DATE : 18/05/2013

Test Booklet Code

W

Aakash
Medical | IIT-JEE | Foundations
(Divisions of Aakash Educational Services Ltd.)

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Time : 3 hrs.

Answers & Solutions

Max. Marks : 720

for

NEET-UG 2013 (Karnataka)

Important Instructions :

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 **side-1** and **side-2** carefully with **blue/black** ball point pen only.
2. The test is of **3 hours** duration and Test Booklet contains **180** 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.
4. Rough work is to be done on the space provided for this purpose in the Test Booklet only.
5. **On completion of the test, the candidate must handover the Answer Sheet to the invigilator in the Room/Hall. The candidates are allowed to take away this Test Booklet with them.**
6. The CODE for this Booklet is **W**. Make sure that the CODE printed on **Side-2** of the Answer Sheet is the same as that on this Booklet. In case of discrepancy, the candidate should immediately report the matter to the Invigilator for replacement of both the Test Booklet and the Answer Sheet.
7. The candidates should ensure that the Answer Sheet is not folded. 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.
8. Use of white fluid for correction is **NOT** permissible on the Answer Sheet.
9. Each candidate must show on demand his/her Admission Card to the Invigilator.
10. No candidate, without special permission of the Superintendent or Invigilator, would leave his/her seat.
11. The candidates should not leave the Examination Hall without handing over their Answer Sheet to the Invigilator on duty and sign the Attendance Sheet twice. Cases where a candidate has not signed the Attendance Sheet the second time will be deemed not to have handed over Answer Sheet and dealt with as an unfair means case.
12. Use of Electronic/Manual Calculator is prohibited.
13. The candidates are governed by all Rules and Regulations of the Board with regard to their conduct in the Examination Hall. All cases of unfair means will be dealt with as per Rules and Regulations of the Board.
14. No part of the Test Booklet and Answer Sheet shall be detached under any circumstances.
15. The candidates will write the Correct Test Booklet Code as given in the Test Booklet/Answer Sheet in the Attendance Sheet.

1. The pair of quantities having same dimensions is
   (1) Young's modulus and Energy
   (2) Impulse and Surface Tension
   (3) Angular momentum and Work
   (4) Work and Torque

Answer (4)

Sol. [Work] = [Torque] = $[M^1L^2T^{-2}]$

2. Vectors $\vec{A}, \vec{B}$ and $\vec{C}$ are such that $\vec{A}\cdot\vec{B}=0$ and $\vec{A}\cdot\vec{C}=0$. Then the vector parallel to $\vec{A}$ is
   (1) $\vec{B}$ and $\vec{C}$ (2) $\vec{A}\times\vec{B}$
   (3) $\vec{B}+\vec{C}$ (4) $\vec{B}\times\vec{C}$

Answer (4)

Sol. Vector triple product

$\vec{A}\times(\vec{B}\times\vec{C})=\vec{B}(\vec{A}\cdot\vec{C})-\vec{C}(\vec{A}\cdot\vec{B})=0$

$\Rightarrow \vec{A}//(\vec{B}\times\vec{C})$

3. 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) 2 m (2) 4 m
   (3) 0 m (zero) (4) 6 m

Answer (3)

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

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

$\Rightarrow t = 3$

$\Rightarrow x = 0.$

4. A person holding a rifle (mass of person and rifle together is 100 kg) stands on a smooth surface and fires 10 shots horizontally, in 5 s. Each bullet has a mass of 10 g with a muzzle velocity of 800 ms^{-1}. The final velocity acquired by the person and the average force exerted on the person are
   (1) –1.6 ms^{-1}; 8 N (2) –0.08 ms^{-1}; 16 N
   (3) –0.8 ms^{-1}; 8 N (4) –1.6 ms^{-1}; 16 N

Answer (3)

Sol. $MV + mnv = 0$

$$V=\frac{-mNv}{M}=\frac{-0.01\text{ kg}\times 10\times 800\text{ m/s}}{100}$$

= –0.8 m/s

Average workdone = Change of average kinetic energy

$$F_{av}\times S_{av}=\frac{1}{2}mV_{rms}^2$$

$$\Rightarrow \frac{F_{av}V_{max}t}{2}=\frac{1}{2}m\frac{V_{rms}^2}{2}$$

$\Rightarrow F_{av}$ = 8 N

5. A car is moving in a circular horizontal track of radius 10 m with a constant speed of 10 m/s. A bob is suspended from the roof of the car by a light wire of length 1.0 m. The angle made by the wire with the vertical is
   (1) 0° (2) $\frac{\pi}{3}$
   (3) $\frac{\pi}{6}$ (4) $\frac{\pi}{4}$

Answer (4)

Sol. $\tan\theta=\frac{v^2}{rg}=\frac{(10)^2}{10\times 10}=1$

$$\Rightarrow \theta=45°=\frac{\pi}{4}$$

6. A particle with total energy E is moving in a potential energy region $U(x)$. Motion of the particle is restricted to the region when
   (1) $U(x) > E$ (2) $U(x) < E$
   (3) $U(x) = O$ (4) $U(x) \le E$

Answer (4)

Sol. Kinetic energy ≥ 0

$\Rightarrow U(x) \le E$

7. One coolie takes 1 minute to raise a suitcase through a height of 2 m but the second coolie takes 30 s to raise the same suitcase to the same height. The powers of two coolies are in the ratio
   (1) 1 : 2 (2) 1 : 3
   (3) 2 : 1 (4) 3 : 1

Answer (1)

Sol. $P=\frac{E}{t}$

$$\Rightarrow \frac{P_1}{P_2}=\frac{t_2}{t_1}=\frac{30\text{ s}}{1\text{ minute}}=\frac{1}{2}$$

8. Two discs are rotating about their axes, normal to the discs and passing through the centres of the discs. Disc D_1 has 2 kg mass and 0.2 m radius and initial angular velocity of 50 rad s^{-1}. Disc D_2 has 4kg mass, 0.1 m radius and initial angular velocity of 200 rad s^{-1}. The two discs are brought in contact face to face, with their axes of rotation coincident. The final angular velocity (in rad.s^{-1}) of the system is
   (1) 40 (2) 60
   (3) 100 (4) 120

Answer (3)

Sol. $W_f=\frac{I_1W_1+I_2W_2}{I_1+I_2}=100\text{ rads}^{-1}.$

9. The ratio of radii of gyration of a circular ring and a circular disc, of the same mass and radius, about an axis passing through their centres and perpendicular to their planes are

(1) $\sqrt{2}:1$ (2) $1:\sqrt{2}$

(3) 3 : 2 (4) 2 : 1

Answer (1)

Sol. $\frac{K_1}{K_2}=\sqrt{\frac{I_1}{I_2}}=\sqrt{\frac{MR^2}{\left(\frac{MR^2}{2}\right)}}=\sqrt{2}:1$.

10. The radius of a planet is twice the radius of earth. Both have almost equal average mass-densities. If V_P and V_E are escape velocities of the planet and the earth, respectively, then

(1) $V_E = 1.5V_P$ (2) $V_P = 1.5V_E$

(3) $V_P = 2V_E$ (4) $V_E = 3V_P$

Answer (3)

Sol. $V_e = R\sqrt{\frac{8}{3}\pi GP}$

$\Rightarrow V_e \propto R$

$\Rightarrow \frac{V_P}{V_E}=\frac{R_P}{R_E}=2$

$\Rightarrow V_P = 2V_E$.

11. A particle of mass 'm' is kept at rest at a height $3R$ from the surface of earth, where 'R' is radius of earth and 'M' is mass of earth. The minimum speed with which it should be projected, so that it does not return back, is

(g is acceleration due to gravity on the surface of earth)

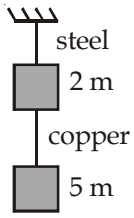
(1) $\left(\frac{GM}{R}\right)^{\frac{1}{2}}$ (2) $\left(\frac{GM}{2R}\right)^{\frac{1}{2}}$

(3) $\left(\frac{gR}{4}\right)^{\frac{1}{2}}$ (4) $\left(\frac{2g}{R}\right)^{\frac{1}{2}}$

Answer (2)

Sol. $V_e=\sqrt{\frac{2GM}{r}}=\sqrt{\frac{2GM}{R+h}}=\sqrt{\frac{2GM}{4R}}=\left(\frac{GM}{2R}\right)^{\frac{1}{2}}$.

12. If the ratio of diameters, lengths and Young's modulus of steel and copper wires shown in the figure are p, q and s respectively, then the corresponding ratio of increase in their lengths would be



(1) $\frac{7q}{(5sp)}$ (2) $\frac{5q}{(7sp^2)}$

(3) $\frac{7q}{(5sp^2)}$ (4) $\frac{2q}{(5sp)}$

Answer (3)

Sol. $\Delta L=\frac{FL}{AY}=\frac{4FL}{\pi D^2 Y}$

$\frac{\Delta L_S}{\Delta L_C}=\frac{F_S}{F_C}\left(\frac{D_C}{D_S}\right)^2\frac{Y_C}{Y_S}\frac{L_S}{L_C}$

$=\frac{7}{5}\times\left(\frac{1}{p}\right)^2\left(\frac{1}{s}\right)q$

$=\frac{7q}{5p^2s}$.

