycin

Ans. (2)

Sol. Tetracycline

145. The specific receptors for neurotransmitters in a synapse are present on:
(1) Post-synaptic membrane
(2) Pre-synaptic membrane
(3) Myelin sheath
(4) Schwann cell

Ans. (1)

Sol. Post-synaptic membrane

146. Which of the following statements are correct with reference to human endoskeleton ?
A. Human skull is monocondylic.
B. The joint between any two adjoining vertebrae is a cartilaginous joint.
C. In human beings, the number of cervical vertebrate is seven.
D. All ribs except the last 12 pairs are bicephalic.
E. The occipital bone of skull is articulates with atlas vertebra.

Choose the correct answer from the options given below.
(1) B, C and E only
(2) C, D and E only
(3) A, B and D only
(4) B and E only

Ans. (1)

Sol. A. Human skull dicondylic
D. All ribs except last 2 pairs are bicephalic

147. the Human protein named α-1-antitrypin, abtained from transgenic animals, is used for the treatment of _____
(1) Alzheimer' s disease
(2) Emphysema
(3) Cystic fibrosis
(4) rheumatoid arthritis

Ans. (2)

Sol. the Human protein named α-1-antitrypin, abtained from transgenic animals, is used for the treatment of emphysema

148. Select the incorrect statements with reference to Rh grouping.
A. Erythroblastosis foetails is a condition observed having foetus with Rh^{-ve} bold and mother with Rh^{+ve} blood.
B. Rh antigen is observed in RBCs group should also be matched.
C. Before blood transfusion, Rh group s
D. Rh incompatibility is observed when a pregnant mother is Rh^{-ve} and the foetus is Rh^{+ve}
E. Erythroblastosis foetalis can be avoided by administering anti – Rh antibodies to the mother immediately after the delivery of the second child.

Choose the answer from the options given below.
(1) B and C only
(2) A and B only
(3) A and E only
(4) C and D only

Ans. (3)

Sol. A. Erythroblastosis foetails is a condition observed having foetus with Rh^{+ve} bold and mother with Rh^{-ve} blood.
E. Erythroblastosis foetalis can be avoided by administering anti – Rh antibodies to the mother immediately after the delivery of the first child.

149. match List I with List II:

	List I (Drug)		**List II (Effect)**
A	Nicotine	I	Cause sense of euphoria and increased energy
B	Morphine	II	Stimulates adrenal gland to release catecholamines into blood circulation
C	Heroin	III	Effective sedative and painkiller
D	Cocaine	IV	A depressant; slows down body function

Choose the **correct** answer from the options given below:
(1) A-II, B-III, C-IV, D-I
(2) A-III, B-II, C-I, D-IV
(3) A-III, B-II, C-IV, D-I
(4) A-II, B-III, C-I, D-IV

Ans. (1)

Sol. Matching type

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150. Match List I with List II related to muscular/skeletal system:

	List I		List II
A	Tetany	I	Inflammation of joints
B	Arthritis	II	Autoimmune disorder affecting neuromuscular junction
C	Myasthenia gravis	III	Wild contraction in muscle due to low Ca^{++} in body fluid
D	Muscular dystrophy	IV	Progressive degeneration of skeletal muscle

Choose the **correct** answer from the options given below:

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

Ans. (2)

Sol. Matching type

151. Match List I with List II :

	List I		List II
A.	Progestasert	I.	Barrier made of rubber used by females
B.	Multiload 375	II.	Oral contraceptive
C.	Diaphragam	III.	Hormone releasing IUD
D.	Saheli	IV.	Copper releasing IUD

(1) A – IV, B – II, C – I, D – III
(2) A – III, B – IV, C – II, D – I
(3) A – III, B – IV, C – I, D – II
(4) A – IV, B – III, C – I, D – II

Ans. (3)

Sol. Matching type

152. Salect the correct statements regarding cell membrane in eukaryotic cell.

A. Membrane of human RBCs has approximately 52% protein.
B. Major phospholipids are arranged in a bilayer.
C. Extensions of the plasma membrane into the cell form mesosomes.
D. Tails towards the inner part of lipids are hydrophobic and thus protected from aqueous medium.
E. Glyococalyx is present on the outer surface of the plasma membrane.

