

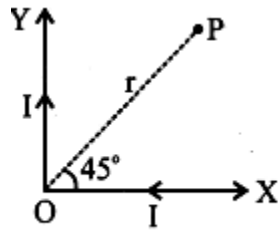
NEET PRACTICE SET : 5

Important Instructions for Mock test :

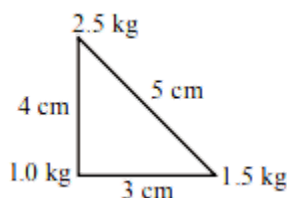
1. The Answer Sheet is inside this Test Booklet. When you are directed to open the Test Booklet, take out the Answer Sheet and fill in the particulars on OFFICE Copy carefully with **blue/black** ball point pen only.
2. The test is of 3 hours duration and the Test Booklet contains 180 multiple-choice questions. Each question carries 4 marks . For each correct response, the candidate will get 4 marks. For each incorrect response, one mark will be deducted from the total scores. The maximum marks are 720.
3. **Use Blue/Black Ball Point Pen** only for writing particulars on this page/marking responses on Answer Sheet.
4. Rough work is to be done in the space provided for this purpose in the Test Booklet only.
5. On completion of the test, the candidate must hand over the Answer Sheet (ORIGINAL and OFFICE Copy) to the Invigilator before leaving the Room/Hall. The candidates are allowed to take away this Test Booklet with them.
6. Do not make any stray marks on the Answer Sheet. Do not write your Roll No. anywhere else except in the specified space in the Test Booklet/ Answer Sheet.
7. Use of white fluid for correction is NOT permissible on the Answer Sheet.
8. No candidate, without special permission of the centre Superintendent or Invigilator, would leave his/her seat.
9. The candidates should not leave the Examination Hall without handing over their Answer Sheet to the Invigilator on duty and sign (with time) the Attendance Sheet twice. Cases, where a candidate has not signed the Attendance Sheet second time, will be deemed not to have handed over the Answer Sheet and dealt with as an Unfair Means case
10. The candidates will write the Correct Test Booklet Code as given in the Test Booklet/Answer Sheet in the Attendance Sheet.

PHYSICS

- A cable is replaced by another one of the same length and material but of twice the diameter. The maximum load that the new wire can support without exceeding the elastic limit, as compared to the load that the original wire could support, is
 (1) half (2) double
 (3) four times (4) one-fourth
- Current I flows through a long conducting wire bent at right angles as shown in the figure. The magnetic field at a point P on the right bisector of the angle XOY at a distance r from O is :



- $\frac{\mu_0 I}{\pi r}$
 - $\frac{2\mu_0 I}{\pi r}$
 - $\frac{\mu_0 I}{4\pi r}(\sqrt{2} + 1)$
 - $\frac{\mu_0}{4\pi} \times \frac{2I}{r}(\sqrt{2} + 1)$
- A square coil of edge L having n turns carries a current i . It is kept on a smooth horizontal plate. A uniform magnetic field B exists in a direction parallel to an edge. The total mass of the coil is M . What should be the minimum value of B for which the coil will start tipping over?
 (1) $\frac{Mg}{niL}$ (2) $\frac{Mg}{2niL}$
 (3) $\frac{Mg}{4niL}$ (4) $\frac{2Mg}{niL}$
 - Three point particles of masses 1.0 kg , 1.5 kg and 2.5 kg are placed at three corners of a right angle triangle of sides 4.0 cm , 3.0 cm and 5.0 cm as shown in the figure. The center of mass of the system is at a point:



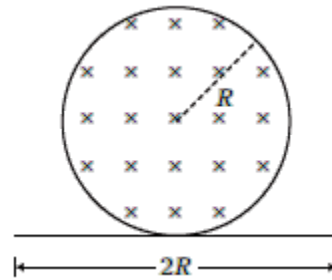
- 2.0 cm right and 0.9 cm above 1 kg mass

- 0.9 cm right and 2.0 cm above 1 kg mass
- 0.6 cm right and 2.0 cm above 1 kg mass
- 1.5 cm right and 1.2 cm above 1 kg mass

- In Young's double slit experiment, one of the slit is wider than other, so that amplitude of the light from one slit is double of that from other slit. If I_m be the maximum intensity, the resultant intensity I when they interfere at phase difference ϕ is given by

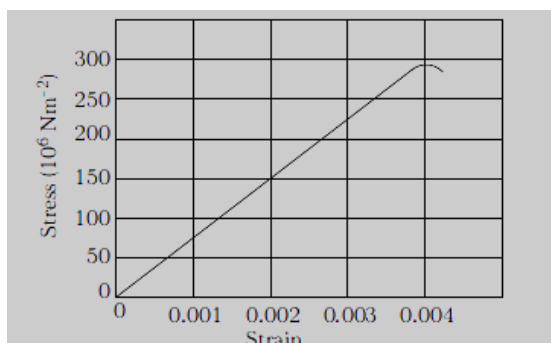
- $\frac{I_m}{9}(4 + 5\cos\phi)$
- $\frac{I_m}{3}\left(1 + 2\cos^2\frac{\phi}{2}\right)$
- $\frac{I_m}{5}\left(1 + 4\cos^2\frac{\phi}{2}\right)$
- $\frac{I_m}{9}\left(1 + 8\cos^2\frac{\phi}{2}\right)$

- A uniform but time varying magnetic field is present in a circular region of radius R . The magnetic field is perpendicular and into the plane of the loop and the magnitude of field is increasing at a constant rate α . There is a straight conducting rod of length $2R$ placed as shown in figure.

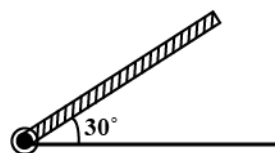


The magnitude of induced emf across the rod is

- $\pi R^2 \alpha$
 - $\frac{\pi R^2 \alpha}{2}$
 - $\frac{R^2 \alpha}{\sqrt{2}}$
 - $\frac{\pi R^2 \alpha}{4}$
- Figure shows the strain-stress curve for a given material. What are (i) Young's modulus and (ii) approximate yield strength for this material?



11. A rod of length 50 cm is pivoted at one end. It is raised such that it makes an angle of 30° from the horizontal as shown and released from rest. Its angular speed when it passes through the horizontal (in rad s^{-1}) will be ($g=10\text{ms}^{-2}$)



- (1) $5 \times 10^5 \text{Nm}^{-2}$, $3 \times 10^6 \text{Nm}^{-2}$
 (2) $2 \times 10^{-6} \text{Nm}^{-2}$, $4 \times 10^4 \text{Nm}^{-2}$
 (3) $7.5 \times 10^{10} \text{Nm}^{-2}$, $3 \times 10^8 \text{Nm}^{-2}$
 (4) $7.5 \times 10^{10} \text{Nm}^{-2}$, $3 \times 10^6 \text{Nm}^{-2}$
8. A steel scale measures the length of a copper rod as 80 cm when both are at 20°C . The calibration temperature for the scale. What would the scale read for the length of the rod when both are at 40°C ? α for steel = $1.1 \times 10^{-6}^\circ\text{C}$ and α for copper $1.7 \times 10^{-6}^\circ\text{C}$.
 (1) 80.1126 cm (2) 80.2136 cm
 (3) 80.0096 cm (4) 80.1006 cm
9. A tuning fork whose frequency as given by manufacturer is 512 Hz is being tested with an accurate oscillator. It is found that the fork produces a beat of 2Hz, when oscillator reads 514 Hz but produces a beat of 6 Hz when oscillator reads 510 Hz. The actual frequency of fork is :-
 (1) 508 Hz (2) 512 Hz
 (3) 516 Hz (4) 518 Hz
10. Match List - I with List - II

List - I	List - II
(a) UV rays	(i) Diagnostic tool in medicine
(b) X-rays	(ii) Water purification
(c) Microwave	(iii) Communication, Radar
(d) Infrared wave	(iv) Improving visibility in foggy days

Choose the correct answer from the options given below :

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

- (1) $\sqrt{30}$ (2) $\sqrt{\frac{30}{2}}$
 (3) $\frac{\sqrt{30}}{2}$ (4) $\frac{\sqrt{20}}{3}$

12. A body is in pure rotation. The linear speed v of a particle, the distance r of a particle from the axis and the angular velocity ω of the body are related as $\omega = \frac{v}{r}$. Thus,
 (1) $\omega \propto \frac{1}{r}$
 (2) $\omega \propto r$
 (3) $\omega = 0$
 (4) ω is independent of r
13. A particle is executing SHM along a straight line. Its velocities at distances x_1 and x_2 from the mean position are V_1 and V_2 , respectively. Its time period is

- (1) $2\pi\sqrt{\frac{V_1^2+V_2^2}{x_1^2+x_2^2}}$ (2) $2\pi\sqrt{\frac{V_1^2-V_2^2}{x_1^2-x_2^2}}$
 (3) $2\pi\sqrt{\frac{x_1^2+x_2^2}{V_1^2+V_2^2}}$ (4) $2\pi\sqrt{\frac{x_2^2-x_1^2}{V_1^2-V_2^2}}$

14. A hemispherical paper weight contains a small flower on its axis of symmetry at a distance of 4 cm from its flat surface. Where is the flower appears to an observer when he looks at it along the axis of symmetry from the top? (Take, refractive index of refraction of glass = 1.5)
 (1) 15 cm from top
 (2) 20 cm from top
 (3) 5 cm from top
 (4) 25 cm from top
15. A convex lens of focal length f is placed some, where in between an object and a screen. The distance between object and screen is x . If numerical value of magnification produced by lens is m , then focal length of lens is

$$(1) \frac{mx}{(m+1)^2}$$

$$(2) \frac{mx}{(m-1)^2}$$

$$(3) \frac{(m+1)^2}{m}x$$

$$(4) \frac{(m-1)^2}{m}x$$

16. A cylinder contains hydrogen gas at pressure of 249 kPa and temperature 27°C. Its density is (Take, $R = 83 \text{ J mol}^{-1} \text{ K}^{-1}$)

$$(1) 0.2 \text{ kg/m}^3$$

$$(2) 0.1 \text{ kg/m}^3$$

$$(3) 0.02 \text{ kg/m}^3$$

$$(4) 0.5 \text{ kg/m}^3$$

17. A α particle and proton has same K.E. The ratio of de Broglie wavelength of a α particle and proton is....

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

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

$$(3) 1$$

$$(4) 2$$

18. Radius of a nucleus $2 \times 10^{-15} \text{ m}$. If we imagine an electron inside the nucleus then energy of electron will be = MeV.

$$m_e = 9.1 \times 10^{-31} \text{ kg}, h = 6.6 \times 10^{-34} \text{ Js}$$

$$(1) 6.98 \times 10^3$$

$$(2) 8.94 \times 10^3$$

$$(3) 4.98 \times 10^3$$

$$(4) 9.48 \times 10^3$$

19. Two particles of mass m_1 and m_2 are initially at rest at infinite distance. Find their velocity of approach due to gravitational attraction, when separation is d :

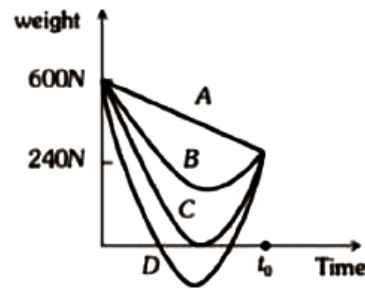
$$(1) \sqrt{\frac{2G(m_1+m_2)}{d}}$$

$$(2) \sqrt{\frac{G(2m_1+m_2)}{3^d}}$$

$$(3) \sqrt{\frac{3G(2m_1+m_2)}{d}}$$

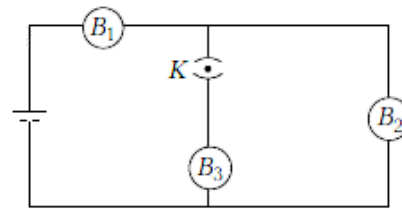
$$(4) \sqrt{\frac{G(m_1+m_2)}{d}}$$

20. Suppose, the acceleration due to gravity at the earth's surface is 10 m/s^2 and at the surface of Mars it is 4.0 m/s^2 . A 60 kg passenger goes from the earth to the Mars in a spaceship moving with a constant velocity. Neglect all other objects in the sky. Which part of figure best represents the weight (net gravitational force) of the passenger as a function of time



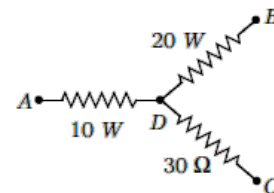
- (1) A
(2) B
(3) C
(4) D

21. B_1, B_2 and B_3 are the three identical bulbs connected to a battery of steady emf with key K closed. What happens to the brightness of the bulbs B_1 and B_2 when the key is opened?



- (1) Brightness of the bulb B_1 increases and that of B_2 decreases
(2) Brightness of the bulbs B_1 and B_2 increases
(3) Brightness of the bulb B_1 decreases and B_2 increases
(4) Brightness of the bulbs B_1 and B_2 decreases

22. A source of emf $E = 15 \text{ V}$ and having negligible internal resistance is connected to a variable resistance, so that the current in the circuit increases with time as $i = 1.2t + 3$. Then, the total charge that will flow in first five second will be
(1) 10 C
(2) 20 C
(3) 30 C
(4) 40 C
23. In the circuit given here, the points A, B and C are at 70 V, zero, 10 V, respectively. Then,



- (1) the point D will be at a potential of 60 V
(2) the point D will be at a potential of 20 V
(3) currents in the paths AD, DB and DC are in the

ratio of 1: 2: 3

(4) currents in the paths AD , DB and DC are in the ratio of 3: 2: 1

24. A potentiometer having the potential gradient of $2mVcm^{-1}$ is used to measure the difference of potential across a resistance of 10Ω . If a length of 50 cm of the potentiometer wire is required to get the null points, then the current passing through 10Ω resistor is (in mA)

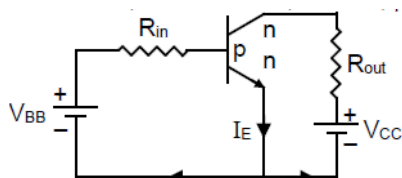
(1) 1 (2) 2
(3) 5 (4) 10

25. A semiconductor having electron and hole mobilities μ_n and μ_p respectively. if its intrinsic carrier density is n_i , then what will be the value of hole concentration P for which the conductivity will be minimum at a given temperature?

(1) $n_i \sqrt{\frac{\mu_n}{\mu_p}}$ (2) $n_h \sqrt{\frac{\mu_n}{\mu_p}}$
(3) $n_i \sqrt{\frac{\mu_p}{\mu_n}}$ (4) $n_h \sqrt{\frac{\mu_p}{\mu_n}}$

26. The given transistor operates in saturation region then what should be the value of

V_{BB} : ($R_{out} = 200\Omega$, $R_{in} = 100 K\Omega$, $V_{CC} = 3 \text{ volt}$, $V_{BE} = 0$)



(1) 4.1 volt (2) 7.5 volt
(3) 8.2 volt (4) 6.8 volt

27. Which of the following gate is called universal gate?

(1) OR gate (2) AND gate
(3) NAND gate (4) NOT gate

28. In an experiment four quantities a , b , c and d are measured with percentage error 1%, 2%, 3% and 4% respectively. Quantity P is calculated as

follows $P = \frac{a^3 b^2}{cd}$ % error in P is :-

(1) 4% (2) 14%
(3) 10% (4) 7%

29. The angle of $1'$ (minute of arc) in radian is nearly equal to

(1) $2.91 \times 10^{-4} \text{ rad}$

(2) $4.85 \times 10^{-4} \text{ rad}$

(3) $4.80 \times 10^{-6} \text{ rad}$

(4) $1.75 \times 10^{-2} \text{ rad}$

30. Given that $\int \frac{dx}{\sqrt{2ax-x^2}} = a^n \sin^{-1} \left[\frac{x-a}{a} \right]$ where a = constant. Using dimensional analysis, the value of n is:

(1) 1 (2) 0
(3) -1 (4) None of the above

31. A particle of mass M starting from rest undergoes uniform acceleration. If the speed acquired in time t is v , the power delivered to the particle is

(1) $\frac{Mv^2}{t}$ (2) $\frac{1}{2} \frac{Mv^2}{t^2}$
(3) $\frac{Mv^2}{t^2}$ (4) $\frac{1}{2} \frac{Mv^2}{t}$

32. The kinetic energy acquired by a body of mass m in travelling a certain distance starting from rest, under a constant force is:

(1) directly proportional to m
(2) directly proportional to $\sqrt{m}$
(3) inversely proportional $\sqrt{m}$
(4) independent of m

33. **Assertion :** In a region, where uniform electric field exists, the net charge within volume of any size is zero.

Reason : The electric flux within any closed surface in region of uniform electric field is zero.