13. A fluid is in streamline flow across a horizontal pipe of variable area of cross section. For this which of the following statements is correct?

(1) The velocity is minimum at the narrowest part of the pipe and the pressure is minimum at the widest part of the pipe

(2) The velocity is maximum at the narrowest part of the pipe and pressure is maximum at the widest part of the pipe

(3) Velocity and pressure both are maximum at the narrowest part of the pipe

(4) Velocity and pressure both are maximum at the widest part of the pipe

Answer (2)

Sol. $P+\frac{1}{2}\rho v^2 = \text{constant}$ and Av = constant

If A is minimum, v is maximum, P is minimum.

14. The density of water at 20°C is 998 kg/m^3 and at 40°C 992 kg/m^3. The coefficient of volume expansion of water is

(1) 10^{-4}/°C (2) 3×10^{-4}/°C

(3) 2×10^{-4}/°C (4) 6×10^{-4}/°C

Answer (2)

Sol. $\rho = \frac{m}{V}$

$\Rightarrow \frac{\Delta\rho}{\rho} = -\frac{\Delta V}{V}$

$\Rightarrow \left|\frac{\Delta\rho}{\rho}\right| = \left|\frac{\Delta V}{V}\right|$

$\Rightarrow \frac{1}{V}\frac{\Delta V}{\Delta t} = \frac{1}{\rho}\frac{\Delta\rho}{\Delta t}$

$= \frac{6}{995 \times 20} \approx 3 \times 10^{-4}$ /°C

15. Two metal rods 1 and 2 of same lengths have same temperature difference between their ends. Their thermal conductivities are K_1 and K_2 and cross sectional areas A_1 and A_2, respectively. If the rate of heat conduction in 1 is four times that in 2, then

(1) $K_1A_1 = K_2A_2$ (2) $K_1A_1 = 4K_2A_2$

(3) $K_1A_1 = 2K_2A_2$ (4) $4K_1A_1 = K_2A_2$

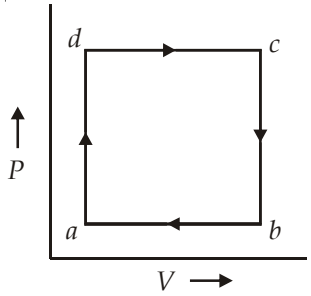
Answer (2)

Sol. $Q_1 = 4Q_2$

$\Rightarrow \frac{K_1A_1\Delta t}{L} = 4\frac{K_2A_2\Delta t}{L}$

$\Rightarrow K_1A_1 = 4K_2A_2.$

16. A system is taken from state *a* to state *c* by two paths *adc* and *abc* as shown in the figure. The internal energy at *a* is U_a = 10 J. Along the path *adc* the amount of heat absorbed δQ_1 = 50 J and the work obtained δW_1 = 20 J whereas along the path abc the heat absorbed δQ_2 = 36 J. The amount of work along the path *abc* is



(1) 6 J (2) 10 J

(3) 12 J (4) 36 J

Answer (1)

Sol. $Q_{adc} = \Delta U_{adc} + W_{adc}$

$50 \text{ J} = \Delta U_{adc} + 20 \text{ J}$

$\Delta U_{adc} = 30 \text{ J}$

Again, $Q_{abc} = \Delta U_{abc} + W_{abc}$

$W_{abc} = Q_{abc} - \Delta U_{abc}$

$= Q_{abc} - \Delta U_{adc}$

$= 36 \text{ J} - 30 \text{ J}$

$= 6 \text{ J}$

17. Which of the following relations does not give the equation of an adiabatic process, where terms have their usual meaning?

(1) $P^{\gamma}.T^{1-\gamma}$ = constant (2) $P^{1-\gamma}T^{\gamma}$ = constant

(3) PV^{γ} = constant (4) $TV^{\gamma-1}$ = constant

Answer (1)

Sol. Adiabatic equations of state are

PV^{γ} = constant

$TV^{\gamma-1}$ = constant

$T^{\gamma}P^{1-\gamma}$ = constant.

18. Two Carnot engines *A* and *B* are operated in series. The engine *A* receives heat from the source at temperature T_1 and rejects the heat to the sink at temperature *T*. The second engine *B* receives the heat at temperature *T* and rejects to its sink at temperature T_2. For what value of *T* the efficiencies of the two engines are equal?

(1) $\frac{T_1 + T_2}{2}$ (2) $\frac{T_1 - T_2}{2}$

(3) T_1T_2 (4) $\sqrt{T_1T_2}$

Answer (4)

Sol. $\eta_1 = 1 - \frac{T}{T_1}$, $\eta_2 = 1 - \frac{T_2}{T}$

Here, $\eta_1 = \eta_2$

$\Rightarrow \frac{T}{T_1} = \frac{T_2}{T}$

$\Rightarrow T = \sqrt{T_1T_2}$.

19. In a vessel, the gas is at a pressure *P*. If the mass of all the molecules is halved and their speed is doubled, then the resultant pressure will be

(1) 4*P* (2) 2*P*

(3) *P* (4) *P*/2

Answer (2)

Sol. $P = \frac{1}{3}\frac{mn}{V}V_{rms}^2$

$$P' = \frac{1}{3} \times \frac{m}{2} \times \frac{n}{V}(2v_{rms})^2$$

$$= 2\ P.$$

20. A particle of mass m oscillates along x-axis according to equation $x = a \sin \omega t$. The nature of the graph between momentum and displacement of the particle is

(1) Straight line passing through origin
(2) Circle
(3) Hyperbola
(4) Ellipse

Answer (4)

Sol. P versus x graph is similar to that V versus x graph.

21. The length of the wire between two ends of a sonometer is 100 cm. What should be the positions of two bridges below the wire so that the three segments of the wire have their fundamental frequencies in the ratio 1 : 3 : 5?

(1) $\frac{1500}{23}$ cm, $\frac{2000}{23}$ cm (2) $\frac{1500}{23}$ cm, $\frac{500}{23}$ cm

(3) $\frac{1500}{23}$ cm, $\frac{300}{23}$ cm (4) $\frac{300}{23}$ cm, $\frac{1500}{23}$ cm

Answer (1)

Sol. $f = \frac{1}{x}\sqrt{\frac{T}{m}}$

$$\Rightarrow \frac{1}{f} \propto l$$

$$l_1 : l_2 : l_3 = \frac{1}{f_1} : \frac{1}{f_2} : \frac{1}{f_3}$$

$$= f_2 f_3 : f_1 f_3 : f_1 f_2$$

$$= 15 : 5 : 3$$

22. Two sources P and Q produce notes of frequency 660 Hz each. A listener moves from P to Q with a speed of 1 ms^{-1}. If the speed of sound is 330 m/s, then the number of beats heard by the listener per second will be

(1) Zero (2) 4
(3) 8 (4) 2

Answer (2)

Sol. $\frac{\Delta f}{f} = \frac{v}{C}$

$$\Rightarrow \frac{(\text{Beats})/2}{f} = \frac{v}{C}$$

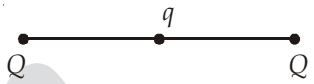
$$\Rightarrow \text{Beats} = \frac{2 f_V}{C} = 4\ .$$

23. A charge 'q' is placed at the centre of the line joining two equal charges 'Q'. The system of the three charges will be in equilibrium if 'q' is equal to

(1) $Q/2$ (2) $-Q/4$
(3) $Q/4$ (4) $-Q/2$

Answer (2)

Sol. Net force on $Q = 0$.



$$\Rightarrow \frac{KQq}{(r/2)^2} + \frac{KQ^2}{r^2} = 0$$

$$\Rightarrow q = -\frac{Q}{4}.$$

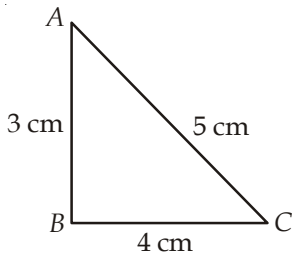
24. An electric dipole of dipole moment p is aligned parallel to a uniform electric field E. The energy required to rotate the dipole by 90° is

(1) pE^2 (2) p^2E
(3) pE (4) Infinity

Answer (3)

Sol. $W = U_f - U_i = (-pE\cos 90°) - (-PE\cos 0°) = pE.$

25. A 12 cm wire is given a shape of a right angled triangle ABC having sides 3 cm, 4 cm and 5 cm as shown in the figure. The resistance between two ends (AB, BC, CA) of the respective sides are measured one by one by a multi-meter. The resistances will be in the ratio



(1) 3 : 4 : 5 (2) 9 : 16 : 25
(3) 27 : 32 : 35 (4) 21 : 24 : 25

Answer (3)

Sol. $R_{AB} = \dfrac{3\times(4+5)}{3+(4+5)} = \dfrac{27}{12}$

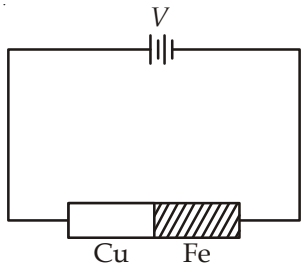
$R_{BC} = \dfrac{4\times(3+5)}{4+(3+5)} = \dfrac{32}{12}$

$R_{AC} = \dfrac{5\times(3+4)}{5+(3+4)} = \dfrac{35}{12}$

$R_{AB} : R_{BC} : R_{AC} = 27 : 32 : 35$

26. Two rods are joined end to end, as shown. Both have a cross-sectional area of 0.01 cm^2. Each is 1 meter long. One rod is a copper with a resistivity of 1.7×10^{-6} ohm-centimeter, the other is of iron with a resistivity of 10^{-5} ohm-centimeter.