Choose the correct answer from the options given below :

(1) C, D and E only
(2) B, C and E only
(3) A, C and E only
(4) A, B and D only

Ans. (4)

Sol. Mesosomes are absent in eukaryotic cell.
Glyococalyx is present on the outer surface of the cell wall.

153. Choose the correct statements regarding cell organelles and their inclusions.

A. The endomembrane system includes Golgi complex, endoplasmic reticulum and mitochondria.
B. Rough endoplasmic reticulum bears ribosomes on its surface.
C. Both mitochondria and plastids have circular DNA
D. A network of microtubules, microfilaments and intermediate filaments present in the cytoplasm is called cytoskeleton.
E. Mitochondrion is a single membrane–bound structure.

Choose the **correct** answer from the options given below :

(1) A, B and C only
(2) A and B only
(3) C, D and E only
(4) B, C and D only

Ans. (4)

Sol. Mitochondria is double membranous and do not come under endomembrane system

154. Match List I with List II related to embryonic development at various months of pregnancy

	List I		List II
A.	The foetus movement starts	I.	24 weeks of pregnancy
B.	The foetus develops limbs and digits	II.	20 weeks of pregnancy
C.	The foetus develops external genital organs	III.	8 weeks of pregnancy
D.	The foetus body is covered with fine hair; eyelids separate and eyelashes are formed	IV.	12 weeks of pregnancy

Choose the correct answer from the options given below :

(1) A–II, B–IV, C–III, D–I
(2) A–III, B–II, C–IV, D–I
(3) A–II, B–III, C–IV, D–I
(4) A–IV, B–II, C–III, D–I

Ans. (3)

Sol. Matching type

155. Which one of the following is an appropriate example of 'sexual deceit' ?

(1) Sea anemone and clown fish
(2) Female wasp and fig
(3) Ophrys and bumblebee
(4) Cuckoo and crow

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Ans. (3)
Sol. Ophrys and bumblebee

156. Salect the set of fishes which belong to the class Osteichthyes :
(1) Saw fish, Fighting fish and Dog fish
(2) Devil fish, Cuttlefish and Hagfish
(3) Flying fish, Angel fish and Fighting fish
(4) Starfish, Hagfish and Cuttlefish
Ans. (3)
Sol. Flying fish, Angel fish and Fighting fish

157. Match List I with List II with respect to ehronology of evolutions of life forms :

	List I		List II
A.	About 65 mya	I.	Jawless fish probably evolved
B.	About 500 mya	II.	The dinosaurs suddenly disappeared from the earth
C.	About 350 mya	III.	Seaweeds and few plants probably existed
D.	About 320 mya	IV.	Invertebrates were formed and became active

Choose the correct answer from the options given below :
(1) A–II, B–IV, C–I, D–III
(2) A–I, B–II, C–III, D–IV
(3) A–III, B–IV, C–I, D–II
(4) A–II, B–IV, C–III, D–I
Ans. (1)
Sol. Matching type

158. In which animal do haploid cells divide mitotically to produce gametes ?
(1) Male frogs
(2) Male honeybees
(3) Male grasshoppers
(4) Male earthworms
Ans. (2)
Sol. male honeybees produce gametes by mitosis

159. The WBC count of a person's blood sample is 8000/cu.mm. How many eosinophils and lymphocytes would be in the same blood sample approximately ?
(1) 300 – 500/cu.mm and 500 – 700/cu.mm, respectively
(2) 300 – 500/cu.mm and 1200 – 1500/cu.mm, respectively
(3) 100 – 120/cu.mm and 160 – 200/cu.mm, respectively
(4) 160 – 240/cu.mm and 1600 – 2000/cu.mm, respectively
Ans. (4)
Sol. Eosinophils 2 to 3 % lymphocytes 20 to 25%

160. What is the probability of having children with 'O' blood group, where both mother and father are heterozygous for 'A' and 'B' blood group, respectively?
(1) 50%
(2) 75%
(3) 0%
(4) 25%
Ans. (4)
Sol. One child will have O blood group.