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

34. A magnet oscillating in a horizontal plane has a time period of 2 s at a place where the angle of dip is 30° and 3 s at another place where the angle of dip is 60° . The ratio of resultant magnetic fields at the two places is

(1) $\frac{4\sqrt{3}}{7}$

(2) $\frac{4}{9\sqrt{3}}$

(3) $\frac{9}{4\sqrt{3}}$

(4) $\frac{9}{\sqrt{3}}$

35. Rydberg constant R is equal to

(1) $\frac{me^2}{8\epsilon_0^2 ch^3}$

(2) $\frac{me^4}{8\epsilon_0^2 ch^3}$

(3) $\frac{m^2 e^4}{8\epsilon_0^2 ch^3}$

(4) $\frac{m^4 e^4}{8\epsilon_0^2 ch^3}$

36. An electron of stationary hydrogen atom passes from the fifth energy level to the ground level. The velocity that the atom of mass m acquired as a result of photon emission will be :

(R is Rydberg constant and h is Planck's constant)

(1) $\frac{25m}{24hR}$

(2) $\frac{24m}{25hR}$

(3) $\frac{24hR}{25m}$

(4) $\frac{25hR}{24m}$

37. A particle moved towards east with a velocity 5 ms^{-1} . After 10 s its direction changes towards north with the same velocity. The average acceleration of the particle is :

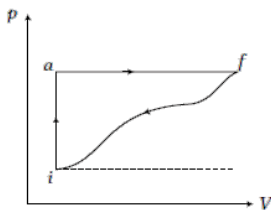
(1) zero

(2) $\frac{1}{\sqrt{2}} \text{ ms}^{-2} \text{ N} - \text{W}$

(3) $\frac{1}{\sqrt{2}} \text{ ms}^{-2} \text{ N} - \text{E}$

(4) $\frac{1}{\sqrt{2}} \text{ ms}^{-2} \text{ S} - \text{W}$

38. When a system is taken from state i to a state f along path iaf , $Q = 50 \text{ J}$ and $= 20 \text{ J}$. If $W = -13 \text{ J}$ for the curved return path fi , Q in this path is



(1) 33 J

(2) 23 J

(3) -7 J

(4) -43 J

39. A sonometer wire has a length 114 cm between two fixed ends. Where should two bridges be placed, so as to divide the wire into three segments whose fundamental frequencies are in the ratio 1: 3: 4 ?

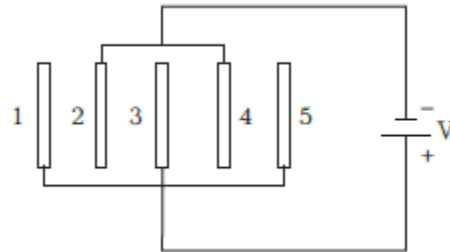
(1) $l_1 = 72 \text{ cm}, l_2 = 24 \text{ cm}, l_3 = 18 \text{ cm}$

(2) $l_1 = 60 \text{ cm}, l_2 = 40 \text{ cm}, l_3 = 14 \text{ cm}$

(3) $l_1 = 52 \text{ cm}, l_2 = 30 \text{ cm}, l_3 = 32 \text{ cm}$

(4) $l_1 = 65 \text{ cm}, l_2 = 30 \text{ cm}, l_3 = 19 \text{ cm}$

40. Five identical plates each of area A are joined as shown in the figure. The distance between the plates is d . The plates are connected to a potential difference of V volt. The charge on plates 1 and 4 will be



(1) $-\frac{\epsilon_0 AV}{d}, \frac{2\epsilon_0 AV}{d}$

(2) $\frac{\epsilon_0 AV}{d}, \frac{2\epsilon_0 AV}{d}$

(3) $\frac{\epsilon_0 AV}{d}, \frac{-2\epsilon_0 AV}{d}$

(4) $\frac{-\epsilon_0 AV}{d}, \frac{-2\epsilon_0 AV}{d}$

41. The capacity and the energy stored in a charged parallel plate condenser with air between its plates are respectively, C_0 and W_0 . If the air is replaced by glass (dielectric constant = 5) between the plates, the capacity of the plates and the energy stored in it will respectively be

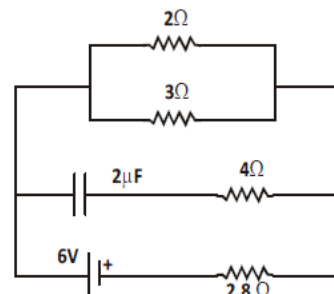
(1) $5C_0, 5W_0$

(2) $5C_0, \frac{W_0}{5}$

(3) $\frac{C_0}{5}, 5W_0$

(4) $\frac{C_0}{5}, \frac{W_0}{5}$

42. In the figure shown, the capacity of the condenser is $2\mu\text{F}$. The current in 2Ω resistor is :



(1) 9 A

(2) 0.9

(3) $\frac{1}{9} A$

(4) $\frac{1}{0.9} A$

43. A series AC circuit has a resistance of 4Ω and a reactance of 3Ω . The impedance of the circuit is

(1) 5Ω

(2) 7Ω

(3) $12/7\Omega$

(4) $7/12\Omega$

44. There are N coplanar vectors each of magnitude V . Each vector is inclined to the preceding vector at angle $\frac{2\pi}{N}$. What is the magnitude of their resultant?

(1) $\frac{V}{N}$

(2) V

(3) Zero

(4) $\frac{N}{V}$

45. The displacement ' x ' (in meter) of a particle of mass ' m ' (in kg) moving in one dimension under the action of a force, is related to time ' t ' (in sec) by $t = \sqrt{x} + 3$. The displacement of the particle when its velocity is zero, will be

(1) 4 m

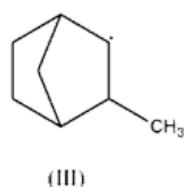
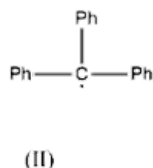
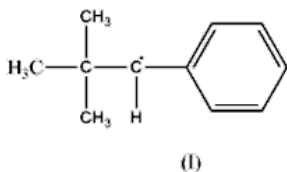
(2) 0 m

(3) 6 m

(4) 2 m

CHEMISTRY

46. Consider the following compounds:



Hyperconjugation occurs in

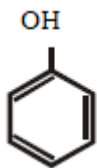
- (1) II only.
- (2) III only.
- (3) I and III.
- (4) I only.

47. The increasing order of stability of the following free radicals is

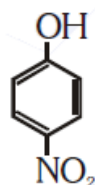
- (1) $(\text{C}_6\text{H}_5)_2\text{H}\dot{\text{C}}\text{H} < (\text{C}_6\text{H}_5)_3\dot{\text{C}} < (\text{CH}_3)_3\dot{\text{C}} < (\text{CH}_3)_2\dot{\text{C}}\text{H}$
- (2) $(\text{CH}_3)_2\dot{\text{C}}\text{H} < (\text{CH}_3)_3\dot{\text{C}} < (\text{C}_6\text{H}_5)_2\dot{\text{C}}\text{H} < (\text{C}_6\text{H}_5)_3\dot{\text{C}}$
- (3) $(\text{CH}_3)_2\dot{\text{C}}\text{H} < (\text{CH}_3)_3\dot{\text{C}} < (\text{C}_6\text{H}_5)_2\dot{\text{C}}\text{H} < (\text{C}_6\text{H}_5)_3\bullet\dot{\text{C}}$
- (4) $(\text{C}_6\text{H}_5)_3\dot{\text{C}} < (\text{C}_6\text{H}_5)_2\dot{\text{C}}\text{H} < (\text{CH}_3)_3\dot{\text{C}} < (\text{CH}_3)_2\dot{\text{C}}\text{H}$

48. Which one is the most acidic compound

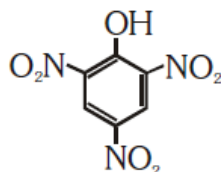
(1)



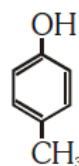
(2)



(3)



(4)



49. The correct order of boiling points for primary (1°), secondary (2°) and tertiary alcohol (3°) is

- (1) $1^\circ > 2^\circ > 3^\circ$
- (2) $3^\circ > 2^\circ > 1^\circ$
- (3) $2^\circ > 1^\circ > 3^\circ$
- (4) $2^\circ > 3^\circ > 1^\circ$

50. Which of the following reactions will not result in the formation of anisole?

- (1) Phenol + dimethyl sulphate in presence of a base
- (2) Sodium phenoxide is treated with methyl iodide
- (3) Reaction of diazomethane with phenol
- (4) Reaction of methylmagnesium iodide with phenol

51. Which of the following statements are correct concerning redox properties?

- (i) A metal M for which E° for the half reaction $M^{n+} + ne \rightleftharpoons M$ is very negative will be a good reducing agent.
- (ii) The oxidising power of halogens decreases from chlorine to iodine.
- (iii) The reducing power of hydrogen halides increases from hydrogen chloride to hydrogen iodide.

- (1) (i), (ii), (iii)
- (2) (i) and (ii)

- (3) (i) only
(4) (ii) and (iii) only

52. Why the displacement reactions of chlorine, bromine and iodine using fluorine are not generally carried out in aqueous solution?
(1) chlorine, bromine and iodine reacts with water and displace oxygen of water
(2) Fluorine being very reactive attacks water and displaces oxygen of water
(3) Fluorine does not react with chlorine, bromine and iodine in aqueous media
(4) None of these

53. Given below are two statements:

Statement I: The Balmer spectral line for H atom with lowest energy is located at $\frac{5}{36}R_H \text{ cm}^{-1}$.
($R_H = \text{Rydberg constant}$)

Statement II: When the temperature of blackbody increases, the maxima of the curve (intensity and wavelength) shifts to shorter wavelength.

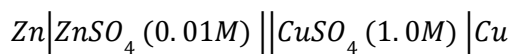
In the light of the above statements, choose the correct answer from the options given below:

- (1) Statement I is true but Statement II is false
(2) Statement I is false but Statement II is true
(3) Both Statement I and Statement II are true
(4) Both Statement I and Statement II are false
54. The Bohr's orbit radius for the hydrogen atom ($n = 1$) is approximately $0.53 \text{ \AA}$. The radius for the first excited state ($n = 2$) orbit is:
(1) $1.27 \text{ \AA}$ (2) $0.27 \text{ \AA}$
(3) $2.12 \text{ \AA}$ (4) $3.12 \text{ \AA}$
55. Choose the correct statement for the work done in the expansion and heat absorbed or released when 5 litres of an ideal gas at 10 atmospheric pressure isothermally expands into vacuum until volume is 15 litres :
(1) Both the heat and work done will be greater than zero
(2) Heat absorbed will be less than zero and work done will be positive
(3) Work done will be zero and heat will also be zero
(4) Work done will be greater than zero and heat will remain zero
56. The enthalpy of combustion of carbon and carbon monoxide are -390 kJ and -278 kJ

respectively. The enthalpy of formation of CO in kJ is

- (1) 668
(2) 112
(3) -112
(4) -668

57. The e.m.f. of a Daniell cell at 298 K is E_1 .



When the concentration of ZnSO_4 is $1.0M$ and that of CuSO_4 is $0.01M$, the e.m.f. changed to E_2 .

What is the relationship between E_1 and E_2 ?

- (1) $E_2 = 0 \neq E_1$ (2) $E_1 > E_2$
(3) $E_1 < E_2$ (4) $E_1 = E_2$

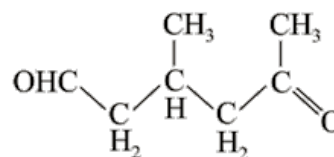
58. Given the following molar conductivity at infinite dilution and 25°C ,

$$\text{HCl}: \Lambda_m^\infty = 426.2 \text{ S cm}^2 \text{ mol}^{-1} \quad \text{KCl}: \Lambda_m^\infty = 114.42 \text{ S cm}^2 \text{ mol}^{-1}$$

The molar conductance at infinite dilution and at 25°C , for acetic acid solution is

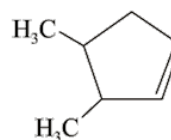
- (1) $461.86 \text{ S cm}^2 \text{ mol}^{-1}$
(2) $269.12 \text{ S cm}^2 \text{ mol}^{-1}$
(3) $289.63 \text{ S cm}^2 \text{ mol}^{-1}$
(4) $172.94 \text{ S cm}^2 \text{ mol}^{-1}$

59. A single compound of the structure

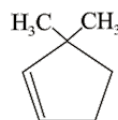


is obtainable from ozonolysis of which of the following cyclic compounds?

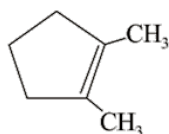
- (1)



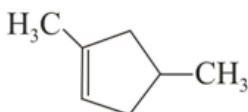
- (2)



- (3)



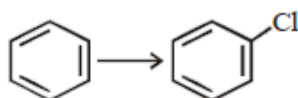
(4)



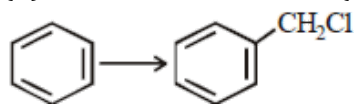
60. Match the column.

Column I

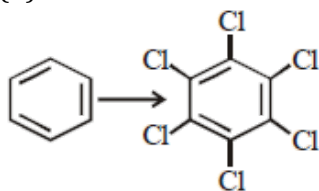
(A)



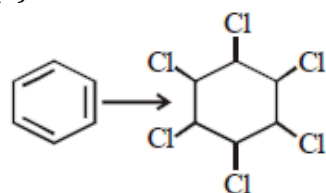
(B)



(C)



(d)



Column II

(p) Cl_2 , uv, 500K

(q) anhy. AlCl_3

(r) CH_2Cl_2 , anhy. AlCl_3

(s) Cl_2 , anhy. AlCl_3 ,

(1) A - (s), B - (r), C - (q), D - (p)

(2) A - (q), B - (r), C - (s), D - (p)

(3) A - (r), B - (p), C - (q), D - (s)

(4) A - (q), B - (p), C - (s), D - (r)

61. Which of the following statements are correct?

(1) The rate of reactivity of alkanes with halogens is $\text{F}_2 > \text{Cl}_2 > \text{Br}_2 > \text{I}_2$

(ii) Rate of replacement of hydrogens of alkanes is $3^\circ > 2^\circ > 1^\circ$

(iii) Fluorination of alkanes is a very slow process.

(iv) Iodination of alkanes is too violent to be controlled.

(1) (i), (ii) and (iii)

(2) (i) and (ii)

(3) (ii) and (iii)

(4) (i) and (iv)

62. Which of the following statement(s) is / are incorrect for CO_2 ?

(i) In laboratory CO_2 is prepared by the action of

dilute HCl on calcium carbonate

(ii) Carbon dioxide is a poisonous gas

(iii) Increase in carbon dioxide content in atmosphere lead to increase in green house effect.

(iv) CO_2 as dry ice is used as a refrigerant for ice

cream and frozen food.

(1) (i) and (ii)

(2) Only(ii)

(3) (i), (ii) and (iii)

(4) (ii) and (iii)

63. Among the following, the correct order of acidity is

(1) $\text{HClO}_2 < \text{HClO} < \text{HClO}_3 < \text{HClO}_4$

(2) $\text{HClO}_4 < \text{HClO}_2 < \text{HClO} < \text{HClO}_3$

(3) $\text{HClO}_3 < \text{HClO}_4 < \text{HClO}_2 < \text{HClO}$

(4) $\text{HClO} < \text{HClO}_2 < \text{HClO}_3 < \text{HClO}_4$

64. Which of the following is the correct order of dipole moment?

(1) $\text{NH}_3 < \text{BF}_3 < \text{NF}_3 < \text{H}_2\text{O}$

(2) $\text{BF}_3 < \text{NF}_3 < \text{NH}_3 < \text{H}_2\text{O}$

(3) $\text{BF}_3 < \text{NH}_3 < \text{NF}_3 < \text{H}_2\text{O}$

(4) $\text{H}_2\text{O} < \text{NF}_3 < \text{NH}_3 < \text{BF}_3$

65. Consider the molecules CH_4 , NH_3 and H_2O

Which of the given statements is false?

(1) The $\text{H} - \text{O} - \text{H}$ bond angle in H_2O is smaller than the $\text{H} - \text{N} - \text{H}$ bond angle in N_3 .

(2) The $\text{H} - \text{C} - \text{H}$ bond angle in CH_4 , is larger than the $\text{H} - \text{N} - \text{H}$ bond angle in NH_3

(3) The $\text{H} - \text{C} - \text{H}$ bond angle in CH_4 , the $\text{H} - \text{N} - \text{H}$ bond angle in NH_3 , and the

$\text{H} - \text{O} - \text{H}$ bond angle in H_2O are all greater than 90° .

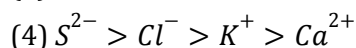
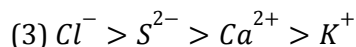
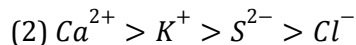
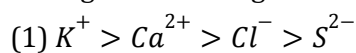
(4) The $\text{H} - \text{O} - \text{H}$ bond angle in H_2O is larger than the $\text{H} - \text{C} - \text{H}$ bond angle in CH_4

66. In which of the following pairs of molecules/ions, the central atoms have sp^2

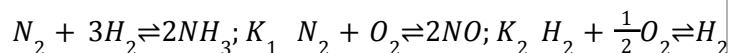
hybridization?



67. The correct order of the decreasing ionic radii among the following isoelectronic species is



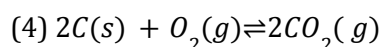
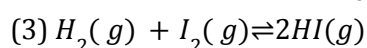
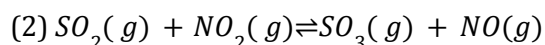
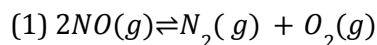
68. The following equilibrium constants are given:



The equilibrium constant for the oxidation of the NH_3 by oxygen to give NO is



69. In which of the following equilibrium K_c and K_p are not equal?



70. Calculate the pH of a solution obtained by diluting 1 mL of 0.10M weak monoacidic base to 100 mL at constant temperature if K_b of the base is

1×10^{-5} ?