How much voltage is required to produce a current of 1 ampere in the rods?



(1) 0.117 V (2) 0.00145 V

(3) 0.0145 V (4) 1.7×10^{-6} V

Answer (1)

Sol. $V = RI = R_{Cu} + R_{Fe} = (\rho_1 + \rho_2)\dfrac{l}{A}$

$= (1.7 \times 10^{-6} \times 10^{-2} + 10^{-5} \times 10^{-2}) \div 0.01 \times 10^{-4}$ volt

$= 0.117$ volt

27. Ten identical cells connected in series are needed to heat a wire of length one meter and radius 'r' by 10°C in time 't'. How many cells will be required to heat the wire of length two meter of the same radius by the same temperature in time 't'?

(1) 10 (2) 20

(3) 30 (4) 40

Answer (2)

Sol. We have $\dfrac{(10E)^2}{R}t = mS\Delta T$, Now $\dfrac{(nE)^2 t}{2R} = (2m)S\Delta T$

$\Rightarrow \dfrac{n^2E^2t}{2R} = 2\dfrac{10^2E^2t}{R}$

$\Rightarrow n = 20$

28. A long straight wire carries a certain current and produces a magnetic field 2×10^{-4} $\dfrac{\text{Weber}}{\text{m}^2}$ at a perpendicular distance of 5 cm from the wire. An electron situated at 5 cm from the wire moves with a velocity 10^7 m/s towards the wire along perpendicular to it. The force experienced by the electron will be (charge on electron 1.6×10^{-19} C)

(1) Zero (2) 3.2 N

(3) 3.2×10^{-16} N (4) 1.6×10^{-16} N

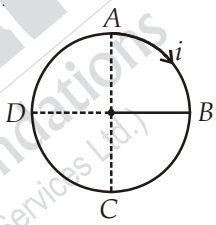
Answer (3)

Sol. $F = qvB \sin 90°$

$= 1.6 \times 10^{-19} \times 10^7 \times 2 \times 10^{-4}$

$= 3.2 \times 10^{-16}$ N

29. A circular coil $ABCD$ carrying a current i is placed in a uniform magnetic field. If the magnetic force on the segment AB is $\vec{F}$, the force on the remaining segment $BCDA$ is



(1) $\vec{F}$ (2) $-\vec{F}$

(3) $3\vec{F}$ (4) $-3\vec{F}$

Answer (2)

Sol. $\vec{F}_{AB} + \vec{F}_{BCDA} = \vec{0} \Rightarrow \vec{F}_{BCDA} = -\vec{F}_{AB} = -\vec{F}$

30. A bar magnet of magnetic moment M is placed at right angles to a magnetic induction B. If a force F is experienced by each pole of the magnet, the length of the magnet will be

(1) F/MB (2) MB/F

(3) BF/M (4) MF/B

Answer (2)

Sol. $FL = MB \Rightarrow L = \dfrac{MB}{F}$

31. A current of 2.5 A flows through a coil of inductance 5 H. The magnetic flux linked with the coil is

(1) 2 Wb (2) 0.5 Wb

(3) 12.5 Wb (4) Zero

Answer (3)

Sol. $\phi = LI = 5 \times 2.5$ Wb $= 12.5$ Wb

32. The primary of a transformer when connected to a dc battery of 10 volt draws a current of 1 mA. The number of turns of the primary and secondary windings are 50 and 100 respectively. The voltage in the secondary and the current drawn by the circuit in the secondary are respectively

(1) 20 V and 0.5 mA

(2) 20 V and 2.0 mA

(3) 10 V and 0.5 mA

(4) Zero volt and therefore no current

Answer (4)

Sol. DC source so No mutual induction between coils

$\Rightarrow E_2 = 0$ and $I_2 = 0$

33. An electromagnetic wave of frequency $\nu = 3.0$ MHz passes from vacuum into a dielectric medium with relative permittivity $\varepsilon = 4.0$. Then

(1) Wavelength is doubled and frequency unchanged

(2) Wavelength is doubled and frequency becomes half

(3) Wavelength is halved and frequency remains unchanged

(4) Wavelength and frequency both remain unchanged

Answer (3)

Sol. $f = 2\text{MHz}, \in_r = 4$

$$v = \frac{c}{\sqrt{\in_r}} = \frac{c}{2} \Rightarrow \lambda' = \frac{\lambda}{2}$$

34. An electron in hydrogen atom makes a transition $n_1 \rightarrow n_2$ where n_1 and n_2 are principal quantum numbers of the two states. Assuming Bohr's model to be valid the time period of the electron in the initial state is eight times that in the final state. The possible values of n_1 and n_2 are

(1) $n_1 = 4$ and $n_2 = 2$ (2) $n_1 = 6$ and $n_2 = 2$

(3) $n_1 = 8$ and $n_2 = 1$ (4) $n_1 = 8$ and $n_2 = 2$

Answer (1)

Sol. $T \propto n^3$

35. α-particles, β-particles and γ-rays are all having same energy. Their penetrating power in a given medium in increasing order will be

(1) β, γ, α (2) γ, α, β

(3) α, β, γ (4) β, α, γ

Answer (3)

Sol. For same energy, lighter particle has higher penentrating power.

36. How does the Binding Energy per nucleon vary with the increase in the number of nucleons?

(1) Increases continuously with mass number

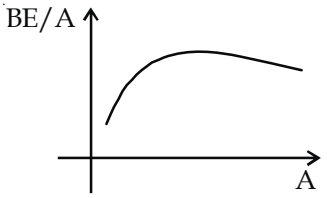
(2) Decrease continuously with mass number

(3) First decreases and then increases with increase in mass number

(4) First increases and then decreases with increase in mass number

Answer (4)

Sol.



37. A source of light is placed at a distance of 50 cm from a photo cell and the stopping potential is found to be V_0. If the distance between the light source and photo cell is made 25 cm, the new stopping potential will be

(1) $2V_0$ (2) $V_0/2$

(3) V_0 (4) $4V_0$

Answer (3)

Sol. Stopping potential is independent of distance

38. The de-Broglie wavelength of neutrons in thermal equilibrium at temperature T is

(1) $\frac{30.8}{\sqrt{T}}$ Å (2) $\frac{3.08}{\sqrt{T}}$ Å

(3) $\frac{0.308}{\sqrt{T}}$ Å (4) $\frac{0.0308}{\sqrt{T}}$ Å

Answer (1)

Sol. $$\lambda = \frac{h}{\sqrt{2mKT}} = \frac{6.63\times10^{-34}}{\sqrt{2\times1.67\times10^{-27}\times1.38\times10^{-23}T}}m$$

$$= \frac{30.8}{\sqrt{T}}\text{Å}$$

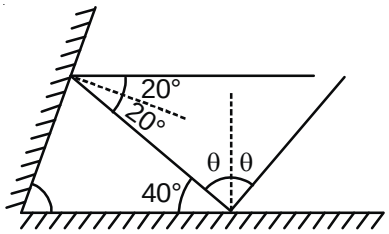
39. Two plane mirrors are inclined at 70°. A ray incident on one mirror at angle θ after reflection falls on second mirror and is reflected from there parallel to first mirror. The value of θ is

(1) 50° (2) 45°

(3) 30° (4) 55°

Answer (1)

Sol.



40. The reddish appearance of the sun at sunrise and sunset is due to
    (1) The colour of the sky
    (2) The scattering of light
    (3) The polarisation of light
    (4) The colour of the sun

Answer (2)

Sol. The light reaches us is rich in red.