161. Arrange the following events occurring in Renin–Angiotensin mechanism in the correct order :
A. Increase in blood pressure and Glomerular filtration rate.
B. Reabsorption of Na and water from distal parts of tubule due to Aldosterone.
C. Fall in Glomerular filtration rate.
D. Vasoconstriction by Angiotensin II and release of Aldosterone.
(1) C, E, D, B, A
(2) A, C, E, B, D
(3) A, D, B, E, C
(4) C, A, B, D, E
Ans. (1)
Sol. C, E, D, B, A

162. Choose the correct statements regarding population interactions between two species.
A. In both parasitism and commensalism, only one species benefits and the other species is harmed.
B. Both species benefit in mutualism.
C. Both species benefit in commensalism.
D. In parasitism, only one species benefits and the other species is harmed.
E. In amensalism, one species is harmed and the other is unaffected.

Choose the **correct** answer from the options given below:
(1) B and E only
(2) A and B only
(3) B, D and E only
(4) A and D only
Ans. (3)
Sol. In commensalism one species benefited other species neither benefited nor harmed

163. Spermatogonia undergo a series of cell divisions to produce sperms. Select the correct statements from the following:
A. Spermatogonia always undergo meiotic cell division.
B. Primary spermatocytes divide mitotically to produce secondary spermatocytes.
C. Secondary spermatocytes, through their second meiotic division, produce haploid spermatids.
D. Spermatids produce spermatozoa through mitosis.

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E. Spermatids transform into spermatozoa by spermiogenesis.

Choose the **correct** answer from the options given below:

(1) C and E only
(2) A, C and E only
(3) B, C and D only
(4) A, C and E only

Ans. (2)

Sol. A. Spermatogonia always undergo mitosic cell division.
B. Primary spermatocytes divide meiotically to produce secondary spermatocytes.
D. Spermatids produce spermatozoa through spermiogenesis.

164. The following are the stages of life cycle of Plasmodium. Arrange the stages in the proper order.
A. The parasites reproduce asexually in RBCs, bursting the cells.
B. The parasites reproduce asexually in liver cells, bursting the cells and releasing into blood.
C. Gametocytes develop in RBCs.
D. Sporozoites reach the liver through the blood
E. Female mosquito injects sporozoites into humans during bite.

Choose the correct answer from the options given below :

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

Ans. (1)

Sol. Matching type

165. Match List I with List II :

List I (Bioactive molecules)		List II (Importance)
A. Streptokinase	I.	Immunosuppressive agent
B. Statins	II.	Removal of clots from the blood vessels
C. Lipases	III.	Blood cholesterol-lowering agent
D. Cyclosporin A	IV.	Detergent formulations

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

Ans. (3)

Sol. Matching type

166. Which of the following is not an example of convergent evolution?

(1) Wings of butterflies and birds
(2) Flippers of penguins and dolphins
(3) Fore limbs of whales and bats
(4) Eyes of octopuses and mammals

Ans. (3)

Sol. Convergent Evolution leads to analogous structures (different origins same function) Forelimbs of whales and bats are examples of homologous structures i.e. divergent evolutions

167. What is the reason behind productions of large holes in 'Swiss Cheese'?

(1) The productions of large amount of CO_2 and H_2 by Trichoderma polysporum
(2) The production of large amount of CO_2 by Clostridium butylicum
(3) The production of large amount of CO_2 and H_2 by lactic acid bacteria called lactobacillus
(4) The production of large amount of CO_2 by propionibacterium sharmanii

Ans. (4)