(1) 8 (2) 9

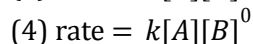
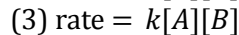
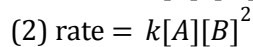
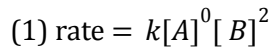
(3) 10 (4) 11

71. For a reaction $A + B \rightarrow C + 2D$, experimental results were collected for three trials and the data obtained are given below:

Trial	[A], M	[B], M	Initial Rate, $M s^{-1}$
1	0.40	0.20	5.5×10^{-4}

2	0.80	0.20	5.5×10^{-4}
3	0.40	0.40	2.2×10^{-3}

The correct rate law of the reaction is



72. The activation energy of exothermic reaction,

$A \rightarrow B$, is 80 kJ mol^{-1} . The heat of reaction is 200 kJ mol^{-1} . The activation energy for the reaction $B \rightarrow A$ (in kJ/mol) will be:

(1) 120 (2) 40

(3) 280 (4) 80

73.

List-I	List-II
(a) Adenine	(i) Pigment
(b) Anthocyanin	(ii) Polysaccharide
(c) Chitin	(iii) Alkaloid
(d) Codeine	(iv) Purine

Choose the correct answer from the options given below .

(1) (a) - (i), (b) - (iv), (c) - (iii), (d) - (ii)

(2) (a) - (iv), (b) - (i), (c) - (ii), (d) - (iii)

(3) (a) - (iv), (b) - (iii), (c) - (ii), (d) - (i)

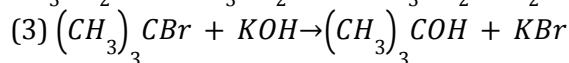
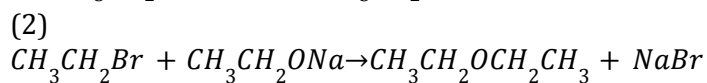
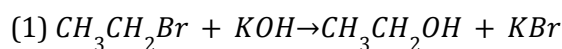
(4) (a) - (iii), (b) - (i), (c) - (iv), (d) - (ii)

74. Which of the following glucose transporters is insulin-dependent?

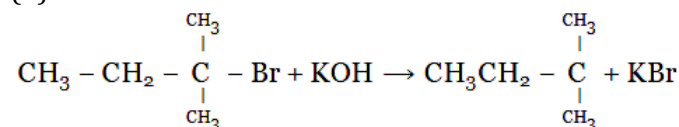
(1) GLUT II (2) GLUT III

(3) GLUT IV (4) GLUT I

75. Which of the following is an example of S_N2 reaction?



(4)



76. Which of the following reactions is an example of nucleophilic substitution reaction?

- (1) $2RX + 2Na \rightarrow R-R + 2NaX$
 (2) $RX + H_2 \rightarrow RH + HX$
 (3) $RX + Mg \rightarrow RMgX$
 (4) $RX + KOH \rightarrow ROH + K$

77. Consider a and b are two components of a liquid mixture, their corresponding vapour pressure ($mmHg$) are respectively 450 and 700 in pure states and total pressure given is 600 . Then corresponding composition in liquid phase will be

- (1) 0.4, 0.6 (2) 0.5, 0.5
 (3) 0.6, 0.4 (4) 0.3, 0.7

78. Two liquids X and Y form an ideal solution. At 300 K, vapour pressure of the solution containing 1 mol of X and 3 mol of Y is 550 mmHg. At the same temperature, if 1 mol of Y is further added to this solution, vapour pressure of the solution increases by 10 mmHg. Vapour pressure (in mmHg) of X and Y in their pure states will be, respectively

- (1) 300 and 400
 (2) 400 and 600
 (3) 500 and 600
 (4) 200 and 300

79. The normality of orthophosphoric acid having purity of 70 % by weight and specific gravity 1.54 is

- (1) 11 N (2) 22 N
 (3) 33 N (4) 44 N

80. Two flasks of equal volumes are evacuated, then one is filled with gas A and other with gas B at the same temperature and pressure. The weight of B was found to be 0.80 g while the weight of gas A is found to be 1.40 g . What is the weight of one molecule of B in comparison to one molecule of A ?

- (1) 1.40 times as heavy as A .
 (2) 0.40 times as heavy as A .
 (3) 0.57 times as heavy as A .
 (4) 0.80 times as heavy as A .

81. Suppose the elements X and Y combine to form two compounds XY_2 and X_3Y_2 . When 0.1 mole of XY_2 weighs 10 g and 0.05 mole of X_3Y_2 weighs 9 g, the atomic weights of X and Y are

- (1) 40,30 (2) 60,40
 (3) 20,30 (4) 30,20

82. Which of the following statements are correct?

- (i) Square planar complexes of $MABXL$ type show three isomers-two cis and one trans.
 (ii) Complexes of Ma_3B_3 type show three isomers-two cis and one trans.
 (iii) Optical isomerism is common in octahedral complexes involving bidentate ligands.

(iv) $\left[Co(NH_3)_4Cl(NO_2)\right]Cl$ show linkage

isomerism.

(v) Hydrate isomerism is another name of solvate isomerism.

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

83. Which of these statements about $[Co(CN)_6]^{3-}$ is true ?

- (1) $[Co(CN)_6]^{3-}$ has four unpaired electrons and will be in a low-spin configuration.
 (2) $[Co(CN)_6]^{3-}$ has four unpaired electrons and will be in a high spin configuration.
 (3) $[Co(CN)_6]^{3-}$ has no unpaired electrons and will be in a high-spin configuration.
 (4) $[Co(CN)_6]^{3-}$ has no unpaired electrons and will be in a low-spin configuration.

84. Which of the following are inner orbital complex (i.e., involving d^2sp^3 hybridisation) and is paramagnetic in nature?

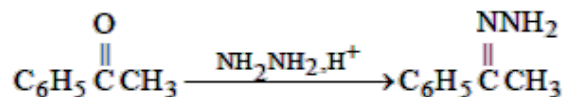
- (1) $[Mn(CN)_6]^{3-}$, $[Fe(CN)_6]^{3-}$, $[Co(C_2O_4)_3]^{3-}$
 (2) $[MnCl_6]^{3-}$, $[FeF_6]^{3-}$, $[CoF_6]^{3-}$
 (3) $[Mn(CN)_6]^{3-}$, $[Fe(CN)_6]^{3-}$
 (4) $[MnCl_6]^{3-}$, $[Fe(CN)_6]^{3-}$, $[Co(C_2O_4)_3]^{3-}$

85. Addition of hydrogen cyanide to aldehydes and ketones occurs in presence of a base. The role of base is to

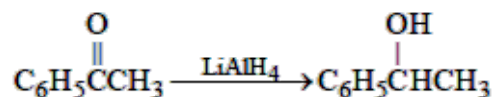
- (i) catalyse the reaction
- (ii) generate CN^- ion
- (iii) slow down the reaction
- (iv) to stabilize the cyanohydrins
- (1) (i) and (iii) (2) (i) and (ii)
- (3) (i) and (iv) (4) (ii) and (iv)

86. Which of the following is an example of nucleophilic addition?

(1)

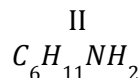
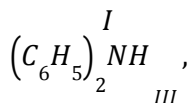
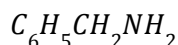
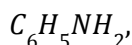


(2)



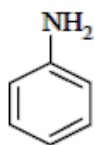
- (3) Both (a) and (b)
- (4) None of the two

87. The correct order of decreasing basic character is

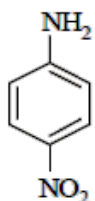


- (1) II > I > III > IV (2) IV > II > I > III
- (3) IV > III > II > I (4) IV > II > III > I

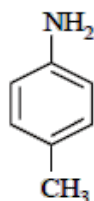
88. The correct increasing order of basic strength for the following compounds is _____.



(I)



(II)



(III)

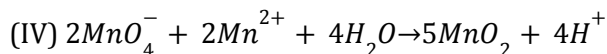
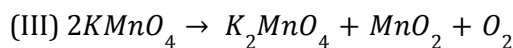
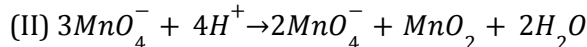
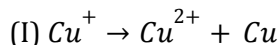
- (1) II < III < I (2) III < I < II
- (3) III < II < I (4) II < I < III

89. Nitration of nitrobenzene is carried out than obtained product is reduced with Fe/HCl , product so formed on reaction with HNO_2 and than with H_2O , forms

- (1) 1,3-dihydroxybenzene
- (2) 3-nitrophenol
- (3) 2-nitrophenol

(4) 1,2-dihydroxybenzene

90. Which of the following reactions are disproportionation reactions?



- (1) I, II
- (2) I, II, III
- (3) II, III, IV
- (4) I, IV

BIOLOGY

91. Choose one question

Select the correct match

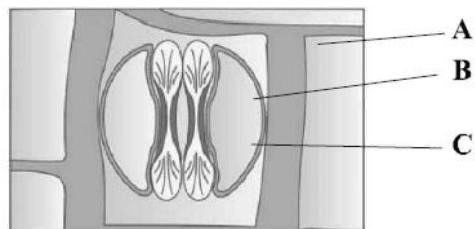
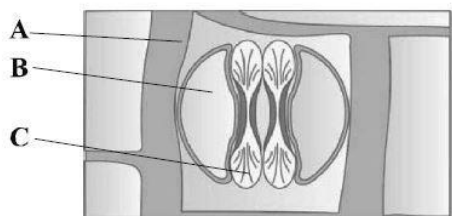
- a. Carrot grass i. Parthenium
- b. Water hyacinth ii. Eichhornia
- c. African cat fish iii. Clarias griepinus
- d. Co-extinctions iv. Plant pollinator

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

92. Which of the following is true?

- A. The biological wealth of our plant has been declining rapidly and the accusing finger is clearly pointing to human activities
- B. The colonisation of tropical pacific Island by humans is said to have led to the extinction of more than 2,000 species of native bird
- C. The IUCN Red list (2004) documents the extinction of 784 species in last 500
- (1) A,B and C is correct
- (2) A and B is correct
- (3) B and C is correct
- (4) A and C is, correct

93. The given diagrams show stomatal apparatus in dicots and monocots. Which one is correct option for A,B and C ?



(1) A - Epidermal cells; B - Subsidiary cells; C - chloroplast

(2) A - Guard cells; B - Subsidiary cells; C - Stomatal pore

(3) A - Guard cells; B - Epidermal cells; C - Guard cells

(4) A - Epidermal cells; B - Subsidiary cells; C - Guard cells

94. Consider the following statements

(a) Xylem transports water and minerals

(b) Gymnosperms lack sieve tubes and companion cells in phloem

(c) First formed primary xylem is called metaxylem

(d) Phloem fibres (bast fibres) are made of collenchyma

Of these statements

(1) a and c alone are correct

(2) a and b alone are correct

(3) c and d alone are correct

(4) b and c alone are correct.

95. Match the Column I with Column II -

Column I

I. Sieve tube

II. Companion cell

III. Albuminous cells

IV. Sieve cell

V. Parenchyma

VI. Fibre

Column II

A Gymnospermic phloem

B. Angiospermic phloem

(1) (A) = (I), (II), (V), (VI); (B) = (III), (IV), (V), (VI)

(2) (A) = (I), (III), (IV), (V), (VI); (B) = (II), (III), (IV), (V), (VI)

(3) (A) = (III), (IV), (V), (VI); (B) = (I), (II), (V), (VI)

(4) (A) = (I), (V), (VI); (B) = (II), (III), (IV)

96. Which one of the following is the incorrect match

(1) Plastid - Plant cell

(2) Lysosome - Animal cell

(3) Centromere - Chromosome

(4) Nucleolus - Membrane bound structure

97. Mycoplasmas, the smallest cells, are only (i) μm in length while bacteria could be (ii) μm . Among multicellular organisms, human red blood cells are about (iii) μm in diameter. Identify (i), (ii), and (iii)

	(i)	(ii)	(iii)
A	0.5	5-7	7
B	0.3	3-7	9
C	0.3	3-5	4
D	0.3	3-5	7

(1) A

(2) B

(3) C

(4) D

98. Consider the following statements comparing fermentation and aerobic respiration:

(1) Fermentation accounts for only a partial breakdown of glucose whereas in aerobic respiration it is completely degraded to CO_2 and H_2O .

(2) In fermentation there is a net gain of only one molecules of ATP for each molecule of glucose, whereas many molecules of ATP are generated under aerobic conditions.

(3) NADH is oxidised to NAD^+ rather quickly in fermentation, however the reaction is very slow in case of aerobic respiration.

Which of the statement(s) given above is/are in correct?

- (1) (1) only
- (2) (1) and (2) only
- (3) (2) and (3) only
- (4) None of the above

99. Chemiosmotic hypothesis given by Peter Mitchell proposes the mechanism of

- (1) synthesis of ATP
- (2) synthesis of FADH₂
- (3) synthesis of NADH
- (4) synthesis of NADPH

100. Match the list

Match Column-I with Column-II and select the correct answer from the codes given below.

Column-I

- A. Trichoderma
- B. Streptomyces
- C. Nitrosomonas
- D. Lactobacillus

Column-II

- (i) Nitrification
- (ii) Biocontrol agent
- (iii) Lactic acid
- (iv) Source of antibiotic

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

101. Which of the following bacteria help in nitrogen fixation from atmosphere ?

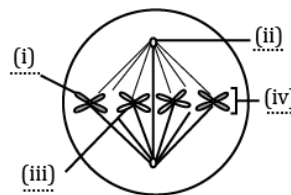
- I. Azotobacter
- II. Rhizobium
- III. Azospirillum
- IV. Lactobacillus

- (1) I, III, IV
- (2) I, II, III, IV
- (3) II, III, IV
- (4) I, II, III

102. Which of the following is false?

- (1) The mitotic spindle is composed of microtubules.
- (2) In plant cells, cytokinesis is accomplished by the formation of a cell plate.
- (3) The distribution of mitochondria between the daughter cells during cytokinesis is random.
- (4) Chromatin condenses to form discrete, visible chromosomes early in G₁

103. Identify the structures indicated by labels (i), (ii), (iii) and (iv) select the correct option.



- (1) (i) - Chromatid, (ii) - Centriole, (iii) - Centromere, (iv) - Chromosomeome
- (2) (i) - Chromosomeome, (ii) - Centriole, (iii) - Centromere, (iv) - Chromatid
- (3) (i) - Chromatid, (ii) - Centromere, (iii) - Centriole, (iv) - Chromosomeome
- (4) (i) - Chromosomeome, (ii) - Centromere, (iii) - Centriole, (iv) - Chromatid

104. Read the following statements and find out the incorrect statement.

- (1) In an animal cell, cytokinesis is achieved by the appearance of a furrow in the plasma membrane.
- (2) Furrow formation starts in the centre of cell and grows outward to meet the existing lateral walls.
- (3) Cell plate represents the middle lamella between the walls of two adjacent plant cells.
- (4) During cytokinesis, organelles like mitochondria and plastids get distributed between the two daughter cell

105. In G₁-phase of cell division,

- (1) RNA and proteins are synthesised for cell growth
- (2) DNA and proteins are synthesised
- (3) Formation of RNA and DNA continues for spindle formation and cell growth
- (4) Cell undergoes duplication

106. Which one / ones is / are false for DNA replication?

- (1) On is a definite region in DNA where replication starts
- (2) Deoxyribonucleoside triphosphates (dNTPs) serve as substrates as well as source of energy for polymerization.
- (3) Both leading and lagging strands are synthesised in 3'→5' direction.
- (4) Replication of DNA is responsible for continuity of life on earth.

107. In chromosome, DNA is associated with -

- A. Negatively charged proteins
- B. Positively charged proteins
- C. Neutral proteins
- D. NHC protein

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

108. Regulator gene controls chemical synthesis (operon system) by

- (1) inhibiting substrate enzyme action
- (2) inhibiting transcription of mRNA
- (3) inhibiting passage of mRNA
- (4) inhibiting enzymes

109. Split gene is a gene _____.

- (1) Whose entire sequence are not retained in RNA
- (2) Whose entire sequences are retained in RNA
- (3) Which has promoter but no operator
- (4) Which has operator but no promoter

110. DNA template sequence of CTGATAGC is transcribed over mRNA as

- (1) GUCTUTCG
- (2) GACUAUCG
- (3) GAUTATUG
- (4) UACTATCU

111. In *Drosophila*, the allele for normal grey body colour (G) is dominant to the ebony body (g). The following table summarises the results of several crosses:

Cross	Result
Strain 1 × gg	All Grey type
Strain 2 × gg	1 Grey : 1 ebony
Strain 3 × gg	All ebony type
Strain 4 × Gg	3 Grey : 1 ebony

Which strains have the genotype Gg ?

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

112. Sickle cell anemia is

- (1) Characterized by elongated sickle like RBCs with a nucleus
- (2) An autosomal linked dominant trait
- (3) Caused by substitution of valine by glutamic acid in the β -globin chain of haemoglobin

(4) Caused by a change in a single base pair of DNA

113. **Assertion (A):** In humans, the gamete contributed by the male determines whether the child produced will be male or female.

Reason (R) : Sex in humans is a polygenic trait, depending upon a cumulative effect of some genes on X-chromosome.

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

114. Read the following statements and choose the correct option.

- I. Failure of segregation of chromatids during cell division results in aneuploidy.
- II. Chromosomal disorders are mainly determined by alteration or mutation in a single gene.
- III. Thalassaemia and cystic fibrosis are Mendelian disorders.
- IV. Sickle cell anemia is an X-linked trait.
- V. Haemophilia is an autosome linked recessive disease.