41. In Young's double slit experiment the distance between the slits and the screen is doubled. The separation between the slits is reduced to half. As a result the fringe width
    (1) Is doubled (2) Is halved
    (3) Becomes four times (4) Remains unchanged

Answer (3)

Sol. $\beta = \frac{\lambda D}{d}$

42. A parallel beam of light of wavelength λ is incident normally on a narrow slit. A diffraction pattern is formed on a screen placed perpendicular to the direction of the incident beam. At the second minimum of the diffraction pattern, the phase difference between the rays coming from the two edges of slit is
    (1) $\pi\lambda$ (2) 2π
    (3) 3π (4) 4π

Answer (4)

Sol. Path diff. = $2\lambda \Rightarrow$ Phase diff. = 4π

43. In an unbiased p-n junction, holes diffuse from the p-region to n-region because of
    (1) The potential difference across the p-n junction
    (2) The attraction of free electrons of n-region
    (3) The higher hole concentration in p-region than that in n-region
    (4) The higher concentration of electrons in the n-region than that in the p-region

Answer (3)

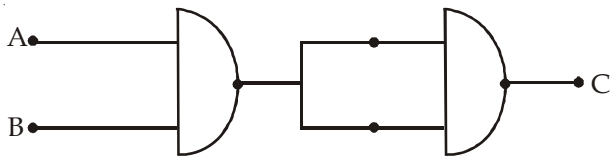
Sol. The higher hole cencentration is in *P*-region than that in *n*-region.

44. One way in which the operation of a n-p-n transistor differs from that of a p-n-p
    (1) The emitter junction is reversed biased in n-p-n
    (2) The emitter junction injects minority carriers into the base region of the p-n-p
    (3) The emitter injects holes into the base of the p-n-p and electrons into the base region of n-p-n
    (4) The emitter injects holes into the base of n-p-n

Answer (3)

Sol. Emitter-base junction is forward biased.

45. The output from a NAND gate is divided into two in parallel and fed to another NAND gate. The resulting gate is a



    (1) NOT gate (2) AND gate
    (3) NOR gate (4) OR gate

Answer (2)

Sol. $C = \overline{\overline{AB}} = AB$.

46. The values of Ksp of $CaCO_3$ and CaC_2O_4 are 4.7×10^{-9} and 1.3×10^{-9} respectively at 25°C. If the mixture of these two is washed with water, what is the concentration of Ca^{2+} ions in water?
    (1) 7.746×10^{-5} M (2) 5.831×10^{-5} M
    (3) 6.856×10^{-5} M (4) 3.606×10^{-5} M

Answer (1)

Sol. $CaCO_3 \longrightarrow \underset{x}{Ca^{2+}} + \underset{x}{CO_3^{2-}}$

$CaC_2O_4 \longrightarrow \underset{y}{Ca^{2+}} + \underset{y}{C_2O_4^{2-}}$

Now, $[Ca^{2+}] = x + y$

and $x(x + y) = 4.7 \times 10^{-9}$

$y(x + y) = 1.3 \times 10^{-9}$

On solving we get

$[Ca^{2+}] = 7.746 \times 10^{-5}$ M

47. What is the density of N_2 gas at 227°C and 5.00 atm pressure ? (R = 0.0821 Atm K^{-1} mol^{-1})
    (1) 0.29 g/ml (2) 1.40 g/ml
    (3) 2.81 g/ml (4) 3.41 g/ml

Answer (4)

Sol. Density = $\frac{PM}{RT}$

48. At 100°C the K_w of water is 55 times its value at 25°C. What will be the pH of neutral solution? (log 55 = 1.74)

(1) 6.13

(2) 7.00

(3) 7.87

(4) 5.13

Answer (1)

Sol. At 100°C

$K_w = 55 \times 10^{-14}$

$\therefore \quad H^+ = \sqrt{55 \times 10^{-14}}$

and pH = –log H^+

49. When 5 litres of a gas mixture of methane and propane is perfectly combusted at 0°C and 1 atmosphere, 16 litre of oxygen at the same temperature and pressure is consumed. The amount of heat released from this combustion in kJ (ΔH_{comb} (CH_4) = 890 kJ mol^{-1}, ΔH_{comb} (C_3H_8) = 2220 kJ mol^{-1}) is

(1) 32 (2) 38

(3) 317 (4) 477

Answer (3)

Sol. $\underset{x}{CH_4} + \underset{2x}{2O_2} \longrightarrow CO_2 + 2H_2O$

$\underset{(5-x)}{C_3H_8} + \underset{5(5-x)}{5O_2} \longrightarrow 3CO_2 + 4H_2O$

$2x + 5(5 - x) = 16$

$\Rightarrow \quad x = 3$ L

$\therefore$ Heat released $= \frac{3}{22.4} \times 890 + \frac{2}{22.4} \times 2220$

50. According to law of photochemical equivalence the energy absorbed (in ergs/mole) is given as (h = 6.62 × 10^{-27} ergs, c = 3 × 10^{10} cm s^{-1}, N_A = 6.02 × 10^{23} mol^{-1})

(1) $\frac{1.956 \times 10^{16}}{\lambda}$ (2) $\frac{1.956 \times 10^{8}}{\lambda}$

(3) $\frac{2.859 \times 10^{5}}{\lambda}$ (4) $\frac{2.859 \times 10^{16}}{\lambda}$

Answer (2)

Sol. $E = \frac{hc}{\lambda} \times N_A$

51. The dissociation constant of a work acid is 1 × 10^{-4}. In order of prepare a buffer solution with a pH = 5 the [Salt]/[Acid] ratio should be

(1) 1 : 10 (2) 4 : 5

(3) 10 : 1 (4) 5 : 4

Answer (3)

Sol. $pH = pK_a + \log \frac{[Salt]}{[Acid]}$

and $pK_a = -\log K_a$

$= 4$

52. A reaction is 50% complete in 2 hours and 75% complete in 4 hours. The order of reaction is

(1) 0 (2) 1

(3) 2 (4) 3

Answer (2)

Sol. For a first order reaction,

$t_{75\%} = 2 \times t_{50\%}$

53. Accumulation of lactic acid ($HC_3H_5O_3$), a monobasic acid in tissues leads to pain and a feeling of fatigue. In a 0.10 M aqueous solution, lactic acid is 3.7% dissociates. The value of dissociation constant, Ka, for this acid will be:

(1) 2.8 × 10^{-4} (2) 1.4 × 10^{-5}

(3) 1.4 × 10^{-4} (4) 3.7 × 10^{-4}

Answer (3)

Sol. $\alpha = \sqrt{\frac{K_a}{c}}$

54. Three thermochemical equations are given below:

(i) $C_{(graphite)} + O_2(g) \rightarrow CO_2(g)$; $\Delta_r H° = x$ kJ mol^{-1}

(ii) $C_{(graphite)} + \frac{1}{2} O_2(g) \rightarrow CO(g)$; $\Delta_r H° = y$ kJ mol^{-1}

(iii) $CO(g) + \frac{1}{2} O_2(g) \rightarrow CO_2(g)$; $\Delta_r H° = z$ kJ mol^{-1}

Based on the above equations, find out which of the relationship given below is correct:

(1) $x = y - z$ (2) $z = x + y$

(3) $x = y + z$ (4) $y = 2z - x$

Answer (3)

Sol. Applying Hesse's law, equation (i) can be obtained by adding equations (ii) and (iii).

55. In which of the following pair both the species have sp^3 hybridization?

(1) H_2S, BF_3 (2) SiF_4, BeH_2

(3) NF_3, H_2O (4) NF_3, BF_3

Answer (3)

Sol. Applying VSEPR theory, both NF_3 and H_2O are sp^3 hybridized.

56. In an experiment it showed that 10 mL of 0.05 M solution of chloride required 10 mL of 0.1 M solution of $AgNO_3$, which of the following will be the formula of the chloride (X stands for the symbol of the element other than chlorine):

(1) X_2Cl (2) X_2Cl_2

(3) XCl_2 (4) XCl_4

Answer (3)

Sol. Millimoles of solution of chloride = $0.05 \times 10 = 0.5$

Millimoles of $AgNO_3$ solution = $10 \times 0.1 = 1$

So, the millimoles of $AgNO_3$ are double than the chloride solution.

$$\therefore \quad XCl_2 + 2AgNO_3 \longrightarrow 2AgCl + X(NO_3)_2$$

57. How many grams of cobalt metal will be deposited when a solution of cobalt(II) chloride is electrolyzed with a current of 10 amperes for 109 minutes (1 Faraday = 96,500 C; Atomic mass of Co = 59 u)

(1) 0.66 (2) 4.0

(3) 20.0 (4) 40.0

Answer (3)

Sol. Applying,

$\omega = ZIt$

58. Which condition is not satisfied by an ideal solution?

(1) Δ_{mix} H = 0

(2) Δ_{mix} V = 0

(3) Δ_{mix} S = 0

(4) Obeyance to Raoult's Law

Answer (3)

Sol. Fact.

59. For a reaction between A and B the order with respect to A is 2 and the order with respect to B is 3. The concentrations of both A and B are doubled, the rate will increase by a factor of:

(1) 10 (2) 12

(3) 16 (4) 32

Answer (4)

Sol. Rate = $K[A]^2[B]^3$

60. The pair of species that has the same bond order in the following is:

(1) O_2, B_2

(2) CO, NO^+

(3) NO^-, CN^-

(4) O_2, N_2

Answer (2)

Sol. Isoelectronic species have identical bond order.