Sol. The production of large amount of CO_2 by propionibactarium sharmanii

168. Match List I with List II:

List I		List II
A. Cortisol	I.	Stimulates the formation of alveoli in mammary glands
B. Aldosterone	II.	Produces anti-inflammatory reactions
C. Cholecystokinin	III.	Stimulate reabsorption of Na^+ and water from renal tubule
D. Progesterone	IV.	Stimulates secretion of pancreatic enzymes and bile juice

Choose the **Correct** answer from the options given below:

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

Ans. (4)

Sol. A-II, B-III, C-IV, D-I

169. Arrange the following cell layers/structures around the female gamete, from outer to inner side:
A. Zona pellucide
B. Perivitelline space
C. Corona radiata
D. Plasma membrane of ovum

Choose the **Correct** answer from the options given below:

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

Ans. (2)

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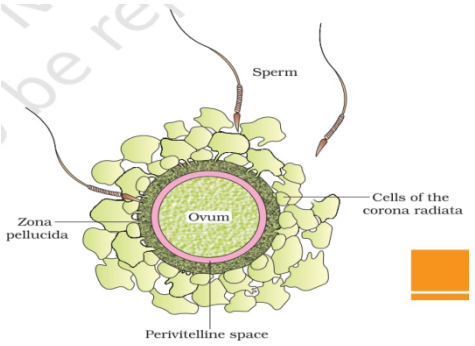
Sol.



170. Which of the following equations depicts Verhulst-Pearl logistic population growth?

(1) $\frac{dN}{dt} = rN\left(\frac{K-N}{N}\right)$

(2) $\frac{dN}{dt} = rN\left(\frac{K-N}{K}\right)$

(3) $\frac{dN}{dt} = rN\left(\frac{K}{K-N}\right)$

(4) $\frac{dN}{dt} = rN\left(\frac{K+N}{K}\right)$

Ans. (2)

Sol. $\frac{dN}{dt} = rN\left(\frac{K-N}{K}\right)$

171. The toxic proteins isolated from bacillus thuringiensis, coded by which of the following genes would control cotton bollworms and corn borer, respectively?

(1) *cryIAc* and *cryIAb*
(2) *cryIIAb* and *cryIAc*
(3) *cryIAc* and *cryIIIAb*
(4) *cryIAc* and *cryIIAb*

Ans. (1)

Sol. The genes cry1Ac (or cryIIAb) are used to control cotton bollworms, and cry1Ab is used to control the corn borer.

172. The JGA (Juxta Glomerular Apparatus) is a special sensitive region formed by cellular modifications in ----------related to the same nephron.

(1) Proximal convoluted tubule and afferent renal arteriole
(2) Distal convolutes tubule and efferent renal arteriole
(3) Proximal convoluted tubule and efferent renal arteriole
(4) Distal convolutes tubule and afferent renal arteriole

Ans. (4)

Sol. The Juxtaglomerular Apparatus (JGA) is a specialized structure in the kidney that plays a vital role in regulating blood pressure and the glomerular filtration rate (GFR). It is formed at the point where the distal convoluted tubule (DCT) and the afferent arteriole of the same nephron come into contact.

173. Match List I with List II

	List I		List II
A.	Molluscs	I.	Pulmonary respiration only
B.	Reptiles	II.	Branchial respiration
C.	Adult Amphibians	III.	Cellular respiration
D.	Amoeba	IV.	Pulmonary and Cutaneous respiration

Choose the **Correct** answer from the options given below:

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

Ans. (4)

Sol. A. Molluscs Branchial respiration (Most aquatic molluscs use gills/ctenidia for respiration)
B. Reptiles - Pulmonary respiration only (Reptiles breathe only through lungs)
C. Adult amphibians -IV. Pulmonary and Cutaneous (Adult amphibians use lungs and moist skin for respiration).
D. Amoeba -III. Cellular respiration (Amoeba, as a unicellular organism, utilizes diffusion across its surface

174. The sixth mutant codon of beta globin gene causing polymerization of Haemoglobin and change in RBC shape is

(1) CAG
(2) GUG
(3) AUG
(4) GAG

Ans. (2)

Sol. The sixth mutant codon of the beta -globin gene that causes sickle-cell anemia—characterized by polymerization of hemoglobin under low oxygen tension and the resulting sickle shape of red blood cells—is GUG.