- (1) I and III alone are correct
- (2) I, III and IV alone are correct
- (3) III and IV alone are correct
- (4) II and III alone are correct

115. Genetic Map is one that :-

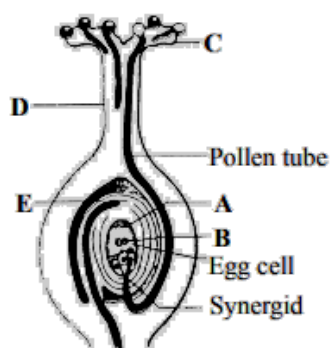
- (1) Establishes sites of the genes on a chromosome
- (2) Establishes the various stages in gene evolution
- (3) Shows the stages during the cell division
- (4) Shows the distribution of various species in a region

116. Which of the given statements are true?

- (i) During the development of a dicot embryo, heart-shaped embryo is followed by globular embryo.
 - (ii) The part of embryonal axis above the level of cotyledons is epicotyl, while the part below the level of cotyledons is hypocotyl.
 - (iii) Monocot seeds possess a single cotyledon represented by scutellum.
- (1) (i) and (ii)
 - (2) (ii) and (iii)

- (3) (i) and (iii)
 (4) (i), (ii) and (iii)

117. The given figure represent the L.S of a flower showing growth of pollen tube. Few structures are marked as A,B,C,D&E. Identify A,B,C,D and E respectively.



- (1) Antipodal cells, Polar nuclei, Stigma, Style, Chalaza
 (2) Antipodal cells, Polar nuclei, Style, Stigma, Chalaza
 (3) Antipodal cells, Polar nuclei, Stigma, Chalaza, Style
 (4) Antipodal cells, Polar nuclei, Chalaza, Stigma, Style

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

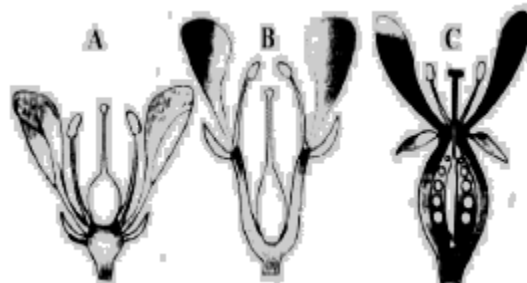
Column I	Column II
A. Funicle	(i) Mass of parenchymatous cells
B. Hilum	(ii) Basal part of ovule
C. Integument	(iii) One or two protective layers of ovule
D. Chalaza	(iv) Region where body of ovule fuses with funicle
E. Nucellus	(v) Stalk of ovule

- (1) A-(v), B-(iv), C-(iii), D-(ii), E-(i)
 (2) A-(i), B-(iii), C-(iv), D-(ii), E-(iv)
 (3) A-(iv), B-(ii), C-(i), D-(iii), E-(v)
 (4) A-(i), B-(ii), C-(iii), D-(iv), E-(v)

119. The phosphorus cycle differs from the carbon cycle in that
 (1) phosphorus does not enter living organisms, whereas carbon does.
 (2) the phosphorus cycle does not include a gaseous phase, whereas the carbon cycle does.
 (3) the phosphorus cycle includes a solid phase, whereas the carbon cycle does not.

(4) the primary reservoir of the phosphorus cycle is the atmosphere, whereas the primary reservoir for the carbon cycle is in rock.

120. Pyramid of energy is always upright indicating that
 (1) Producers have the lowest energy conversion efficiency.
 (2) Energy conversion efficiency is same for all trophic levels.
 (3) Carnivorous have a better energy efficiency than herbivores.
 (4) Herbivores have a better energy conversion efficiency than carnivores.
121. Given figures (A,B and C) show the position of floral parts on thalamus. (given as I, II and III) Select the correct combination



- I. Hypogynous flower
 II. Perigynous flower
 III. Epigynous flower
 (1) A - I, B - II, C - III
 (2) A - I, B - III, C - II
 (3) A - III, B - II, C - I
 (4) A - III, B - I, C - II

122. Find out the incorrect match
 (1) Sterile stamen – Staminode
 (2) Stamens attached to petals – Epipetalous
 (3) Stamens attached to perianth – Episepalous
 (4) Free stamens – Polyandrous
123. Crysanthemum is concerned with special functions i.e.,
 i. Food storage
 ii. Vegetative propagation
 iii. Assimilation
 iv. Spread to new niches
 v. Perennation
 (1) ii, iv
 (2) i, ii, v
 (3) ii, iv, v
 (4) iii, iv, v
124. Parthenocarpic tomato fruits can be produced by

- (a) treating the plants with low concentrations of gibberellic acid and auxins
- (b) raising the plants from vernalized seeds
- (c) treating the plants with phenylmercuric acetate
- (d) removing androecium of flowers before pollen grains are released

125. Which of the following statements are correct ?

- (a) O_2 helps in releasing metabolic energy essential for growth activities
- (b) Nutrients (micro and macromolecules) are required by plants for the synthesis of protoplasm as well as act as source of energy
- (c) Optimum temperature for plant growth is needed
- (d) Environmental signal like light and gravity affect certain phases of growth

- (1) All of these
- (2) None of these
- (3) a, b and d
- (4) a and d

126. Identify the correct sequence of the developmental process in a plant cell.

- (1) Plasmatic growth, differentiation, senescence and maturation, respectively
- (2) Plasmatic growth, differentiation, maturation and senescence, respectively
- (3) Maturation, plasmatic growth, differentiation, and senescence, respectively
- (4) Differentiation, plasmatic growth, maturation and senescence, respectively

127. Which of the following is /are true with reference to taxonomical aids?

- a. Separate taxonomic keys are required for each taxonomic category.
- b. Keys are not considered to be analytical in nature.
- c. Each statement in the key is called a couplet.
- d. Keys are used for identification purposes.

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

128. Match List - I with List - II:

List-I

- A. Chlamydomonas
- B. Cycas

List-II

- i. Moss
- ii. Pteridophyte

C. Selaginella

iii. Algae

D. Sphagnum

iv. Gymnosperm

Choose the correct answer from the options given below:

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

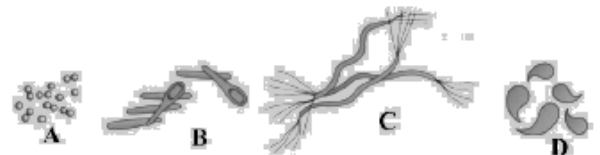
129. In which one of the following male and female gametophytes do not have free living independent existence ?

- (1) Polytrichum
- (2) Cedrus
- (3) Pteris
- (4) Funaria

130. The major difference between the mosses and ferns is:

- (1) Ferns lack alternation of generation while mosses show the same.
- (2) Mosses are facultative aerobes while ferns are obligate aerobes.
- (3) Vascular bundles of ferns show xylem vessels while those of mosses lack it.
- (4) Sporophytes of ferns live much longer as compared to the sporophytes of mosses.

131. Choose the correct names of the different bacteria given below according to their shapes.



- (1) A - Cocci, B - Bacilli, C - Spirilla, D - Vibrio
- (2) A - Bacilli, B - Cocci, C - Spirilla, D - Vibrio
- (3) A - Spirilla, B - Bacilli, C - Cocci, D - Vibrio
- (4) A - Spirilla, B - Vibrio, C - Cocci, D - Bacilli

132. Which of the following statements is true?

- (I). Many secondary compounds are produced by plants for the purpose of discouraging herbivores (Grazers and Browsers).
- (II). Predators generally are high on lethality and low on intimacy
- (III). Predators in nature are prudent because they do not exploit their prey.
- (IV). Parasites are low on lethality and high on intimacy.

- (1) Statements I and IV only
- (2) Statements I and II only

(3) Statements I,II and III only

(4) All statements are correct

133. Natality is the characteristic of a population which means

(1) The total number of individuals present per unit area at a given time

(2) The increase in number of individuals in a population under given environmental conditions

(3) Loss of individuals due to death in a population under given environmental conditions

(4) The movement of individuals into and out of population

134. During light-dependent reactions, light energy is converted to chemical potential energy through the process of chemiosmosis in the chloroplasts. Which of the following statement about this process is false -

(I). The electron carriers of phosphorylation are located in the thylakoid

(II). During phosphorylation, the chloroplast stroma becomes more acidic than the interior of thylakoid membrane

(III). Protons diffuse through the protein channels which are ATP synthetase molecules

(IV). ATP is formed from ADP+Pi on the stroma side of the thylakoid in the chloroplast

(V). During phosphorylation, water ionizes to form $H^+ + 2OH^-$ yielding an e^- to PSII

(1) I, II, V

(2) Only II

(3) III, IV

(4) Only IV

135. Following steps in random order are given below for photophosphorylation through chemiosmosis -

(I). ATP synthase produces ATP due to flow of H^+ from thylakoid lumen to stroma

(II). NADP reductase, located on stroma side of membrane, obtains e^- from PSI and protons from stroma to form $NADPH_2$

(III). Cytochrome system transport electrons and pumps H^+ from stroma to thylakoid space

(IV). PSII oxidises water

(V). Reaction centre of PSII gets photoexcited having released electrons

The correct sequence is -

(1) I, II, II, IV, V

(2) V, IV, III, II, I

(3) I, III, II, IV, V

(4) III, V, IV, II, I

136. Which of the following statement is NOT CORRECT about the compound epithelium?

I. It consist of several layers

II. It covers the dry surface of the skin, the moist surface of buccal cavity, inner lining of ducts of salivary glands and pancreatic ducts

III. It provides protection against chemical and mechanical stresses

IV. Being multilayered it has a great role in secretion and absorption

(1) Only III

(2) Only IV

(3) Only I and IV

(4) Only II

137. The function of the gap junction is to

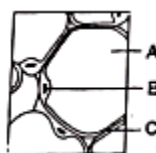
(1) separate two cells from each other

(2) stop substance from leaking across a tissue

(3) performing cementing to keep neighbouring cells together

(4) facilitate communication between adjoining cells by connecting the cytoplasm for rapid transfer of ions, small molecules and some large molecules.

138.

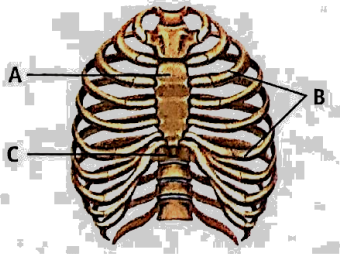


In above diagram of adipose tissue, identify A, B and C

	A	B	C
(1)	Vacuole	Fat	Cell membrane
(2)	Cytoplasm	Fat	Cell membrane

(3)	Nucleus	Fat	Cell membrane
(4)	Fat storage area	Nucleus	Cell membrane

139. The figure given here is of rib cage. Identify the parts labelled as A, B and C and select the correct option.



	A	B	C
(1)	Coccyx	Ribs	Vertebral column
(2)	Sternum	Ribs	Vertebral column
(3)	Scapula	Ribs	Vertebral column
(4)	Tarsal	Ribs	Vertebral column

140. Elbow joint is an example of

- (1) hinge joint
- (2) gliding joint
- (3) ball and socket joint
- (4) pivot joint

141. Which of the following statements about human vertebral column is false -

- (1) Vertebral column consists of 26 vertebrae
- (2) It is ventrally placed
- (3) It extends from the base of skull and constitutes the main framework of the trunk
- (4) Neural canal in vertebra is the passage for spinal cord

142. Match the following columns.

Column I (Types of WBCs)		Column II (Functions)	
A	Basophils	1	Phagocytes
B	Neutrophils	2	Secrete histamine, serotonin and heparin
C	Eosinophils	3	Allergic reaction
D	Lymphocytes	4	Immunity

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

143. Which of the following events do not occur during joint diastole?

- (I). All 4 chambers of heart are in relaxed state
 - (II). Tricuspid and bicuspid valves open
 - (III). Action potential is conducted from SAN to AVN
 - (IV). Blood from the pulmonary veins and vena cava flows into the left and right ventricles respectively through the left and right atria
 - (V). The Semilunar valves are closed
- (1) Only V
 - (2) Only III
 - (3) Only IV
 - (4) Only I and II

144. Select the correct statement(s).

- A. The essence of Darwinian theory about evolution is natural selection.
 - B. The rate of appearance of new forms is not linked to the life cycle or the life span.
 - C. Adaptative ability is not inherited
 - D. Mutation is random and directionless
- (1) B and C
 - (2) A and D
 - (3) None

(4) AII

145.

Column I		Column II	
I	Darwin	A	Inheritance of acquired character
II	De Vries	B	Swan-Necked
III	Pasteur	C	Natural Selection and origin of species
IV	Lamarck	D	Mutational theory

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

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

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

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

146.

Which of the following are not analogous organs?

(1) fins of fishes and flippers of whales

(2) stings of honey bee and scorpion

(3) thorn of Bougainvillea and tendril of Cucurbita

(4) wings of insect and wings of pterodactyl

147. Select the correct match

A. Glycogen I. Plant cell wall

B. Cellulose II. Branched chain polysaccharide

C. Chitin III. RNA

D. Ribose IV. Complex polysaccharide

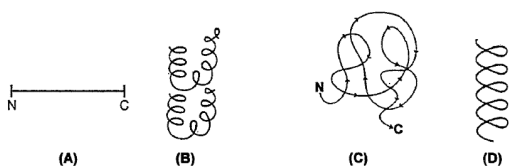
(1) A-I, B-II, C-III, D-IV

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

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

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

148.



What kinds of the structures of proteins are shown in the above figure?

(1) A = 1° structure, B = 2° structure, C = 3° structure, D = 4° structure

(2) A = 4° structure, B = 2° structure, C = 3° structure, D = 1° structure

(3) A = 1° structure, B = 4° structure, C = 3° structure, D = 2° structure

(4) A = 4° structure, B = 3° structure, C = 2° structure, D = 1° structure

149. All carbohydrates and lipids have similarity in possessing -

(1) C, H, O

(2) N, S, Protein

(3) Carboxylic and amino group

(4) Carboxylic and hydroxyl group

150. Which one is false?

(1) Fatty acids may be unsaturated (with one or more C=C bonds) or a saturated (without double bonds)

(2) Fatty acid(s) may be esterified with glycerol forming monoglyceride, diglyceride and then triglyceride

(3) Some times especially neural tissues have lipid very much simple structures

(4) Fats and oils are triglycerides

151.

Assertion (A): During pregnancy, the level of several hormones like estrogens, progestogens, cortisol, prolactin, thyroxine, etc are increased several folds in the maternal blood.

Reason (R): Increased production of these hormones is essential for supporting the foetal growth, metabolic changes in the mother, and maintenance of pregnancy.

In light of the above statements, choose the correct answer from the options given below:

(1) Both (A) and (R) are true but (R) is not the correct explanation of (A).

(2) Both (A) and (R) are true and (R) is the correct explanation of (A).

(3) (A) is true but (R) is false.

(4) (A) is false but (R) is true.

152. Match the column-I with column-II and choose the correct option.

Column I

A. Semen

B. Birth canal

Column II

(i) Clitoris

(ii) Testicular lobules

- C. Penis (iii) Vagina
D. Seminiferous tubule (iv) Seminal plasma

- (a) A-(ii), B -(i), C -(iv), D -(iii)
(b) A – (iv), B – (ii), C -(iii), D – (i)
(c) A -(iv), B -(iii), C -(ii), D -(i)
(d) A-(iv), B-(iii), C -(i), D -(ii)

153. Where is one least likely to find complete semen (all components are present)?
(a) At the junction of the bulbourethral duct and the urethra
(b) In the epididymis
(c) At the male urethral orifice
(d) In the vagina of a woman who's trying to become pregnant
154. Which of the following sequences is correct to initiate inspiration?
(i) The contraction of external intercostal muscles raises the ribs and sternum
(ii) Volume of thorax increases in the dorso-ventral axis
(iii) Intrapulmonary pressure decreases
(iv) Diaphragm contraction
(v) Air rushes into lungs
(vi) Volume of thorax increases in the anterior-posterior axis
(1) (i),(ii),(iv),(v),(iii),(vi)
(2) (vi), (v), (i), (ii), (iii), (iv)
(3) (i), (ii), (iii), (iv), (vi), (v)
(4) (i),(ii),(iv),(vi),(iii),(v)
155. The largest quantity of air that can be expired after a maximal inspiratory effort is called
(1) residual volume
(2) tidal volume
(3) vital capacity
(4) total lung volume
156. Read the given statements and identify the structure referred here
(i) Reabsorption in this region is minimum
(ii) This region plays a significant role in the maintenance of high osmolarity of interstitial fluid
(iii) Its descending limb is permeable to water but almost impermeable to electrolytes
(iv) Its ascending limb is impermeable to water but allows transport of electrolytes actively or passively

- (1) PCT
(2) Loop of Henle
(3) DCT
(4) Bowman's capsule

157. Which one of the following statements is correct with respect to kidney function regulation?
(1) When someone drinks lot of water, ADH release is suppressed.
(2) An increase in glomerular blood flow stimulates formation of angiotensin II.
(3) Exposure to cold temperature stimulates ADH release.
(4) During summer when body loses lot of water by evaporation, the release of ADH is suppressed.
158. The test-tube Baby Programme employs which one of the following techniques
(1) Intra cytoplasmic sperm injection (ICSI)
(2) Intra uterine insemination (IUI)
(3) Gamete intra fallopian transfer (GIET)
(3) Zygote intra fallopian transfer (ZIFT)
159. What is true for "Lactational amenorrhoea"?
I. It means absence of menstruation
II. Ovulation does not occur during the lactational period
III. Chances of failure of contraception are almost nil upto six months following parturition
IV. Side effects are almost nil
V. Contraceptive efficiency reduces after the period of intense lactation
VI. It is a natural method of contraception
VII. It increases phagocytosis of sperms
(1) II, III, IV, V, VI
(2) All except VII
(3) II, III, IV, V
(4) All
160. Read the following statements and select the option having both incorrect statements.
(i) Condoms decrease sperm motility.
(ii) Diaphragms, cervical caps and vaults are for both males and females.
(iii) IUDs are inserted by-expert nurses.
(iv) Sterilisation is a terminal method to prevent further pregnancy.
(1) (i) and (ii)