61. The correct IUPAC name for $[CrF_2(en)_2]Cl$ is:

(1) Chloro difluoridobis (ethylene diamine) chromium (III)

(2) Chloro difluorido ethylene diaminechromium (III) chloride

(3) Difluoridobis (ethylene diamine) chromium (III) chloride

(4) Difluorobis-(ethylene diamine) chromium (III) chloride

Answer (3)

Sol. Fact.

62. The outer electronic configuration of Gd (At. No. 64) is:

(1) $4f^4\ 5d^5\ 6s^1$ (2) $4f^5\ 5d^4\ 6s^1$

(3) $4f^7\ 5d^1\ 6s^2$ (4) $4f^3\ 5d^5\ 6s^2$

Answer (3)

Sol. Fact.

63. Identify the incorrect statement, regarding the molecule XeO_4:

(1) XeO_4 molecule is tetrahedral

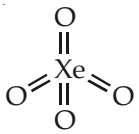
(2) XeO_4 molecule is square planar

(3) There are four $p\pi - d\pi$ bonds

(4) There are four $sp^3 - p, \sigma$ bonds

Answer (2)

Sol.



64. Crystal field splitting energy for high spin d^4 octahedral complex is:

(1) $-1.6\ \Delta_0$ (2) $-1.2\ \Delta_0$

(3) $-0.6\ \Delta_0$ (4) $-0.8\ \Delta_0$

Answer (3)

Sol. CFSE $= -0.4 \times 3 + 0.6 \times 1$

$= -0.6\ \Delta_0$

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65. In which of the following ionization processes the bond energy increases and the magnetic behaviour changes from paramagnetic to diamagnetic?

(1) $N_2 \rightarrow N_2^+$ (2) $O_2 \rightarrow O_2^+$

(3) $C_2 \rightarrow C_2^+$ (4) NO → NO+

Answer (4)

Sol. Fact.

66. Which one of the following arrangements represents the correct order of least negative to most negative electron gain enthalpy for C, Ca, Al, F and O?

(1) Ca < Al < C < O < F

(2) Al < Ca < O < C < F

(3) Al < O < C < Ca < F

(4) C < F < O < Al < Ca

Answer (1)

Sol. Fact.

67. Sc (Z = 21) is a transition element but Zn (Z = 30) is not because

(1) Both Sc and Zn do not exhibit variable oxidation states

(2) Both Sc^{3+} and Zn^{2+} ions are colourless and form white compounds

(3) In case of Sc, 3d orbitals are partially filled but in Zn these are filled

(4) Last electron is assumed to be added to 4s level in case of Zn

Answer (3)

Sol. Fact.

68. In Castner-Kellner cell for production of sodium hydroxide :

(1) Brine is electrolyzed with Pt electrodes

(2) Brine is electrolyzed using graphite electrodes

(3) Molten sodium chloride is electrolysed

(4) Sodium amalgam is formed at mercury cathode

Answer (4)

Sol. Fact.

69. Which statement is wrong?

(1) Feldspars are not aluminosilicates

(2) Beryl is an example of cyclic silicate

(3) Mg_2SiO_4 is orthosilicate

(4) Basic structural unit in silicates is the SiO_4 tetrahedron

Answer (1)

Sol. Fact.

70. Which is diamagnetic?

(1) $[Fe(CN)_6]^{3-}$

(2) $[Co(F_6)]^{3-}$

(3) $[Ni(CN)_4]^{2-}$

(4) $[NiCl_4]^{2-}$

Answer (3)

Sol. $Ni^{+2} - 3d^8$

and $\overline{CN}$ is a strong ligand and causes pairing of 3d electrons of Ni^{+2}.

71. Consider the half-cell reduction reaction :

$Mn^{2+} + 2e^- \rightarrow Mn$, $E^0 = -1.18$ V

$Mn^{2+} \rightarrow Mn^{3+} + e^-$, $E^0 = -1.51$ V

The E^0 for the reaction $3\,Mn^{2+} \rightarrow Mn^0 + 2\,Mn^{3+}$, and possibility of the forward reaction are, respectively

(1) –2.69 V and no (2) –4.18 V and yes

(3) +0.33 V and yes (4) +2.69 V and no

Answer (1)

Sol. $\Delta G_3 = \Delta G_1 + \Delta G_2$

$$\therefore \quad E_3^0 = \frac{n_1E_1^0 + n_2E_2^0}{n_3}$$

72. The outer orbitals of C in ethene molecule can be considered to be hybridized to give three equivalent sp^2 orbitals. The total number of sigma (σ) and pi (π) bonds in ethene molecule is

(1) 1 sigma (σ) and 2 pi (π) bonds

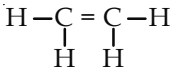
(2) 3 sigma (σ) and 2 pi (π) bonds

(3) 4 sigma (σ) and 1 pi (π) bonds

(4) 5 sigma (σ) and 1 pi (π) bonds

Answer (4)

Sol.



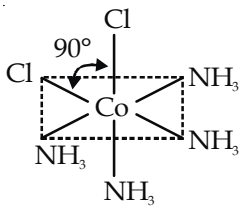
73. In a particular isomer of $[Co(NH_3)_4Cl_2]^0$, the Cl-Co-Cl angle is 90°, the isomer is known as

(1) Linkage isomer (2) Optical isomer

(3) Cis-isomer (4) Position isomer

Answer (3)

Sol.



Cis-isomer

74. The anion of acetylacetone (acac) forms $Co(acac)_3$ chelate with Co^{3+}. The rings of the chelate are

(1) Three membered
(2) Five membered
(3) Four membered
(4) Six membered

Answer (4)

Sol. Fact.

75. The metal oxide which cannot be reduced to metal by carbon is

(1) Fe_2O_3 (2) Al_2O_3
(3) PbO (4) ZnO

Answer (2)

Sol. Fact.

76. Which among the following is a paramagnetic complex?

(1) $Mo(CO)_6$ (2) $[Co(NH_3)_6]^{3+}$
(3) $[Pt(en)Cl_2]$ (4) $[CoBr_4]^{2-}$

(At. No. Mo = 42, Pt = 78)

Answer (4)

Sol. $Co^{2+} \Rightarrow [Ar]4s^0 3d^7$, Br^- is weak ligand.

77. Dettol is the mixture of

(1) Terpineol and Bithionol
(2) Chloroxylenol and Bithionol
(3) Chloroxylenol and Terpineol
(4) Phenol and Iodine

Answer (3)

Sol. Fact.

78. Arrange the following in increasing order of stability.

(a) $(CH_3)_2\overset{\oplus}{C} - CH_2CH_3$ (b) $(CH_3)_3\overset{\oplus}{C}$

(c) $(CH_3)_2\overset{\oplus}{C}H$ (d) $CH_3\overset{\oplus}{C}H_2$

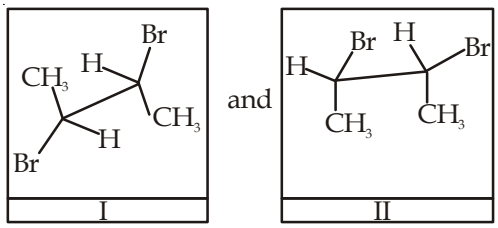
(e) $\overset{\oplus}{C}H_3$

(1) e < d < c < b < a (2) e < d < c < a < b
(3) d < e < c < a < b (4) a < e < d < c < b

Answer (2)

Sol. Stability depends on number of hyper conjugation structure.

79. Given



I and II are

(1) A pair of optical isomers
(2) Identical
(3) A pair of conformers
(4) A pair of geometrical isomers

Answer (3)

Sol. Fact.

80. In the following reaction :

$$HC \equiv CH \xrightarrow[Hg^{2+}]{H_2SO_4} \text{'P'}$$

Product 'P' will not give

(1) Iodoform test
(2) Tollen's reagent test
(3) Brady's reagent test
(4) Victor Meyer test

Answer (4)

Sol. CH_3CHO does not give Victor meyer test.

81. On hydrolysis of a "compound", two compounds are obtained. One of which on treatment with sodium nitrite and hydrochloric acid gives a product which does not respond to iodoform test. The second one reduces Tollen's reagent and Fehling's solution. The "compound" is

(1) $CH_3CH_2CH_2CON(CH_3)_2$
(2) $CH_3CH_2CH_2NC$
(3) $CH_3CH_2CH_2CN$
(4) $CH_3CH_2CH_2ON = O$

Answer (2)

Sol. Hydrolysis gives $CH_3CH_2CH_2NH_2$ + HCOOH and HCOOH gives Tollen's reagent test.