175. In a population of a grasshopper species, the chromosome number of some members in 23 and some other members possess 24 chromosomes. The 23 and 24 chromosome-bearing members in this species are _____

(1) females and males, respectively
(2) all males
(3) males and females, respectively
(4) all females

Ans. (3)

Sol. In grasshoppers, sex determination follows the XX-XO mechanism, where females are homogametic (XX) and males are heterogametic (XO).
Females (24 chromosomes): Possess 22 autosomes and two X sex chromosomes
(22 + XX = 24)

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Males (23chromosomes): Possess 22 autosomes and one X sex chromosome, with the "O" indicating the absence of a second chromosome (22 +XO=23)

Therefore, the 23-chromosome members are males and the 24-chromosome members are females.

176. Select the **incorrect** statements from the following:

A. Digestive system in Platyhelminthes is incomplete.

B. Bilateral symmetry is a characteristic feature of adult Echinoderms.

C. Pseudocoelom is possessed by Aschelminthes.

D. Notochord is persistent throughout life in the class chondrichthyes.

E. Members of class Reptilia maintain a constant body temperature.

Choose the answer from the options given below:

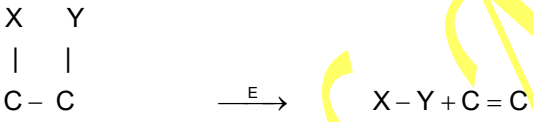
(1) A and C only
(2) B and E only
(3) C and D only
(4) B and D only

Ans. (2)

Sol. The adult echinoderms are radially symmetrical but larvae are bilaterally symmetrical

E– Reptile – poikilotherms (cold blooded)

177. The following reaction depicts the activity of a particular class of enzymes:



Identify the enzyme class 'E' from the following options:

(1) Ligases
(2) Trasnferases
(3) Lyases
(4) Isomerases

Ans. (3)

Sol. Lyases: Enzymes that catalyse removal of groups from substrates by mechanisms other than hydrolysis leaving double bonds.

178. Ecological pyramids represent the relationship between the organisms at different trophic levels and they are generally inverted for:

(1) Pyramid of biomass in grassland
(2) Pyramid of biomass in sea
(3) Pyramid of number in grassland
(4) Pyramid of energy in grassland

Ans. (2)

Sol. The pyramid of biomass in sea is generally inverted because the biomass of fishes far exceeds that of phytoplankton

179. Evolution of human appears parallel to the progressive development of brain and language skills. As such evolution of individual species in the sequence of their appearances is:

(1) Ramapithecus → Homo habilis → Homo erectus → Neanderthal → Homo sapiens
(2) Homo habilis → Homo habilis → Ramapithecus → Neanderthal → Homo sapiens
(3) Homo sapiens → Ramapithecus → Homo habilis → Neanderthal → Homo erectus
(4) Neanderthal → Ramapithecus → Homo habilis → Homo erectus → Homo sapiens

Ans. (1)

Sol. Ramapithecus → Homo habilis → Homo erectus → Neanderthal → Homo sapiens

180. Match List I with List :

List I (Respiratory Volume)		List II (Capacity in mL)	
A.	ERV (expiratory Reserve Volume)	I.	2500-3000 mL
B.	RV (Residual Volume)	II.	500 mL
C.	IRV(Inspiratory Reserve Volume)	III.	1000-1100 mL
D.	TV (Tidal Volume)	IV.	1100-1200 mL

Choose the **Correct** answer from the options given below:

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

Ans. (2)

Sol. A-III, B-IV, C-I, D-II

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