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

161. Which of the following depicts the correct pathway of transport of sperms?

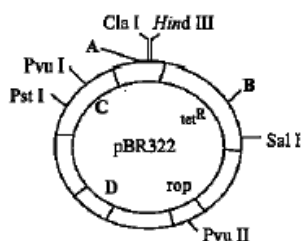
- (1) Rete testis → Efferent ductules → Epididymis → Vas deferens
 (2) Rete testis → Vas deferens → Efferent ductules → Epididymis
 (3) Rete testis → Epididymis → Efferent ductules → Vas deferens
 (4) Efferent ductules → Rete testis → Vas deferens → Epididymis

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

Sr. No	List I	Sr. No.	List II
A.	Pigments	1.	Concanavalin A
B.	Terpenoids	2.	Monoterpenes, Diterpenes
C.	Alkaloids	3.	Morphine, codeine
D.	Lectins	4.	Carotenoids, anthocyanins

- (1) A-(iv);B-(ii);C-(iii);D-(i)
 (2) A-(i),B-(iv),C-(iii),D-(ii)
 (3) A-(iv);B-(iii);C-(ii);D-(i)
 (4) A-(i),B-(iii),C-(ii),D-(iv)

163. Identify A, B, C and D in the given figure of E. coli cloning vector pBR322 and select the correct option



- (1) A - Hindi
 B - EcoRI
 C- ampR
 D - ori
 (2) A - Hindi
 B - BamHI
 C- kanR
 D - ampR

- (3) A - BamHI
 B - PstI
 C - Ori
 D - ampR
 (4) A - EcoRI
 B - BamHI
 C - ampR
 D - ori

164. Restriction endonucleases are enzymes which

- (1) Cuts at specific positions within the DNA molecule
 (2) Recognize a specific nucleotide sequence for binding of DNA ligase
 (3) Restrict the action of the enzyme DNA polymerase
 (4) Remove nucleotides from the ends of the DNA molecule

165. One of the following pairs is incorrect

- (1) Plasmid - Small piece of extra chromosomal DNA in bacteria
 (2) Interferon - An enzyme that interferes with DNA replication
 (3) Cosmid - A vector for carrying large DNA fragments (upto 45Kbp) into host cells
 (4) Myeloma - Cancerous cells of bone marrow

166. The linking of antibiotic resistance gene with the plasmid vector became possible with

- (1) DNA ligase
 (2) Endonucleases
 (3) DNA polymerase
 (4) Exonucleases

167. Vaccine against polio viruses is an example of

- (1) auto-immunization
 (2) passive immunization
 (3) active immunization
 (4) simple immunization

168. Man, in the life cycle of Plasmodium, is :

- (1) primary host
 (2) secondary host
 (3) intermediate host
 (4) none of the above

169. Personal hygiene means

- A. to keep the body clean
 B. to keep the surroundings neat and clean

- C. regular exercise
D. protein-rich diet

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

170. Electroporation Procedure involves

- (1) fast passage of food through sieve pores in phloem elements with the help of electric stimulation
(2) opening of stomatal pores during night by artificial light
(3) purification of saline water with the help of a membrane system
(4) making transient pores in the cell membrane to introduce gene constructs

171. Introduction of transgenes will result in -

- (1) Formation of new species
(2) Formation of new protein
(3) Alter a biosynthetic pathway
(4) Both b and c

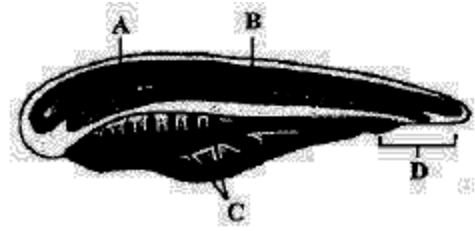
172. Transgenic animals are those which have -

- (1) Foreign DNA in some of its cells
(2) Foreign DNA in all its cells
(3) Foreign RNA in all its cells
(4) both a and c

173. sample of DNA from a person suspected of having sickle-cell anaemia is subjected to DNA hybridization using two probes. One that binds to the normal allele and another that binds to the sickle-cell allele. If both probes bind to the DNA, this individual -

- (1) Is homozygous dominant for the sickle-cell gene
(2) Is heterozygous for the sickle-cell gene
(3) Is heterozygous recessive for the sickle cell gene
(4) Has sickle cell anaemia

174. Animals belonging to Phylum Chordata are fundamentally characterised by the presence of structures noted as A, B, C and D. Identify them and select the correct option.



- (1) A- Notochord, B- Nerve cord, C- Gill slits, D- Post-anal part
(2) A- Nerve cord, B- Notochord, C- Gill slits, D- Post-anal part
(3) A- Nerve cord, B- Gill slits, C- Notochord, D- Post-anal part
(4) A- Nerve cord, B- Notochord, C- Post-anal part, D- Gill slits

175. Match the following organisms with their respective characteristics :

- | | |
|------------------|------------------------|
| A. Pila | i. Flame cells |
| B. Bombyx | ii. Comb plates |
| C. Pleurobrachia | iii. Radula |
| D. Taenia | iv. Malpighian tubules |

Select the correct option from the following :

A B C D

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

176. Which one of the following groups of three animals each is correctly matched with their one characteristic morphological feature?

Animals	Morphological feature
(a) Scorpion, Spider, Cockroach	- Ventral solid central nervous system
(b) Cockroach, Locust, Taenia	- Metameric Segmentation
(c) Liver fluke, Sea anemone, Sea cucumber	- Bilateral symmetry
(d) Centipede, Prawn, Sea urchin	- Jointed appendages

177. Consider following features

- (a) Organ system level of organisation
(b) Bilateral symmetry
(c) True coelomates with segmentation of body
Select the correct option of animal groups which possess all the above characteristic's.

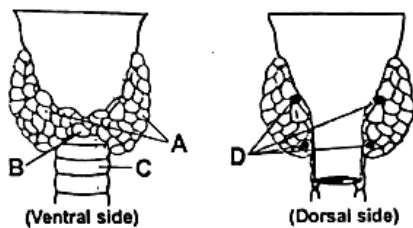
- (1) Annelida, Arthropoda and Chordata
- (2) Annelida, Arthropoda and Mollusca
- (3) Arthropoda, Mollusca and Chordata
- (4) Annelida, Mollusca and Chordata

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

Column I	Column II
A. Cerebrum	(i) Controls of the pituitary
B. Cerebellum	(ii) Controls vision and hearing
C. Hypothalamus	(iii) Controls the rate of heart beat
D. Midbrain	(iv) Seat of intelligence
	(v) Maintains body posture

- (1) A - (v), B - (iv), C - (ii), D - (i)
- (2) A - (iv), B - (v), C - (ii), D - (i)
- (3) A - (v), B - (iv), C - (i), D - (ii)
- (4) A - (iv), B - (v), C - (i), D - (ii)

179. Observe the following figures.
Identify A to D -



- (1) A - Parathyroid gland, B - Isthmus, C - Trachea, D - Thyroid
- (2) A - Thyroid, B - Isthmus, C - Trachea, D - Parathyroid gland
- (3) A - Thyroid, B - Isthmus, C - Larynx, D - Parathyroid gland
- (4) A - Thyroid, B - Corpus luteum, C - Trachea, D - Parathyroid gland

180. The largest endocrine gland is

- (1) Thymus
- (2) Thyroid
- (3) Adrenal
- (4) Pituitary

Answer key

Question no	Answer key	Question no	Answer key	Question no	Answer key	Question no	Answer key
1	3	46	2	91	1	136	2
2	4	47	2	92	1	137	4
3	3	48	3	93	4	138	3
4	2	49	1	94	2	139	2
5	4	50	4	95	3	140	4
6	4	51	1	96	4	141	2
7	3	52	2	97	4	142	2
8	3	53	3	98	3	143	2
9	3	54	3	99	2	144	2
10	2	55	3	100	2	145	1
11	1	56	3	101	4	146	3
12	2	57	2	102	4	147	2
13	4	58	1	103	1	148	3
14	3	59	4	104	2	149	1
15	1	60	2	105	1	150	3
16	1	61	2	106	3	151	2
17	2	62	2	107	1	152	4
18	4	63	4	108	2	153	2
19	1	64	2	109	1	154	4
20	3	65	4	110	2	155	3
21	3	66	4	111	4	156	2
22	3	67	4	112	4	157	1
23	4	68	2	113	3	158	4
24	4	69	4	114	4	159	2
25	1	70	3	115	1	160	2
26	3	71	1	116	2	161	1
27	3	72	3	117	1	162	1
28	2	73	2	118	1	163	3
29	1	74	3	119	2	164	1
30	2	75	1	120	4	165	2
31	4	76	4	121	1	166	1
32	4	77	1	122	3	167	4
33	1	78	2	123	1	168	2
34	3	79	3	124	1	169	1
35	2	80	3	125	1	170	4
36	3	81	1	126	2	171	4
37	2	82	2	127	2	172	2
38	4	83	4	128	2	173	2
39	3	84	3	129	2	174	2
40	3	85	2	130	4	175	1

41	2	86	3	131	1	176	1
42	2	87	2	132	4	177	1
43	1	88	4	133	2	178	4
44	3	89	2	134	1	179	2
45	2	90	1	135	2	180	2

Solution Physics

1 (3) We have, $S = \frac{w}{\pi r^2} = \frac{w'}{\pi(2r)^2}$

$\therefore$ Load, $w' = 4w$

2 (4)

$$r_1 = r \sin 45^\circ = \frac{r}{\sqrt{2}}$$

Net magnetic field at point P is

$$B = \frac{2\mu_0 I}{4\pi \frac{r}{\sqrt{2}}} (\sin 45^\circ + \sin 90^\circ)$$

$$= \frac{\mu_0}{4\pi} \times \frac{2I}{r} (\sqrt{2} + 1)$$

3 (3) The charged particle goes undeflected through both the fields, therefore force experienced by charged particle due magnetic field must be equal to the force experienced by the charge particle due to electric field, i.e. $F_m = F_e$ or
 $evB \sin \theta = eE$

Given, $v = 2 \times 10^3 \text{ ms}^{-1}$ $B = 1.5 \text{ T}$ and $\theta = 90^\circ$ Hence

4 (2)

Take 1 kg mass at origin

$$X_{cm} = \frac{1 \times 0 + 1.5 \times 3 + 2.5 \times 0}{5} = 0.9 \text{ cm} \quad Y_{cm} = \frac{1 \times 0 + 1.5 \times 0 - 2.5 \times 4}{5} =$$

5 (4)

Given, $a_1 = 2a_2$

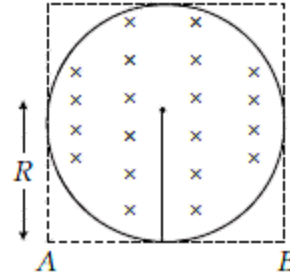
$$I_1 = 4I', I_2 = I'$$

We know that, $I_m = (\sqrt{I_1} + \sqrt{I_2})^2$

$$= (\sqrt{4I'} + \sqrt{I'})^2 = 9I' \therefore I = I_1 + I_2 + 2\sqrt{I_1 I_2} \cos \phi$$

$$= I' (5 + 4 \cos \phi) = \frac{I_m}{9} [5 + 4(2 \cos^2 \frac{\phi}{2} - 1)] = \frac{I_m}{9} [$$

6 (4) Induced emf, $V_{BA} = \frac{(E \cdot 8R)}{4} = \frac{1}{4} \left(\frac{d\phi}{dt} \right)$



$$= \frac{1}{4} (\pi R^2) \cdot \frac{dB}{dt} = \frac{\pi R^2 \alpha}{4} \left(\because \phi = B \cdot A \text{ and } \frac{dB}{dt} = \alpha \right)$$

7 (3) The slope of straight line portion of strain-stress curve for a given material represents its Young's modulus.

(i) Young's modulus of the given material (Y)
 = Slope of strain-stress curve

$$Y = \frac{150 \times 10^6}{0.002} = 75 \times 10^9 = 7.5 \times 10^{10} \text{ Nm}^{-2}$$

(ii) Yield strength of the given material

$$= \text{Maximum stress that material can sustain} = 300 \times$$

8 (3)

Using the relation

$$l_t = l_0 (1 + \alpha t) = 1 \times [1 + 11 \times 10^{-6} \times (40^\circ - 20^\circ)] = 1.$$

Now length of copper rod at 40°C

$$R_t = l_0 (1 + \alpha t) = 80 [1 + 17 \times 10^{-6} (40^\circ - 20^\circ)] = 80.0$$

Now number of cms observed on the scale

$$= \frac{80.0272}{1.00022} = 80.0096$$

9 (3)

The tuning fork whose frequency is being tested produces 2 beats with oscillator at 514Hz, therefore, frequency of tuning fork may either be 512 or 516. With oscillator frequency 510 it gives 6 beats/sec, therefore frequency of tuning fork may be either 516 or 504. Therefore, the actual frequency is 516Hz which gives 2 beats/sec with 514Hz and 6 beats/sec with 510Hz.

10 (2)

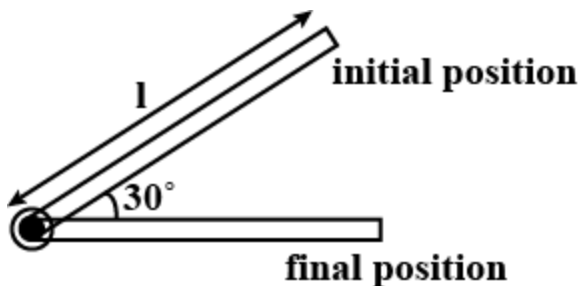
(a) uv rays – used for water purification

(b) x-rays used for diagnosing fracture

(c) Microwaves are used for mobile and radar communication

(d) Infrared waves show less scattering therefore used in foggy days

11 (1)



Work done by gravity from initial to final position is,

$$W = mg \frac{l}{2} \sin 30^\circ = \frac{mgl}{4}$$

According to work-energy theorem

$$W = \frac{1}{2} I \omega^2 \Rightarrow \frac{1}{2} \frac{m l^2}{12} \omega^2 = \frac{mgl}{4} \quad \omega = \sqrt{\frac{3g}{2l}} = \sqrt{\frac{3 \times 10}{2 \times 0.5}} \quad \omega =$$

12 (2)

In the given Relation,

$$\omega = v/r$$

v = velocity of the particle which is directly proportional to distance of particle from the axis.

ω is constant of proportionality and its value will remain same. In case of pure rotation all particles of the rigid body will have same angular velocity.

Also,

v is directly proportional to r.

$$v = \omega * r$$

13(4) For particle undergoing SHM,

$$V = \omega \sqrt{A^2 - x^2} \Rightarrow V^2 = (\omega)^2 (A^2 - x^2) \quad V_1 = \omega \sqrt{A^2 - x}$$

14 (3) We have, $\frac{\mu_2}{v} = \frac{\mu_1}{u} - \frac{\mu_2 - \mu_1}{R}$

$$\frac{1}{v} = \frac{1.5}{-6} - \frac{1-1.5}{-10}$$

$$\therefore v = -5 \text{ cm}$$

15 (1) Here,

$$x = u + v$$

$$\text{Magnification, } m = \frac{f}{f-u} = \frac{f-v}{f}$$

Image is real, magnification is negative

$$-m = \frac{f}{f-u} \Rightarrow u = \frac{(m+1)}{m} f \quad \text{From } -m = \frac{f-v}{f} \Rightarrow$$

Putting the value of v in Eq. (i), we get

$$\Rightarrow x = \frac{(m+1)}{m} f + (m+1) f \quad f = \frac{mx}{(m+1)^2}$$

16 (1)

Given, pressure, $p = 249 \text{ kPa} = 249 \times 10^3 \text{ Pa}$

Temperature, $T = 27^\circ \text{C} = 273 + 27 = 300 \text{ K}$

Density, = ?

From ideal gas equation, $pV = nRT$

$$\Rightarrow pV = \frac{m}{M} RT \left(\because n = \frac{m}{M} \right) \Rightarrow pVM = mRT \Rightarrow pM = \frac{m}{V} RT$$

($\because$ For hydrogen gas, $M = 2 \text{ g} = 2 \times 10^{-3} \text{ kg}$)

$$\rho = 0.2 \text{ kg/m}^3$$

17(2)

$$K = \frac{p^2}{2m} \therefore p = \sqrt{2Km} \quad \lambda = \frac{h}{p} = \frac{h}{\sqrt{2Km}} \therefore \lambda \propto \frac{1}{\sqrt{m}} \therefore \frac{\lambda_a}{\lambda_p}$$

18 (4)

$$\Delta x = 2r = 2 \times 10^{-15} \text{ m} \quad \Delta x \cdot \Delta p \approx \frac{h}{2\pi} \quad \Delta p \approx \frac{h}{2\pi \Delta x} = \frac{h}{2 \times 3.14 \times 10^{-15}}$$

$$= \frac{(0.5255 \times 10^{-19})^2}{2 \times 9.1 \times 10^{-31} \times 1.6 \times 10^{-19}}$$

$$E = 9.48 \times 10^3 \text{ MeV}$$

19 (1)

decrease in potential energy = increase in kinetic energy

$$\frac{Gm_1 m_2}{d^2} = \frac{1}{2} \left[\frac{m_1 m_2}{m_1 + m_2} \right] v_r^2 \quad v_r = \sqrt{\frac{2Gm_1 m_2}{\left(\frac{m_1 m_2}{m_1 + m_2} \right) d}} \quad v_r = \sqrt{\frac{2G(m_1 + m_2)}{d}}$$

where v_r is the relative velocity of approach

20 (3)

Since the acceleration due to gravity varies inversely to the square of the distance hence the apparent weight (net gravitational force) of the passenger with respect to time will not be a straight line but a curve. In between the earth and the mars, there will be a point where the gravitational force due to both of the bodies will be equal and opposite, hence the apparent weight will be zero but never negative. Out of the three curves in the figure, only curve C fulfills this condition.