82. Homolytic fission of the following alkanes forms free radicals $CH_3 - CH_3$, $CH_3 - CH_2 - CH_3$, $(CH_3)_2CH - CH_3$, $CH_3 - CH_2 - CH(CH_3)_2$. Increasing order of stability of the radicals is

(1) $(CH_3)_3\dot{C} < (CH_3)_2\dot{C} - CH_2CH_3 <$
$CH_3 - \dot{C}H - CH_3 < CH_3 - \dot{C}H_2$

(2) $(CH_3)_2\dot{C} - CH_2CH_3 < CH_3 - \dot{C}H - CH_3 < CH_3 - \dot{C}H_2 < (CH_3)_3\dot{C}$

(3) $CH_3 - \dot{C}H_2 < CH_3 - \dot{C}H - CH_3 < (CH_3)_2\dot{C} - CH_2 - CH_3 < (CH_3)_3\dot{C}$

(4) $CH_3 - \dot{C}H_2 < CH_3 - \dot{C}H - CH_3 < (CH_3)_3\dot{C} < (CH_3)_2\dot{C} - CH_2CH_3$

Answer (3)

Sol. Stability depends on number of hyper conjugation structure.

83. Some reactions of amines are given. Which one is not correct ?

(1) $(CH_3)_2NH + NaNO_2 + HCl \rightarrow (CH_3)_2N - N = O$

(2) $(CH_3)_2N-C_6H_4 + NaNO_2 + HCl \rightarrow (CH_3)_2N-C_6H_4-N=NCl$

(3) $CH_3CH_2NH_2 + HNO_2 \rightarrow CH_3CH_2OH + N_2$

(4) $CH_3NH_2 + C_6H_5SO_2Cl \rightarrow CH_3NHSO_2C_6H_5$

Answer (2)

Sol. Fact.

84. Which one of the following statements is not true?

(1) Dissolved Oxygen (DO) in cold water can reach a concentration upto 10 ppm.

(2) Clean water would have a BOD value of 5 ppm.

(3) Fluoride deficiency in drinking water is harmful. Soluble fluoride is often used to bring its concentration upto 1 ppm.

(4) When the pH of rain water is higher than 6.5, it is called acid rain.

Answer (4)

Sol. Fact.

85. What is the hybridisation state of benzyl carbonium ion $C_6H_5-\overset{+}{C}H_2$?

(1) sp^3 (2) sp^2

(3) spd^2 (4) sp^2d

Answer (2)

Sol. Fact.

86. Nitrogen detection in an organic compound is carried out by Lassaigne's test. The blue colour formed corresponds to which of the following formulae?

(1) $Fe_3[Fe(CN)_6]_3$

(2) $Fe_3[Fe(CN)_6]_2$

(3) $Fe_4[Fe(CN)_6]_3$

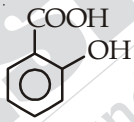
(4) $Fe_4[Fe(CN)_6]_2$

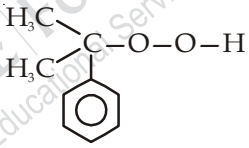
Answer (3)

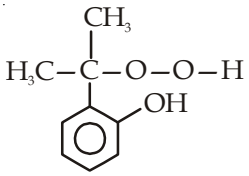
Sol. Fact.

87. Phenol is distilled with Zn dust followed by Friedel Crafts alkylation with propyl chloride in the presence of $AlCl_3$ to give a compound (B). (B) is oxidised in the presence of air to form the compound (C). The structural formula of (C) is

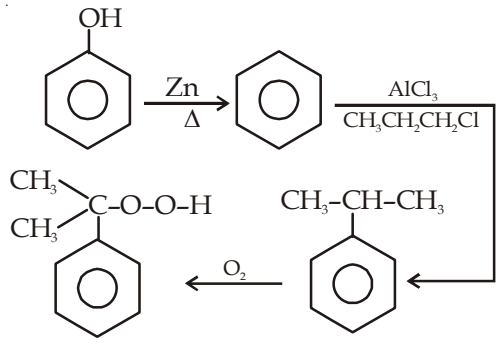
(1) 

(2) 

(3) 

(4) 

Answer (3)

Sol. 

88. In DNA the linkages between different nitrogenous bases are:

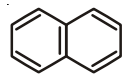
(1) Peptide linkage (2) Phosphate linkage
(3) H-bonding (4) Glycosidic linkage

Answer (3)

Sol. Fact.

89. Which of the following chemical system is non aromatic?

(1)  (2) 

(3)  (4) 

Answer (1)

Sol. Fact, Huckel rule is not obeyed.

No continous conjugation.

90. Number of isomeric alcohols of molecular formula $C_6H_{14}O$ which give positive iodoform test is

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

Answer (3)

Sol. Fact.

91. The plant body is thalloid in

(1) *Funaria* (2) *Sphagnum*
(3) *Salvinia* (4) Marchantia

Answer (1)

Sol. The plant body of a liverwort is thalloid. eg *Marchantia*.

92. Which one of the following is true for fungi?

(1) They are phagotrophs
(2) They lack a rigid cell wall
(3) They are heterotrophs
(4) They lack nuclear membrane

Answer (3)

Sol. The fungi constitute a unique kingdom of heterotrophic organisms.

93. Specialized cells for fixing atmospheric nitrogen in *Nostoc* are

(1) Akinetes (2) Heterocysts
(3) Hormogonia (4) Nodules

Answer (2)

Sol. Cyanobacteria can fix atmospheric nitrogen in specialised cells called heterocysts eg, *Nostoc, Anabaena*.

94. The common characteristics between tomato and potato will be maximum at the level of their

(1) Genus (2) Family
(3) Order (4) Division

Answer (2)

Sol. Tomato (*Lycopersicum esculentum*)
Potato (*Solanum tuberosum*)] Family Solanaceae

95. What is common in all the three, *Funaria, Dryopteris* and *Gingo?*

(1) Independent sporophyte
(2) Presence of archegonia
(3) Well developed vascular tissues
(4) Independent gametophyte

Answer (2)

Sol. The female sex organ archegonium is formed in bryophytes (*Funaria*), pteridophytes (*Dryopteris*) and gymnosperms (e.g. *Ginkgo*).

96. Which one of the following is wrongly matched?

(1) *Nostoc*-Water blooms
(2) *Spirogyra*-Motile gametes
(3) *Sargassum*-Chlorophyll C
(4) Basidiomycetes-Puffballs

Answer (2)

Sol. Gametes are non-flagellated (non-motile) but similar in size as in *Spirogyra.*

97. Among flowers of *Calotropis*, tulip, *Sesbania, Asparagus,* Colchicine, Sweet pea, *Petunia, Indigofera,* Mustard, Soybean, Tobacco and groundnut how many plants have corolla with valvate aestivation?

(1) Five (2) Six
(3) Seven (4) Eight

Answer (3)

Sol. *Calotropis*, tulip, *Asparagus*, colchicine, *Petunia*, Mustard, Tobacco

98. How many plants among China rose, *Icimum*, sunflower, mustard, *Alstonia,* guava, *Calotropis* and *Nerium* (Oleander) have opposite phyllotaxy?

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

Answer (2)

Sol. *Ocimum*, Guava, *Calotropis*

99. In a cymose inflorescence the main axis
(1) Terminates in a flower
(2) Has unlimited growth
(3) Bears a solitary flower
(4) Has unlimited growth but lateral branches end in flowers

Answer (1)

Sol. In cymose type inflorescence the main axis terminates in a flower.

100. Which of the following statements is **not** true for stomatal apparatus?
(1) Inner walls of guard cells are thick
(2) Guard cells invariably possess chloroplasts and mitochondria
(3) Guard cells are always surrounded by subsidiary cells
(4) Stomata are involved in gaseous exchange

Answer (3)

Sol. Sometimes, a few epidermal cells in the vicinity of the guard cells become specialised in their shape and size and are known as subsidiary cells.

101. Meristematic tissue responsible for increase in girth of tree trunk is
(1) Apical meristem (2) Intercalary meristem
(3) Lateral meristem (4) Phellogen

Answer (3)

Sol. Apart from primary growth most dicotyledons plants exhibit an increase in girth. The tissues involved in secondary growth are the two lateral meristems : vascular cambium and cork cambium

102. Inflorescence is racemose in
(1) Soyabean (2) Brinjal
(3) Tulip (4) *Aloe*

Answer (1)

Sol. Inflorescence in family fabaceae (e.g. soyabean) is racemose.

103. During the metaphase stage of mitosis spindle fibres attach to chromosomes at
(1) Centromere
(2) Kinetochore
(3) Both centromere and kinetochore
(4) Centromere, kinetochore and areas adjoining centromere

Answer (2)

Sol. In metaphase, spindle fibres attach to kinetochores of chromosomes.

104. Uridine, present only in RNA is a
(1) Pyrimidine (2) Nucleoside
(3) Nucleotide (4) Purine

Answer (2)

Sol. Uridine consists of uracil and ribose sugar forming nucleoside.

105. The term 'glycocalyx' is used for
(1) A layer surrounding the cell wall of bacteria
(2) A layer present between cell wall and membrane of bacteria
(3) Cell wall of bacteria
(4) Bacterial cell glyco-engineered to possess N-glycosylated proteins

Answer (1)

Sol. The cell envelope in bacteria consists of a tightly bound three layered structure *i.e.* the glycocalyx followed by the cell wall and then plasma membrane.