21(3) When key K is opened, bulb B_3 will not

draw any current from the source. So, that terminal voltage of source increases. Hence, power consumed by bulb increases. So, light of the bulb B_2 becomes more. The brightness of the bulb B_1 decreases.

$$22(3) \quad q = \int_0^5 t dt = \int_0^5 (1.2t + 3) dt = 30C$$

23 (4) Applying Kirchhoff's law at point D, we get

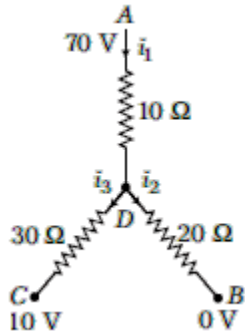
$$i_1 = i_2 + i_3$$

$$\frac{V_A - V_D}{10} = \frac{V_D - 0}{20} + \frac{V_D - V_C}{30}$$

$$\text{or } 70 - V_D = \frac{V_D}{2} + \frac{V_D - 10}{3}$$

$$\Rightarrow V_D = 40V \Rightarrow i = \frac{70-40}{10} = 3A$$

$$i_2 = \frac{40-0}{20} = 2A$$



and

$$i_3 = \frac{40-10}{30} = 1A$$

24 (4)

$$10 \times i = 2 \times 50$$

$$= \frac{100}{10} = 10mA$$

25(1)

The overall conductivity of a semiconductor is

$$\sigma = n_e e \mu_e + n_p e \mu_p \quad \sigma = e [\mu_e n_e + \mu_p n_p]$$

Also $n_e n_p = n_i^2$ (For an intrinsic semiconductor)

$$n_e = \frac{n_i^2}{n_p}$$

$$\text{Now, } \sigma = e \left[\frac{n_i^2}{n_p} \mu_n + \mu_p n_p \right]$$

On differentiating,

$$\frac{d\sigma}{dn_p} = e \left[\frac{n_i^2}{n_p^2} \mu_n + \mu_p \right] = 0 \Rightarrow \mu_p = \frac{n_i^2}{n_p^2} \mu_n \Rightarrow n_p = n_i \sqrt{\mu_n / \mu_p}$$

26 (3)

$$V_{CE} = V_{CC} - I_C R_O \Rightarrow 0 = 3 - I_C \times 200 \quad I_C = \frac{3}{200} = 15 \text{ mA}$$

27 (3)

NAND gate and NOR gate are universal logic gates

28 (2)

$$P = \frac{a^3 b^2}{cd} \frac{\Delta P}{P} = \pm \left(3 \frac{\Delta a}{a} + 2 \frac{\Delta b}{b} + \frac{\Delta c}{c} + \frac{\Delta d}{d} \right) = \pm (3 \times 1$$

29 (1)

$$1 = \left(\frac{1}{60} \right)^\circ = \frac{1}{60} \times \frac{\pi}{180} \text{ radian} = 2.91 \times 10^{-4} \text{ radian}$$

30 (2)

Dimension of a has to be the same as that of x for x - a to be a valid expression in the right side.

Hence, $\sqrt{2aax - x^2}$ has the dimensions of x, which implies the dimensions of the numerator and denominator are same on the left hand side. For the term to be dimensionless on the right hand side too, n must be equal to zero.

31 (4)

Power delivered in time T is

$$P = F \cdot V = MaV \text{ or } P = MV \frac{dV}{dT} \Rightarrow PdT = MVdV$$

32 (4)

F.S = work done = kinetic energy

Force is constant so,

kinetic energy is directly proportional to displacement(S).

and independent of m.

33 (1) If a closed body is placed in an electric

field (either uniform or non-uniform) total flux linked with it will be zero, i.e. $\phi_{net} = 0 \Rightarrow q_{in} = 0$

34 (3) As, $T \propto \frac{1}{\sqrt{H}}$ and $H = B \cos \theta$

$$\Rightarrow \frac{T_1}{T_2} = \sqrt{\frac{B_2 \cos \theta_2}{B_1 \cos \theta_1}} \Rightarrow \frac{2}{3} = \sqrt{\frac{B_2}{B_1} \cdot \frac{\cos 60^\circ}{\cos 30^\circ}} = \frac{B_2}{\sqrt{3} B_1} \Rightarrow \frac{4}{9}$$

$$35 (2) \frac{me^4}{8\epsilon_0^2 ch^3}$$

36(3)

We know that, $\frac{1}{\lambda} = R \left(\frac{1}{n_1^2} - \frac{1}{n_2^2} \right)$

Here, $n_1 = 1, n_2 = 5$ so

$$\frac{1}{\lambda} = R \left(\frac{1}{1^2} - \frac{1}{5^2} \right) = (24/25)R$$

Now, photon energy $E = \frac{hc}{\lambda} = (24/25)hcR$

As atom of mass m acquired a velocity as a result of photo emission so using momentum conservation,

the momentum photon = momentum of atom
= p

Thus, $p = E/c = (24/25)hR$

Velocity of atom, $v = p/m = \frac{24hR}{2.5m}$

37 (2)

$$\vec{\Delta V} = 5\hat{j} - 5\hat{i}$$

$$|\Delta \vec{V}| = \sqrt{5^2 + 5^2} = 5\sqrt{2}$$

$$a_{av} = \frac{5\sqrt{2}}{10} = \frac{1}{\sqrt{2}} \text{ m/s}^2$$

38(4) ΔU remains same for both paths.

For path iaf,

$$\Delta U = \Delta Q - \Delta W = 50 - 20 = 30 \text{ J}$$

For path fi, $\Delta U = -30 \text{ J}$ and $\Delta W = -13 \text{ J}$

$$\Rightarrow \Delta Q = -30 - 13 = -43 \text{ J}$$

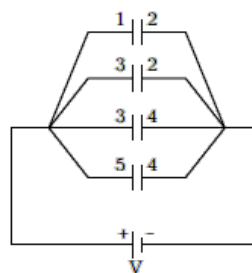
39(3) Amplitude, $A = \frac{2}{2} = 1 \text{ mm}$

From the given equation, we can see that $= 6.25 \text{ m}^{-1}$

The smallest length of string is equivalent to a single loop or length of string equal to $\frac{\lambda}{2}$ or $\frac{\pi}{k}$.

$$\therefore L_{tin} = \frac{\pi}{k} = \frac{\pi}{6.25} = 0.5 \text{ m} = 50 \text{ cm}$$

40(3) Given circuit can be redrawn as shown



Capacity of each capacitor, $C = \frac{\epsilon_0 A}{d}$

So, magnitude of charge on each capacitor =

Magnitude charge on each plate $= \frac{\epsilon_0 A}{d} V$.

As plate 1 is connected with +ve terminal of

battery, so charge on plate 1 $= + \frac{\epsilon_0 A}{d} V$.

Plate 4 comes twice and it is connected with negative terminal of battery. So, charge on plate

$$4 = - \frac{2\epsilon_0 AV}{d}$$

41 (2) On introducing dielectric K in a parallel plate capacitor, its capacity becomes,

$$\therefore C' = KC_0 \text{ Also, energy stored, } W_0 = \frac{q^2}{2C_0} \therefore W' = \frac{q^2}{2C'}$$

42(2)

At the steady state, the branch containing capacitor will be ineffective as no current will be flowing through it

Since 2Ω and 3Ω resistors are in parallel, equivalent resistance,

$$R' = \frac{2 \times 3}{2+3} = 1.2\Omega$$

Total current through the battery,

$$I = \frac{6}{1.2+2.8} = 1.5 A$$

$\therefore$ Current flowing through 2Ω resistor

$$I_{(2\Omega)} = \frac{3}{5} \times 1.5 = 0.9 A$$

43(1)

$$Z = \sqrt{4^2 + 3^2} = \sqrt{16 + 9} = \sqrt{25} = 5\Omega$$

44 (3)

Since each of N-coplanar vector is inclined at $2\pi/N$ to the preceding hence, they will form a closed polygon. Therefore, their resultant must be zero.

45(2)

$$\text{Given : } t = \sqrt{x} + 3$$

$$\text{or } \sqrt{x} = t - 3$$

Squaring both sides, we get

$$x = (t - 3)^2$$

$$\text{Velocity, } v = \frac{dx}{dt} = \frac{d}{dt}(t - 3)^2 = 2(t - 3)$$

Velocity of the particle becomes zero, when

$$2(t - 3) = 0$$

$$\text{or } t = 3s$$

$$\text{At } t = 3s$$

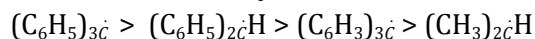
$$x = (3 - 3)^2 = 0m$$

Chemistry

Only (III) has α -H in conjugation with free radical so hyper conjugation is possible.

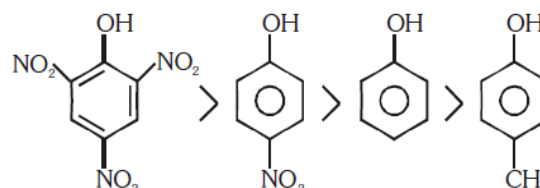
47 (2)

The order of stability of free radicals



The stabilisation of first two is due to resonance and last two is due to inductive effect.

48 (3)



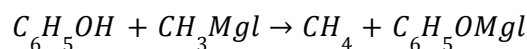
More -I, -M more acidic.

49 (1) Among isomeric alcohols surface area

decreases from 1° to 2° to 3° alcohols and hence the boiling point.

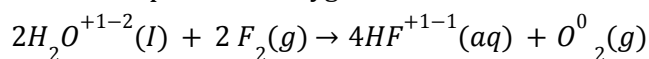
50 (4)

Phenol has active (acidic) hydrogen so it reacts with CH_3Mg to give CH_4 and not anisole



51 (1) all statement correct

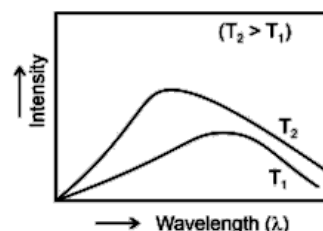
52 (2) Fluorine is so reactive that it attacks water and displaces the oxygen of water :



53 (3)

For Balmer series

$$n_1 = 2 \quad n_2 = 3 \quad v^- = \frac{1}{\lambda} = R_H \left[\frac{1}{n_1^2} - \frac{1}{n_2^2} \right] \quad v^- = R_H \left[\frac{1}{4} - \frac{1}{9} \right]$$



54 (3)

Radius of nth orbit of hydrogen atom

$$r_m = 0.529 \times n^2$$

Given $n = 2$ (where n is no. of orbit)

46 (2)

$$\therefore r_n = 0.529 \times (2)^2 = 2.12 \text{ \AA}$$

55 (3)

Since it is isothermal, $\Delta T = 0$

$$\Delta U = nC_v \Delta T = 0$$

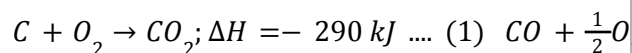
Since expansion is taking place against vacuum

$$P_{ext} = 0 \quad W = -P_{ext} \Delta V = 0$$

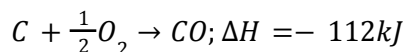
From first law of thermodynamics,

$$\Delta U = q + W \quad 0 = q + 0 \quad q = 0$$

56(3)



By eq. (1) and eq. (2), we get



57 (2) Cell reaction is, $Zn + Cu^{2+} \rightarrow Zn^{2+} + Cu$

$$E_{cell} = E_{cell}^{\circ} - \frac{RT}{nF} \ln \frac{[Zn^{2+}]}{[Cu^{2+}]}$$

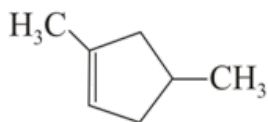
Greater the factor $\left[\frac{[Zn^{2+}]}{[Cu^{2+}]} \right]$, less is the EMF

Hence $E_1 > E_2$

58(1)

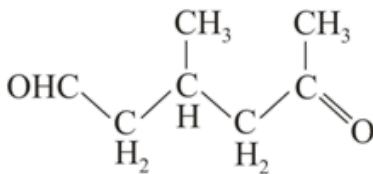
$$HCl, \Lambda_m^{\infty} = 426.2 \text{ Scm}^2 \text{ mol}^{-1} \quad KCl, \Lambda_m^{\infty} = 114.42 \text{ Scm}^2 \text{ mol}^{-1}$$

59(4)

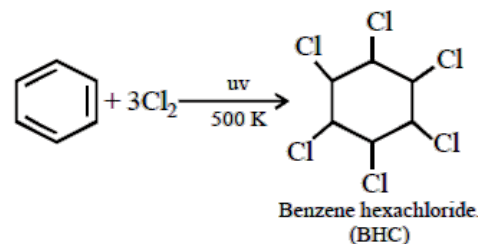
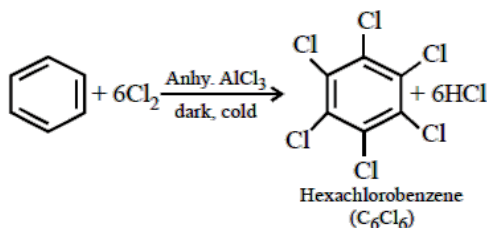
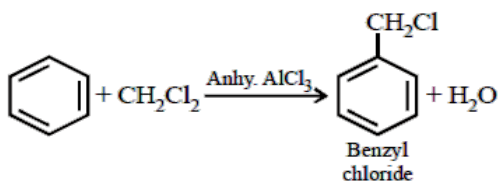
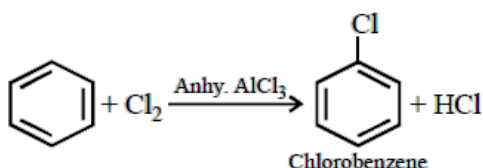


Above compound on reaction

with $O_3 + Zn/H_2O$ shows reductive ozonolysis and form below compound:

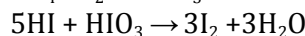
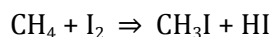


60 (2)



61 (2)

For statement (iii), Fluorination is too violent to be controlled. For statement (iv), Iodination is very slow and an irreversible reaction. It can be carried out in the presence of oxidizing agents like HIO_3 or HNO_3



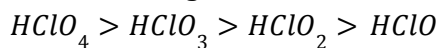
62 (2) Carbon dioxide is not a poisonous gas.

63 (4)

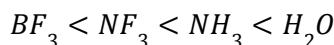
Oxygen is more electronegative than chlorine.

With an increase in the number of O atoms attached to Cl, more electrons are pulled away from O - H bond and more weaker becomes the O - H bond. This increases the acid strength.

The decreasing order of acidic strength is



64 (2)



65 (4)

All the three molecules are sp^3 hybridised but the bond angles are different due to the presence of lone pair. The bond angle of H_2O is 104.5° due to bond pair - lone pair repulsion and the bond angle of CH_4 is 109.25° .

66 (4)

BF_3 and NO_2^- are sp^2 hybridised while NH_2^-, NH_3 and H_2O are sp^3 hybridised.

67(4)

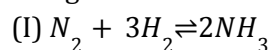
In iso-electronic species, if a positive charge is more then they will have a very less ionic radius. Because here protons are more than electrons and protons attract electrons to come close to the nucleus. But in anionic iso-electronic species, electrons are more than protons. Protons which are in less number can't attract all the electrons to come closer. So, ionic radius increases in the case of anionic species, if negative charge increases.

Therefore the correct order is

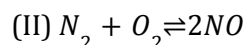
$$S^{-2} > Cl^{-} > K^{+} > Ca^{+2}$$

68 (2)

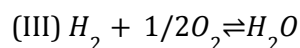
The given reactions are :-



$$\therefore K_1 = \frac{[NH_3]^2}{[N_2][H_2]^3} \rightarrow (I)$$

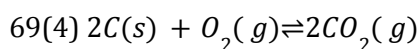
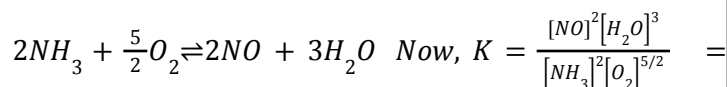


$$\therefore K_2 = \frac{[NO]^2}{[N_2][O_2]} \rightarrow (II)$$



$$\therefore K_3 = \frac{[H_2O]}{[H_2][O_2]^{1/2}} \rightarrow (III)$$

Now, for the reaction,



$$\Delta n = 2 - 1 = +1$$

$\therefore K_c$ and K_p are not equal.

70 (3)

$$M_1 V_1 = M_2 V_2 \quad 1 \times 0.10 = M_2 \times 100 \quad M_2 = 0.001 = 10^{-3}$$

$$K_b = \frac{C\alpha \times C\alpha}{C(1-\alpha)}$$

$$K_b = C^2 (\because 1 - \alpha \approx 1) \quad \alpha = \sqrt{K_b/C} \quad [OH^-] = C\alpha = \sqrt{\frac{K_b}{C}}$$

71 (1)

From the first set of data (i) and (ii) it is observed that on keeping concentration of [B] constant and on doubling the concentration of [A] rate does not changes hence order of reaction with respect to A is zero.

From the second set of data (i) and (iii) it is observed that rate becomes 4 times on doubling the concentration of [B] keeping [A] constant hence order with respect to [B] will be 2 rate

$$= k[A]^0 [B]^2$$

72(3)

$$\Delta H = E_f - E_b - 200 = 80 - E_b \quad E_b = 280 \text{ kJ/mol}$$

73(2)

Adenine :Purine (double ringed structure) found in both DNA and RNA)

Anthocyanin Pigment (secondary metabolite)

Chitin Homopolysaccharide of mathrm

N-acetylglucosamine found in fungal cell wall and exoskeleton of Arthropods

Codeine Alkaloid (secondary metabolite)

74 (3)

GLUT-IV is insulin dependent and is responsible for majority of glucose transport into muscle and adipose cells in anabolic conditions. Whereas GLUT-I is insulin independent and is widely distributed in different tissues.

75 (1) Only 1° alkyl halides (i.e. CH_3Br) undergo

S_N2 reaction.

76 (4) In nucleophilic substitution, a nucleophile provides an electron pair to the substrate and the leaving group departs with an electron pair.



These are usually written as S_N (stands for substitution and N for nucleophilic) and are common in aliphatic compounds especially in alkyl halides and acyl halides.

77 (1) According to idea of Raoult's law "partial pressure of one of the component is proportional to mole fraction of that component in the solution."

$$P = P_1^\circ x_1 + P_2^\circ x_2$$

$$600 = 450x_1 + 700x_2$$

$$4.5x_1 + 7x_2 = 6$$

$$\therefore x_1 + x_2 = 1$$

$$\therefore x_1 = 0.6x_2 = 0.4$$

$$\Rightarrow x_1 = 0.4, x_2 = 0.6$$

$$78 (2) p_{total} = p_A^\circ x_A + p_B^\circ x_B$$

$$550 = p_A^\circ \times \frac{1}{4} + p_B^\circ \times \frac{3}{4}$$

$$p_A^\circ + 3p_B^\circ = 550 \times 4$$

In second case

$$p_{total} = p_A^\circ \times \frac{1}{5} + p_B^\circ \times \frac{4}{5}$$

$$p_A^\circ + 4p_B^\circ = 560 \times 5$$

Subtract (i) from (ii)

$$\therefore p_B^\circ = 560 \times 5 - 550 \times 4 = 600$$

$$\therefore p_A^\circ = 400$$

79 (3)

Equivalent weight of orthophosphoric acid

$$(H_3PO_4) = \frac{3+31+64}{3} = \frac{98}{3}$$

Now 100 gm solution contains 70 gm H_3PO_4

$$\frac{100}{1000 \times 1.54} \text{ litre of solution contains } \frac{70}{98/3} \text{ gm}$$

equivalent of H_3PO_4

Normality of solution

$$= \frac{\frac{70 \times 3}{98}}{\frac{1}{10 \times 1.54}} = \frac{70 \times 3}{98} \times 10 \times 1.54 = 33 N$$

80 (3) Given, Number of moles of A = Number of moles of B

$$\frac{1.4}{M_A} = \frac{0.8}{M_B} \Rightarrow M_A = \frac{1.4}{0.8} M_B \text{ or } M_B = 0.57 M_A$$

81 (1)

Let x and y be the atomic weights of X and Y

Given 0.1 mole of XY_2 weighs 10 g

$$\Rightarrow x + 2y = \frac{10}{0.1} = 100 \rightarrow (1)$$

0.05 mole of X_3Y_2 weighs 9 g

$$\Rightarrow 3x + 2y = \frac{9}{0.05} = 180 \rightarrow (2)$$

$$(1) \Rightarrow x = 100 - 2y$$

Substituting for x in Equation (2)

$$\Rightarrow 3(100 - 2y) + 2y = 180 \Rightarrow 300 - 6y + 2y = 180$$

$$\text{Hence } x = 100 - 2(30) = 40$$

82 (2) Complexes of Ma_3B_3 type shows fac-

meridional isomerism.

Solvate isomerism is referred to as a hydrate isomerism when solvent is water.

83 (4)

In $[Co(CN)_6]^{3-}$ O.N. of Co is +3

$$\therefore Co^{+3} = 3d^6 4s^0$$

CN^- is a strong field ligand

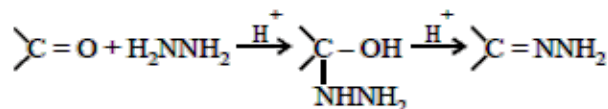
$\therefore$ Pairing of electrons occurs so in this complex no unpaired electron is present and it is low spin complex.

84 (3) $[Mn(CN)_6]^{3-}$ and $[Fe(CN)_6]^{3-}$ are inner orbital complexes and paramagnetic while

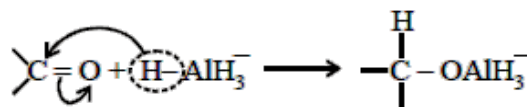
$[Co(C_2O_4)_3]^{3-}$ is diamagnetic in nature.

85 (2) Aldehydes and ketones react with hydrogen cyanide (HCN) to yield cyanohydrins. This reaction occurs very slowly with pure HCN. Therefore, it is catalysed by a base and the generated cyanide ion (CN^-) being a stronger nucleophile readily adds to carbonyl compounds to yield corresponding cyanohydrins

86(3)

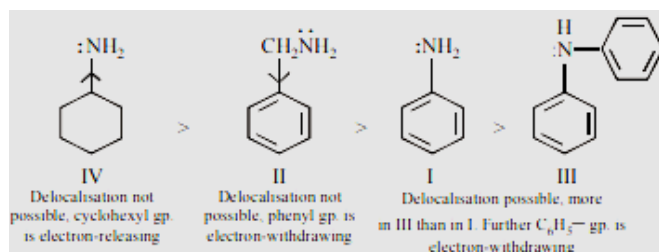


(b) In the reduction of carbonyl group with $LiAlH_4$ or $NaBH_4$, a hydride ion is transferred from the metal to the carbonyl carbon (nucleophilic addition)



87 (2)

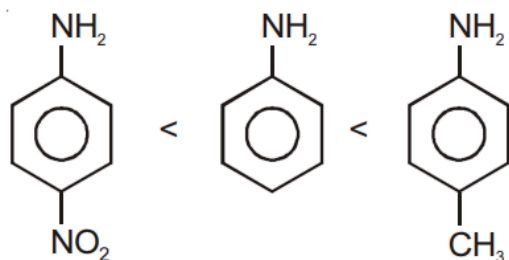
Greater the delocalisation of electron pair on N, lesser is its availability for protonation leading to lesser basic character.



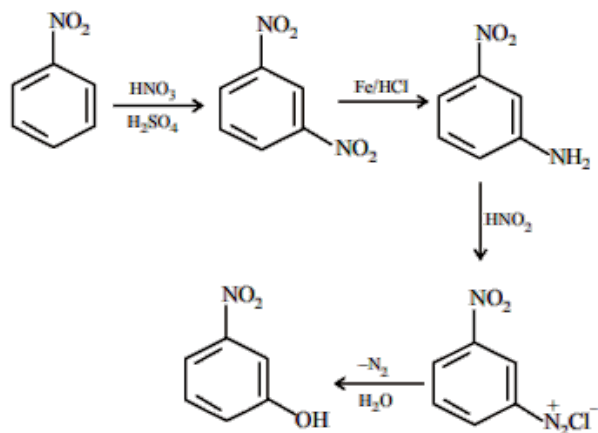
88 (4)

$-\text{NO}_2$ has strong $-\text{R}$ effect
and $-\text{CH}_3$ shows $+\text{R}$ effect.

$\therefore$ Order of basic strength is



89 (2)



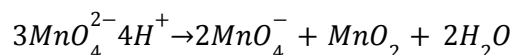
90 (1)

Disproportionation reaction are the reactions in which the same element/compound get oxidized and reduced simultaneously.

Since I and II reactions are as follows



And



Other two reactions are correct and belong to disproportionation reaction.

Biology

- Carrot grass i. Parthenium
- Water hyacinth ii. Eicchornia
- African cat fish iii. Clarias griepinus
- Co-extinctions iv. Plant pollinator

92 (1) A,B and C is correct

93 (4)

Stomata are tiny pores, and composed of two bean shaped epidermal cells called guard cells which enclose stomatal pore. Stomata are mostly present in epidermal layers of leaves and in other aerial parts like young stems, floral parts etc. Guard cells in dicots are kidney shaped and in monocots are dumb bell shaped. The guard cells may be surrounded by varying number of specialized epidermal cells called subsidiary cells or accessory cells.

94 (2)

Plants have two systems for the transportation of substances - using two different types of transport tissue. Xylem transports water and solutes from the roots to the leaves, while phloem transports food from the leaves to the rest of the plant. Sieve cells are long, conducting cells in the phloem that do not form sieve tubes. Their narrow pores are necessary in their function in most seedless vascular plants and gymnosperms which lack sieve-tube members and only have sieve cells to transport molecules.

95 (3)

Correct answer is (c) (A) = (III), (IV), (V), (VI); (B) = (I), (II), (V), (VI)

96 (4)

Lysosome – Plant cell

Lysosome – Animal cell

Centromere – Chromosome

Nucleolus – Non-Membrane bound structure

97 (4)

Mycoplasmas, the smallest cells, are only $0.3 \mu\text{m}$ in length while bacteria could be 3 to $5 \mu\text{m}$.

Among multicellular organisms, human red blood cells are about $7.0 \mu\text{m}$ in diameter.

98 (3)

Comparison between fermentation and aerobic respiration.

(1) Fermentation accounts for only a partial breakdown of glucose whereas in aerobic respiration it is completely degraded to CO_2 and H_2O .

91 (1)

(2) In fermentation there is a net gain of only two molecules of ATP for each molecule of glucose degraded to pyruvic acid whereas many more molecules of ATP are generated under aerobic conditions.

(3) NADH is oxidised to NAD⁺ rather slowly in fermentation, however the reaction is very vigorous in case of aerobic respiration.

99 (2) synthesis of ATP

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

101(4) I, II, III

102 (4) Chromatin condenses to form discrete, visible

chromosomes early in G₁.

103 (1)

The given structure can be found during the metaphase stage as all the chromosomes arrange themselves on the equatorial plate. The chromosome contains two coiled structures thought its length which is known as the chromonemata. A chromatid is a half chromosome or daughter chromosome. The chromatids are connected at the centromere or primary constrictions.

104 (2)

- In an animal cell, cytokinesis is achieved by the appearance of a furrow in the plasma membrane
- Cell wall formation starts in the centre of cell and grows outward to meet the existing lateral walls
- Cell plate represents the middle lamella between the walls of two adjacent plant cells
- During cytokinesis, organelles like mitochondria and plastids get distributed between the two daughter cells

105 (1) the G₁ phase is the time between mitosis and the start of DNA replication. Enzymes, proteins, nucleotides, and other molecular are synthesized at this stage.

106 (3) Both leading and lagging strands are synthesised in 3'→5' direction.

107(1) B,D

108(2) inhibiting transcription of mRNA

109 (1)

A split gene consists of both exons and introns when the post-transcriptional modification happens, the introns which are non-coding genes

are removed and only exons which are protein coding genes are retained in the mature RNA.

110 (2)

During transcription complementary mRNA is formed on DNA template in which T is replaced by U. So, the sequence will be GACUAUCG.

111 (4)

Strain 2 and 4 have the genotype Gg where grey body colour (G) is dominant to the ebony body colour (g). (Strain 2 × gg = Gg : gg = 1:1, and Strain 4 × Gg = GG : Gg : gg = 1:2:1).

Strain 1 will have genotype GG and Strain 3 will have genotype gg.

112 (4)

Sickle cell disease the haemoglobin beta gene found on chromosome 11 gets mutated. Red blood cells with normal haemoglobin are smooth and round and glide through blood vessels but in this disease, the cell becomes the sickle shape. It is caused by a single point mutation (a missense mutation) in the beta-hemoglobin gene that converts a GAG codon into GUG, which encodes the amino acid valine rather than glutamic acid. Haemoglobin transports oxygen from the lungs to other parts of the body.

113 (3)

Assertion is true, Reason is false. It can be corrected as In human, the gametes contributed by the male determines the sex of the child. Thus, sex in human is a polygenic trait depending upon a cumulative effect of some genes present on Y-chromosome and not on X-chromosome

114(4)

- An extra or missing chromosome is a common cause of genetic disorders, including some human birth defects. Aneuploidy originates during cell division when the chromosomes do not separate properly between the two cells.
- Chromosomal disorders may be due to mutations in multiple genes.
- Mendelian disorders result from a mutation at a single genetic locus. Thalassaemia and cystic fibrosis are categorized as Mendelian disorders because these are determined by alternation or mutation in a single gene.
- o Sickle cell anemia is inherited as an autosomal (meaning that the gene is not linked to a sex chromosome) recessive condition. This means

that the gene can be passed on from a parent carrying it to male and female children.

- o Hemophilia is a sex-linked recessive disorder. The gene with the instructions for making factor is found only on the sex chromosome labeled X. If the gene is faulty, the result is hemophilia unless there is a dominant, normal gene on a matching X chromosome.

115(1) Establishes sites of the genes on a chromosome

116 (2)

During the development of dicot embryo, initially the dicot embryo is globular and undifferentiated. Early embryo with radial symmetry is called proembryo. It is transformed into embryo with the development of radicle, plumule and cotyledons. Two cotyledons differentiate from the sides with a faint plumule in the centre. At this time the embryo becomes heart-shaped. Part of embryo axis between the plumule and cotyledonary node is epicotyl (above the level of cotyledons) while the part between radicle and cotyledonary node is called hypocotyl (below the level of cotyledons). The single cotyledon of monocotyledonous seed {e.g. maize grain} is called scutellum. It occupies the major portion of the embryo regions of grain.

117 (1)

In the given figure of LS of flower, the structure marked as A, B, C, D and E are respectively antipodal cells, polar nuclei, stigma, style and chalaza.

118 (1)

The ovule is a small structure attached to the placenta by means of a stalk called funicle. The body of the ovule fuses with funicle in the region called hilum. Each ovule has one or two protective envelopes called integuments. Integuments encircle the ovule except at the tip where a small opening called the micropyle is present. Opposite the micropylar end, is the chalaza. The chalaza represents the basal part of the ovule. A mass of parenchymatous cells; called nucellus; is enclosed within the integuments. So, the correct option is 'A-(v), B-(iv), C-(iii), D-(ii), E-(i)'.

119 (2)

the phosphorus cycle does not include a gaseous phase, whereas the carbon cycle does.

120 (4)

Pyramid of energy represents the amount of energy at each trophic level. In any ecosystem, flow of energy declines as it passes from lower to higher trophic level. Hence, pyramid of energy is always upright indicating that herbivores have a better energy conversion efficiency than carnivores. Each successive trophic level has less total energy. In this, the energy decreases from one trophic level to the next trophic level because energy is lost as metabolic heat during transfer of energy. When food energy passes from producers to herbivores to carnivores, only 10% of energy is transferred from one trophic level to another trophic level.

121 (1)

Based on the position of floral parts on thalamus, flowers are divided into three types shown in the figures. Figures A, B and C are respectively hypogynous, perigynous and epigynous flower. When the calyx, corolla and androecium arise below the ovary, the flower is called hypogynous. In these flowers the ovary is superior. e.g., cruciferae, liliaceae. In perigynous condition of flower, the calyx, corolla and androecium arise around the ovary. In these flowers the ovary is semi inferior. e.g., Saxifraga. When the calyx, corolla and androecium arise from the top of the ovary, the flower is called epigynous. In these flowers the ovary is inferior. e.g., umbiliferae, compositae.

122 (3)

When stamens are attached to the perianth, they are known as epiphyllous, e.g., Asparagus, lily.

123(1)

124(1)

Parthenocarpy is the development of fruits without prior fertilization which results in the formation of seedless fruits. In some plant species, parthenocarpic fruits are produced naturally or they may be induced by treatment of the unpollinated flowers with auxin. Removal of androecium before pollen release is called emasculation which is helpful in preventing unwanted pollination. Vernalized seeds are the

chilled treated seeds for breaking dormancy. Phenyl Mercuric Acetate is an antitranspirant. Gibberellins and Auxins are known to induce parthenocarpy in plants. If a tomato plant is treated with a low concentration of auxin and gibberellic acid it'll produce fruits without fertilization i.e. parthenocarpic fruits.

125 (1)

- O_2 helps in releasing metabolic energy essential for growth activities
- Nutrients (micro and macromolecules) are required by plants for the synthesis of protoplasm as well as act as source of energy
- Optimum temperature for plant growth is needed
- Environmental signal like light and gravity affect certain phases of growth

126 (2)

The correct sequence of the developmental process in a plant cell is plasmatic growth, differentiation, maturation and senescence, respectively.

127 (2)

Key is a taxonomical aid used for identification of plants and animals based on the similarities and dissimilarities. The keys are based on the contrasting characters generally in a pair called couplet. It represents the choice made between two opposite options. This results in acceptance of only one and rejection of the other. Each statement in the key is called a lead. Separate taxonomic keys are required for each taxonomic category such as family, genus and species for = identification purposes. Keys are generally analytical in nature.