106. Which of the following type of plastids does not contain stored food material?
(1) Amyloplasts (2) Chromoplasts
(3) Eleioplasts (4) Aleuroplasts

Answer (2)

Sol. Chromoplasts give the part of the plant a yellow, orange or red colour.

107. During meiosis I, the chromosomes start pairing at
(1) Leptotene (2) Zygotene
(3) Pachytene (4) Diplotene

Answer (2)

Sol. During zygotene chromosomes start pairing together and this process of association is called synapsis.

108. Which two distinct microbial processes are responsible for the release of fixed nitrogen as dinitrogen gas (N_2) to the atmosphere?
(1) Anaerobic ammonium oxidation, and denitrification
(2) Aerobic nitrate oxidation, and nitrite reduction
(3) Decomposition of organic nitrogen, and conversion of dinitrogen to ammonium compounds
(4) Enteric fermentation in cattle, and nitrogen fixation by *Rhizobium* in root nodules of legumes

Answer (1)

Sol. Nitrate present in the soil may reduced to N_2 by the process of denitrification.

109. Which of the following best illustrates FEEDBACK in development?
(1) As tissue (X) develops, it secretes something that slows down the growth of tissue (Y)
(2) Tissue (X) secretes RNA which changes the development of tissue (Y)
(3) As tissue (X) develops, it secretes enzymes that inhibit the development of tissue (Y)
(4) As tissue (X) develops, it secretes something that induces tissue (Y) to develop

Answer (4)

Sol. During embryonic development, the primary organiser signals the development of another organ or tissue by secreting chemical factors.

110. The viability of seeds is tested by
(1) Safranine
(2) 2, 6 dichlorophenol indophenols
(3) 2, 3, 5 triphenyl tetrazolium chloride
(4) DMSO

Answer (3)

Sol. The viability of seeds is tested by 0.1% TTC.

111. The pineapple which under natural conditions is difficult to blossom has been made to produce fruits throughout the year by application of
(1) IAA, IBA (2) NAA, 2, 4-D
(3) Phenyl acetic acid (4) Cytokinin

Answer (2)

Sol. NAA and 2,4-D are often employed for inducing flowering in Litchi and pineapple.

112. Which of the following elements is a constituent of biotin?
(1) Sulphur (2) Magnesium
(3) Calcium (4) Phosphorus

Answer (1)

Sol. Biotin or nicotinic acid consists of sulphur. It acts as coenzyme needed for protein and fatty acid synthesis, CO_2 fixation and transamination.

113. Bundle sheath cells
(1) Are rich in RuBisCo
(2) Are rich in PEP carboxylase
(3) Lack RuBisCo
(4) Lack both RuBisCo and PEP carboxylase

Answer (1)

Sol. In C_4 plants, bundle sheath cells are rich in RuBisCO, but lack PEPcase.

114. Which one of the following statements is **correct**?
(1) Geitonogamy involves the pollen and stigma of flowers of different plants
(2) Cleistogamous flowers are always autogamous
(3) Xenogamy occurs only by wind pollination
(4) Chasmogamous flowers do not open at all

Answer (2)

Sol. Cleistogamos flowers are invariably autogamous as there is no chance of cross pollen landing on the stigma.

115. Megaspores are produced from the megaspore mother cells after
(1) Meiotic division
(2) Mitotic division
(3) Formation of a thick wall
(4) Differentiation

Answer (1)

Sol. Meosis in megaspore mother cell results in the production of mega spores.

116. Syngamy can occur outside the body of the organism in
(1) Fungi (2) Mosses
(3) Algae (4) Ferns

Answer (3)

Sol. Majority of algae and fishes.

117. Animal vectors are required for pollination in
(1) Maize (2) *Vallisneria*
(3) Mulbery (4) Cucumber

Answer (4)

Sol. Maize, mulbery → wind pollination
Vallisneria-Hydrophily

118. Which of the following statements is **correct?**
(1) Sporopollenin can withstand high temperatures but not strong acids
(2) Sporopollenin can be degraded by enzymes
(3) Sporopollenin is made up of inorganic materials
(4) Sporopollenin can withstand high temperatures as well as strong acids and alkalis

Answer (4)

Sol. Sporopollenin is one of the most resistant organic material known.

119. Albuminous seeds store their reserve food mainly in
(1) Perisperm (2) Endosperm
(3) Cotyledons (4) Hypocotyl

Answer (2)

Sol. Endospermic/albuminous seeds.

120. Random unidirectional change in allele frequencies that occurs by chance in all populations and especially in small populations is known as

(1) Mutation (2) Migration

(3) Natural selection (4) Genetic drift

Answer (4)

Sol. Genetic drift is random change in allelic frequencies due to chance events in small populations.

121. Which of the following is **not** a property of the genetic code?

(1) Universal (2) Non-overlapping

(3) Ambiguous (4) Degeneracy

Answer (3)

Sol. One codon codes for only one amino acid, hence it is unambiguous and specific.

122. Genetic variation in a population arises due to

(1) Mutations only

(2) Recombination only

(3) Mutations as well as recombination

(4) Reproductive isolation and selection

Answer (3)

Sol. Mutations and recombinations arising from crossing over are the source of variations.

123. Satellite RNAs are present in some

(1) Plant viruses (2) Viroids

(3) Prions (4) Bacteriophages

Answer (1)

Sol. Tobacco necrosis virus (TNV)

124. One of the most frequently used techniques in DNA fingerprinting is

(1) AFLP (2) VNTR

(3) SSCP (4) SCAR

Answer (2)

Sol. The technique of DNA fingerprinting was initially developed by Alec Jeffreys. He used a satellite DNA as probe that shows very high degree of polymorphism. It was called variable number of tandem repeats.

125. Which one of the following vectors is used to replace the defective gene in gene therapy?

(1) Ti plasmid (2) Adenovirus

(3) Cosmid (4) Ri plasmid

Answer (2)

Sol. Adenovirus is non-enveloped dsDNA virus which cause respiratory diseases. It is used to transfer a gene of interest in animal cells.

126. Which of the following statements is not true about somatic embryogenesis?

(1) A somatic embryo develops from a somatic cell

(2) The pattern of development of a somatic embryo is comparable to that of a zygotic embryo

(3) Somatic embryos can develop from microspores

(4) Somatic embryo is induced usually by an auxin such as 2, 4-D

Answer (3)

Sol. A somatic embryo develops from a somatic cell.

127. Genes of interest can be selected from a genomic library by using

(1) Restriction enzymes (2) Cloning vectors

(3) DNA probes (4) Gene targets

Answer (3)

Sol. cDNA can be used as DNA probe.

128. During the process of isolation of DNA, chilled ethanol is added to

(1) Remove proteins such as histones

(2) Precipitate DNA

(3) Break open the cell to release DNA

(4) Facilitate action of restriction enzymes

Answer (2)

129. RNA interference involves

(1) Synthesis of mRNA from DNA

(2) Synthesis of cDNA from RNA using reverse transcriptase

(3) Silencing of specific mRNA due to complementary RNA

(4) Interference of RNA in synthesis of DNA

Answer (3)

130. Benthic organisms are affected most by

(1) Water-holding capacity of soil

(2) Light reaching the forest floor

(3) Surface turbulence of water

(4) Sediment characteristics of aquatic ecosystems

Answer (4)

Sol. The sediment characteristics often determine the type of benthic animals that can thrive there.

131. Which of the following has maximum genetic diversity in India?
(1) Rice (2) Mango
(3) Wheat (4) Groundnut

Answer (1)

Sol. There are 200,000 varieties of rice in India.

132. Which organization publishes the Red Data Book?
(1) GEF (2) IUCN
(3) UNEP (4) WWF

Answer (2)

Sol. IUCN or WCU maintains a red data book which is a catalogue of threatened plants and animals facing risk of extinction.

133. The largest tiger reserve in India is
(1) Nagarhole
(2) Valmiki
(3) Nagarjunsagar-Srisailam
(4) Periyar

Answer (3)

Sol. Nagarjuna sagar is largest tiger reserve in India.

134. The second commitment period for Kyoto Protocol was decided at
(1) Cancun (2) Durban
(3) Bali (4) Doha

Answer (4)

Sol. In Doha, Qatar on 8 December 2012, the "Doha Amendment to the Kyoto Protocol" was adopted. The second commitment period was from 1st Jan. 2013 to 31st Dec. 2020.

135. Which one of the following is a primary consumer in maize field ecosystem?
(1) Lion (2) Grasshopper
(3) Wolf (4) Phytoplankton

Answer (2)

Sol. Grasshopper/Herbivore.