128 (2) : 1. Chlamydomonas is a green algae.

2. Cycas is a gymnosperm, it is tallest gymnosperm.

3. Selaginella is a pteridophyte, it is belong to class Lycopsidea.

4. Sphagnum also known as peat moss.

129(2)

In gymnosperm (like Cedrus) the male and female gametophyte do not have an independent free living existence. They remain within the sporangia retained on the sporophytes i.e., female gametophyte with megasporangium and male

gametophyte within microsporangium. In bryophytes like Polytrichum and Funaria, the main plant body is a gametophyte which is independent and the sporophyte is partially or fully dependent on gametophytic generation. In pteridophytes (Pteris) gametophyte is usually independent and sporophyte is the dominant phase in the life cycle.

130(4)

Mosses and ferns belong to bryophytes and pteridophytes respectively. In bryophytes, the dominant phase in the life cycle is the gametophytic plant body. However, in pteridophytes, the main plant body is a sporophyte, which is differentiated into true root, stem and leaves. These organs possess well – differentiated vascular tissues.

131 (1)

A - Cocci (spherical), B - Bacilli (rod shaped), C - Spirilla (spiral), D - Vibrio (comma shaped).
These are all the shapes of the bacteria.

132 (4)

All statements are correct

133(2)

The increase in number of individuals in a population under given environmental conditions

134(1) I, II, V

Here's why:

I. The electron carriers of phosphorylation are located in the thylakoid.

- This statement is true. The electron carriers involved in the light reactions of photosynthesis are located in the thylakoid membranes.

II. During phosphorylation, the chloroplast stroma becomes more acidic than the interior of the thylakoid membrane.

- This statement is false. During phosphorylation, protons are pumped into the thylakoid lumen, making the lumen more acidic than the stroma.

III. Protons diffuse through the protein channels which are ATP synthetase molecules.

- This statement is true. Protons diffuse back into the stroma through ATP synthase, driving the synthesis of ATP.

IV. ATP is formed from ADP + P_i on the stroma side of the thylakoid in the chloroplast.

- This statement is true. ATP synthesis occurs on the stroma side of the thylakoid membrane.

V. During phosphorylation, water ionizes to form H^+ and $2OH^-$, yielding an electron to PSII.

- This statement is false. During phosphorylation, water is split (photolysis) to form H^+ , electrons, and O_2 , but it does not form $2OH^-$.

Therefore, the false statements are I, II, and V.

135 (2)

(V) Reaction centre of PSII gets photoexcited having released electrons (IV) PSII oxidises water (III) Cytochrome system transports electrons and pumps H^+ from stroma to thylakoid space (II) NADP reductase, located on stroma side of membrane, obtains e^- from PSI and protons from stroma to form NADPH₂ (I) ATP synthase produces ATP due to flow of H^+ from thylakoid lumen to stroma

So, the correct order is: V, IV, III, II, I.

136(2) IV

To determine which statement is false about the compound epithelium, we need to analyze each statement provided in the question:

1. Statement I: "It consists of several layers."

- This statement is true. Compound epithelium is characterized by being multi-layered, which provides it with protective functions.

2. Statement II: "It covers the dry surface of the skin, the moist surface of the buccal cavity, pharynx, inner lining of ducts of salivary glands and pancreatic ducts."

- This statement is also true. Compound epithelium is found in various locations, including the skin (dry surface) and moist surfaces such as the buccal cavity and pharynx.

3. Statement III: "It provides protection against chemical and mechanical stresses."

- This statement is true. One of the primary functions of compound epithelium is to provide protection against various stresses, including chemical and mechanical.

4. Statement IV: "Being multilayered it has a great role in secretion and absorption."

- This statement is false. While compound epithelium is multilayered, its main function is protection, not secretion and absorption. Secretion and absorption are primarily functions of simple epithelium, which is single-layered.

137 (4) facilitate communication between

adjoining cells by connecting the cytoplasm for rapid transfer of ions, small molecules and some large molecules.

138 (3)

In a typical diagram of adipose tissue, the components can be identified as follows:

A: Nucleus B: Fat C: Cell membrane

139(2)

The correct match is:

(2) Sternum, Ribs, Vertebral column

This matches the key components of the human axial skeleton that include the sternum (breastbone), ribs, and vertebral column.

140 (4)

In hinge joint, the convex surface of one bone fits into the concave surface of another bone. eg, knee, elbow and interphalangeal joints. Pivot joint, one bone is fixed and second articulated, eg, atlas, and axial of skull rotate with axis vertebra. Gliding joints primarily permit side-by-side and back-and-forth gliding movements, eg, intercarpal joints and intertarsal joints. In ball and socket joint, ball of one bone articulates in socket of another bone, eg, head of humerus and glenoid cavity of pectoral girdle.

141 (2)

The vertebral column is actually dorsally placed (located along the back) in the human body.

The other statements are true: A. Vertebral column consists of 26 vertebrae. C. It extends from the base of the skull and constitutes the main framework of the trunk. D. Neural canal in vertebra is the passage for the spinal cord.

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

143 (2)

I. True: All four chambers of the heart are in a relaxed state during joint diastole. II. True: The tricuspid and bicuspid (mitral) valves open during joint diastole to allow blood flow from the atria into the ventricles. III. False: The conduction of the action potential from the sinoatrial node (SAN) to the atrioventricular node (AVN) occurs during atrial systole, not joint diastole. IV. True: Blood flows from the pulmonary veins into the left atrium and from the vena cava into the right atrium, and subsequently into the ventricles during joint diastole. V. True: The semilunar

valves are closed during joint diastole to prevent backflow of blood into the ventricles.

So, the event that does not occur during joint diastole is: Only III

144(2)

A. **True:** The essence of Darwinian theory about evolution is indeed natural selection.

B. **False:** The rate of appearance of new forms is linked to the life cycle and life span. Shorter life cycles and life spans can lead to faster evolutionary changes.

C. **False:** Adaptive ability can be inherited, as traits that provide a survival advantage can be passed down to offspring.

D. **True:** Mutations are random and do not occur in a specific direction; they can provide raw material for evolution by introducing genetic variation.

145 (1)

I. Darwin - C. Natural Selection and Origin of Species II. De Vries - D. Mutational Theory III. Pasteur - B. Swan-Necked IV. Lamarck - A. Inheritance of Acquired Character

146 (3)

Thorns of Bougainvillea and tendril of Cucurbita are homologous in nature. Both are modified branches and are axillary in position. It means axillary branches in Bougainvillea are modified into thorns for protection from burrowing animals and in Cucurbita into tendrils for climbing.

147 (2)

A. Glycogen II. Branched chain polysaccharide
B. Cellulose I. Plant cell wall
C. Chitin IV. Complex polysaccharide
D. Ribose III. RNA

148 (3)

A=1° structure, B=4° structure, C=3° structure.
D=2° structure

149 (1) The common similarity between all carbohydrates and lipids is that they contain carbon (C), hydrogen (H), and oxygen (O) atoms.

150(3)

Some times especially neural tissues have lipid very much simple structures

151(2)

Assertion (A): During pregnancy, the level of several hormones like estrogens, progestogens,

cortisol, prolactin, thyroxine, etc. are increased several folds in the maternal blood. Reason (R): Increased production of these hormones is essential for supporting the foetal growth, metabolic changes in the mother, and maintenance of pregnancy.

In this case, both the assertion and the reason are true, and the reason correctly explains the assertion.

So, the correct answer is: Both (A) and (R) are true and (R) is the correct explanation of (A).

152 (4)

To solve the matching question between Column I and Column II, we will analyze each item in Column I and find the correct match from Column II.

1. Identify Column I Item I: Semen

- Semen is a fluid that contains sperm and seminal plasma. The seminal plasma is produced by various accessory glands, including the prostate gland.

- Match: I. Semen - (D) Prostate gland

2. Identify Column I Item II: Birth canal

- The birth canal is the passage through which a baby is delivered from the uterus to the outside world. This is commonly referred to as the vagina.

- Match: II. Birth canal - (C) Vagina

3. Identify Column I Item III: Penis

- The penis is the male external genitalia that is involved in sexual intercourse and the expulsion of semen.

- Match: III. Penis - (A) Clitoris (Note: The clitoris is actually part of female anatomy, but in this context, it is likely a misalignment. The correct match should be a male reproductive structure, but given the options, we will proceed with the available choices.)

4. Identify Column I Item IV: Seminiferous tubule

- Seminiferous tubules are located within the testis and are responsible for the production of sperm. They are part of the testicular lobules.

- Match: IV. Seminiferous tubule - (B) Testicular lobules

153(2)

Semen consists of sperm and the secretions of the seminal vesicles, the bulbourethral glands, and the prostate. In the epididymis, the glandular

structures have not yet contributed their secretions to the semen.

154 (4)

The correct sequence of events in the initiation of respiration is:

- (i) The contraction of external intercostal muscles raises the ribs and sternum
- (ii) The volume of thorax increases in the dorsoventral axis
- (iv) Diaphragm contraction
- (vi) The volume of thorax increases in the anterior-posterior axis
- (iii) Intrapulmonary pressure decreases
- (v) Air rushes into lungs

155 (3)

The maximum volume of air a person can breathe in after a forced expiration or the maximum volume of air a person can breathe out after a forced inspiration is called vital capacity (VC). This includes tidal volume, inspiratory reserve volume and expiratory reserve volume. (TV + IRV + ERV). VC varies from 3400 ml - 4800 mL, depending upon age, sex and height of the individual.

156 (2)

The structure referred to in the given statements is:

(B) Loop of Henle

The Loop of Henle fits the description provided:

- (i) Reabsorption in this region is minimum. (ii) This region plays a significant role in the maintenance of high osmolarity of interstitial fluid. (iii) Its descending limb is permeable to water but almost impermeable to electrolytes. (iv) Its ascending limb is impermeable to water but allows transport of electrolytes actively or passively.

157(1)

When someone drinks lot of water the volume of body fluid increases, this switches off the osmoreceptors in the body and suppresses the ADH release.

158 (4)

The test-tube baby program, also known as in vitro fertilization (IVF), involves fertilizing an egg outside the woman's body and then implanting the resulting embryo into her uterus. The specific technique employed is:

159 (2)

- I. True. Lactational amenorrhoea means the absence of menstruation during breastfeeding.
- II. True. Ovulation typically does not occur during the lactational period, which is why it is used as a method of contraception.
- III. True. The chances of contraception failure are almost nil up to six months following parturition if the mother is exclusively breastfeeding.
- IV. True. Side effects are almost nil as it is a natural process.
- V. True. Contraceptive efficiency reduces after the period of intense lactation, especially once the mother starts supplementing with other foods.
- VI. True. It is considered a natural method of contraception.
- VII. False. Lactational amenorrhoea does not increase phagocytosis of sperms.

160 (2)

Condom, made of thin rubber or latex, is used to cover the penis in the male just before coitus so that the ejaculated semen (sperms) do not enter into the female reproductive tract. Diaphragms, cervical caps, and vaults are also made of rubber and are inserted into the female reproductive tract to cover the cervix during coitus. They prevent conception by blocking the entry of sperms through the cervix.

161 (1)

In the male sex, accessory duct includes Rete testis, Vasa efferentia, Epididymis and Vas deferens. The sperm are produced in the Seminiferous tubules and Seminiferous tubules of the testis open into the Vasa efferentia through Rete testis and the Vasa efferentia leave the testis and open into epididymis located along the posterior surface of each testis and the epididymis leads to Vas deferens that ascends to the abdomen and loops over the urinary bladder and it receives a duct from seminal vesicle and opens into urethra as the ejaculatory duct.

162(1)

Primary metabolites are the substances like amino acids on proteins structure that are used in the day to day function of the cell. Other than that plant and fungi have different molecules like alkaloid and different pigments and these are considered secondary metabolites.

Pigments-Carotenoids, Anthocyanins,
 Alkaloids- Morphine, Codeine, etc.
 Terpenoides-Monoterpenes, Diterpenes etc.
 Essential oils-Lemon grass oil, etc.
 Toxins-Abrin, Ricin
 Lectins-Concanavalin A
 Drugs-Vinblastin, curcumin, etc.
 Polymer-Rubber, gums, cellulose

163(3)

Based on common elements of the pBR322 vector:

- A is typically BamHI, a restriction enzyme site.
- B is typically PstI, another restriction enzyme site.
- C is typically ori, the origin of replication.
- D is typically ampR, the ampicillin resistance gene.

So the correct option would be:

C. A - BamHI, B - PstI, C - ori, D - ampR

164 (1)

Restriction endonucleases recognize specific sequences in the DNA to cut it into fragments, not to bind the DNA to ligase. The specific sites are 4-6 bp long and are called as restriction sites. Each restriction endonuclease has a specific restriction site. Exonucleases enzymes remove nucleotides one at a time from the end of a polynucleotide chain. They shorten the DNA by one nucleotide at a time, they do not digest it into fragments. DNA polymerase is an enzyme that copies the template DNA strand into daughter DNA through replication. It extends the primer into DNA strands; restriction enzymes do not affect its activity.

165(2) Interferon - An enzyme that interferes with DNA replication

166(1)

The linking of antibiotic resistance gene with the plasmid vector became possible with DNA ligase. DNA ligase is an enzyme that is able to join together two portions of DNA and therefore plays an important role in DNA repair. DNA ligase is also used in recombinant DNA technology as it ensures that the foreign DNA is bound to the plasmid into which it is incorporated

167 (4)

When a host is exposed to antigens, which may be in the form of living or dead microbes or other

proteins, antibodies are produced in the host body. This type of immunity is called active immunity. Injecting the microbes deliberately during immunisation/vaccination induces active immunity e.g., polio vaccine.

168 (2)

Plasmodium is a digenetic protozoan which requires two hosts i.e., primary, definitive or principle host and a secondary, intermediate or vector host. In case of Plasmodium, man serves as primary host and mosquitoes as secondary host some workers consider mosquitoes as primary and vertebrates as secondary host.

169(1)

Personal hygiene primarily refers to practices that maintain the cleanliness and health of one's body and immediate surroundings. Regular exercise and a protein-rich diet, while important for overall health, are not typically included under the definition of personal hygiene.

170 (4)

Electroporation (electroporosity) is the process by which an electrical potential applied across plant cells in culture disrupts their membranes sufficiently to create tiny pores through which DNA in the medium can be taken up, a small fraction of which may get incorporated into the cell's genome.

171 (4)

The introduction of transgenes can lead to the production of new proteins and the alteration of biosynthetic pathways within the organism. It does not typically result in the formation of new species.

172 (2)

Transgenic animals are those which have foreign DNA incorporated into their genome. This typically means that the foreign DNA is present in all the cells of the organism, as it is usually introduced at the embryonic stage.

173 (2)

If both probes bind to the DNA, it means that the individual has both the normal allele and the sickle-cell allele. This indicates that the individual is:

Heterozygous for the sickle-cell gene

In this case, the person is a carrier of the sickle-cell trait but does not have sickle-cell anemia.

174(2)

The given figure shows the internal organisation of a hypothetical chordate. It possesses notochord (B) either during early embryonic stage or throughout life. The notochord lies ventral to nerve cord (A). It possesses a post anal tail (D) and paired pharyngeal gill slits (C).

175(1) : Pila → Radula

Bombyx → Malpighian tubules

Pleurobranchia → Comb plate

Taenia → Flame cell

- Pila or apple snail contain file like rasping organ called radula.
- Bombyx or silkworm is an arthropod in which excretion occur through malpighian tubules.
- The body of ctenophore pleurobranchia bears eight row of ciliated comb plate which help in locomotion.
- In Taenia, excretion occur through specialised cells called flame cells, which contain a protonephridia.
- These are mostly endoparasite found in animal including human.

176 (1) : Scorpion, spider and cockroaches belong

To the phylum Arthropoda and have a ventral solid nerve cord. They have jointed appendages. Non chordate have Double ventral solid, Nerve cord Chordate have Single, dorsal hollow, Nerve cord

- Metameric segmentation in this condition, inter segmental septa are present, which provides internal as well as external segmentation, also called true segmentation. Ex- Earthworm, Cockroach, Locust.
- Bilateral symmetry body is divide into identical left and right halves in only one plane. Example- Liver fluke is a flatworm. Sea Anemone and sea cucumber are Echinoderms, so they have radially symmetry.
- Jointed appendages:- Phylum Arthropoda have jointed appendages. Example- Centipede, Prawn etc.

177 (1)

True segmentation is present in Annelida, Arthropoda and Chordata. They also have an organ-system level of organisation, bilateral symmetry and are true coelomates. On the other hand, molluscs have an unsegmented body.

178 (4)

Cerebrum is the main site of intelligence and consciousness in the body of the organism. The hypothalamus is the area of brain that is important in controlling the balance of bodily functions. It controls the release of hormones from the pituitary gland. The midbrain is responsible for controlling the vision and hearing features of the organism. Medulla oblongata is responsible for controlling the rate of the heart beat.

179(2)

Correct answer is (2) A - Thyroid, B - Isthmus, C - Trachea, D - Parathyroid gland

180 (2)

Endocrine glands secrete their products directly into the blood stream from where they are carried to their target organs. The largest endocrine gland is thyroid gland. It is present in neck between trachea and larynx. It is present in the form of two lobes on either side of trachea. This gland is composed of stromal tissue and follicles. The follicle cells secrete thyroxine hormone that regulates the metabolic rate of body.