136. The characteristics of class Reptilia are :
(1) Body covered with dry and cornified skin, scales over the body are epidermal, they do not have external ears
(2) Body covered with moist skin which is devoid of scales, the ear is represented by a tympanum, alimentary canal, urinary and reproductive tracts open into a common cloaca
(3) Fresh water animals with bony endoskeleton, air-bladder to regulate buoyancy
(4) Marine animals with cartilaginous endoskeleton, body covered with placoid scales

Answer (1)

137. Which one of the following animals is correctly matched with its one characteristics and the taxon?

	Animal	Characteristic	Taxon
(1)	Duckbilled platypus	Oviparous	Mammalian
(2)	Milipede	Ventral nerve cord	Arachnida
(3)	Sea Anemone	Triploblastic	Cnidaria
(4)	Silverfish	Pectoral and Pelvic fins	Chordata

Answer (1)

138. Which one of the following groups of animals reproduces only by sexual means?
(1) Ctenophora (2) Cnidaria
(3) Porifera (4) Protozoa

Answer (1)

Sol. In ctenophora, asexual reproduction is totally absent.

139. Sharks and dogfishes differ from skates and rays by
(1) Their pectoral fins distinctly marked off from cyclindrical bodies
(2) Gill slits are ventrally placed
(3) Head and trunk are widened considerably
(4) Distinct demarcation between body and tail

Answer (1)

Sol. Sharks and dogfishes have cylindrical body while skates and rays have flattened body with winglike pectoral fins which are not distinct from body.

140. Identify the tissue shown in the diagram and match with its characteristcs and its location

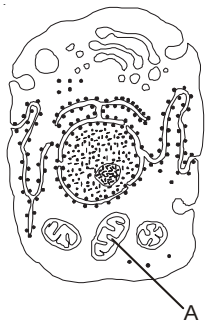
(1) Skeletal muscle, shows striations and closely attached with the bones of the limbs
(2) Smooth muscles, show branching, found in the walls of the heart
(3) Cardiac muscles, unbranched muscles, found in the walls of the heart
(4) Striated muscles, tapering at both-ends, attached with the bones of the ribs

Answer (1)

141. Select the correct option with respect to cockroaches
(1) The fore wings are tegmina which are used in flight
(2) Malpighian tubules convert nitrogenous wastes into urea
(3) Males bear short anal styles not present in females
(4) Nervous system comprises of a dorsal nerve cord and ten pairs of ganglion

Answer (3)

142. Select the alternative giving correct identification and function of the organelle 'A' in the diagram



(1) Endoplasmic reticulum-synthesis of lipids
(2) Mitochondria-produce cellular energy in the form of ATP
(3) Golgi body-provides packaging material
(4) Lysosomes - secrete hydrolytic enzymes

Answer (2)

Sol. Mitochondria are the sites of aerobic respiration. They produce cellular energy in the from of ATP.

143. Why is a capsule advantageous to a bacterium?
(1) It allows the bacterium to attach to the surface
(2) It protects the bacterium from desiccation
(3) It provides means of locomotion
(4) It allows bacterium to "hide" from host's immune system

Answer (4)

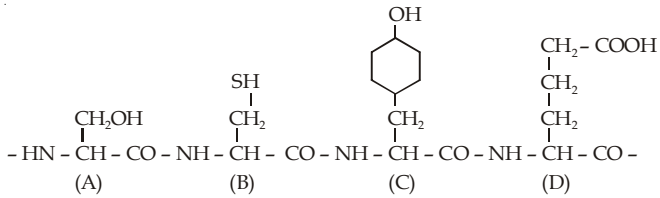
Sol. Capsule protects bacteria from host's immune system.

144. Which of the following statements about enzymes is **wrong**?
(1) Enzymes require optimum pH and temperature for maximum activity
(2) Enzymes are denatured at high temperatures
(3) Enzymes are mostly proteins but some are lipids also
(4) Enzymes are highly specific

Answer (3)

Sol. Enzymes are mostly proteins but some are RNA.

145. The figure shows a hypothetical tetrapeptide portion of a protein with parts labelled A-D. Which one of the following option is correct?

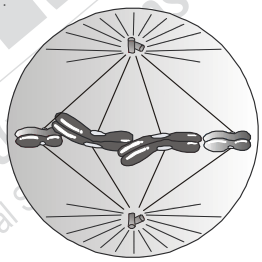


(1) A is the sulphur containing amino acid - methionine
(2) D is the acidic amino acid - glutamic acid
(3) C is an aromatic amino acid - tryptophan
(4) A is the C - terminal amino acid and D is N terminal amino acid

Answer (2)

Sol. D is glutamic acid.

146. A stage of mitosis is shown in the diagram. Which stage is it and what are its characteristics?



(1) Late prophase – chromosomes move to spindle equator
(2) Metaphase – spindle fibres attached to kinetochores, centromeres split and chromatids separate
(3) Metaphase – chromosomes moved to spindle equator chromosomes made up of two sister chromatids
(4) Anaphase – centromeres split and chromatids separate and start moving away

Answer (3)

147. A healthy person eats the following diet - 5 gm raw sugar, 4 gm albumin, 10 gm pure buffalo ghee adultrated with 2 gm vegetable ghee (hydrogenated vegetable oil) and 5 gm lignin. How many calories he is likely to get?
(1) 144 (2) 126
(3) 164 (4) 112

Answer (1)

Sol. Physiological value of carbohydrates is 4.0 kcal/g of proteins 4.0 kcal/g and of fats is 9.0 kcal/g

Hence

5 g raw sugar will yield 5 × 4.0 = 20.0 kcal

4 g albumin (protein) will yield 4 × 4.0 = 16.0 kcal

10 + 2 g of fat will yield 12 × 9.0 = 108.0 kcal

Total yield = 144 kcal.

148. Which enzymes are likely to act on the baked potatoes eaten by a man, starting from the mouth and as it moves down the alimentary canal?

(1) Salivary maltase → carboxy peptidase → trypsinogen

(2) Pancreatic amylase → salivary amylase → lipases

(3) Disaccharidase like maltase → lipases → nucleases

(4) Salivary amylase → pancreatic amylase → disaccharidases

Answer (4)

Sol. Baked potato consists of starch which is digested by amylases.

149. Which one of the following is one of the paths followed by air/O_2 during respiration in an adult male *Periplaneta americana* as it enters the animal body?

(1) Hypopharynx, mouth, pharynx, trachea, tissues

(2) Spiracle in metathorax, trachea, tracheoles, oxygen diffuses into cells

(3) Mouth, bronchial tube, trachea, oxygen enters cells

(4) Spiracles in prothorax, tracheoles, trachea, oxygen diffuses into cells

Answer (2)

Sol. Passages of air in cockroach.

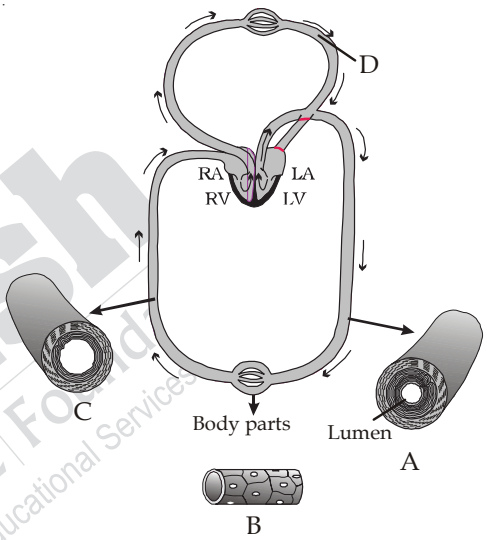
Spiracles (on thorax and abdomen) → Trachea Tracheoles → tissue and cells.

150. The figure shows a human blood cell. Identify it and give its characteristics.

	Blood Cell	Characteristics
(1)	Monocyte	Life span 3 days, produce antibodies
(2)	Basophil	Secrete serotonin, inflammatory response
(3)	B-lymphocyte	Form about 20% of blood cells involved in immune response
(4)	Neutrophil	Most abundant blood cell, phagocytic

Answer (2)

151. Figure shows blood circulation in humans with labels A to D. Select the option which gives correct identification of label and functions of the part:



(1) A – Artery - thick walled and blood flows evenly

(2) B – Capillary - thin without muscle layers and wall two cell thick

(3) C - Vein - thin walled and blood flows in jerks/ spurts

(4) D – Pulmonary vein - takes oxygenated blood to heart PO_2 = 95 mmHg

Answer (4)

152. Select the option which shows correct matching of animal with excretory organs and excretory product

	Animal	Excretory organs	Excretory product
(1)	Housefly	Renal tubules	Uric acid
(2)	*Labeo* (Rohu)	Nephridial tubes	Ammonia
(3)	Salamander	Kidney	Urea
(4)	Peacock	Kidney	Urea

Answer (3)

Sol. Amphibians mostly excrete urea by help of kidneys.

153. Select the correct statement with respect to disorders of muscles in humans

(1) Rapid contractions of skeletal muscles causes muscle dystrophy

(2) Failure of neuromuscular transmission in myasthenia gravis can prevent normal swallowing

(3) Accumulation of urea and creatine in the joints cause their inflammation

(4) An overdose of vitamin D causes osteoporosis

Answer (2)

Sol. Myasthenia gravis is autoimmune disorder affecting neuromuscular function.

154. During muscle contraction in humans the

(1) Actin filaments shorten

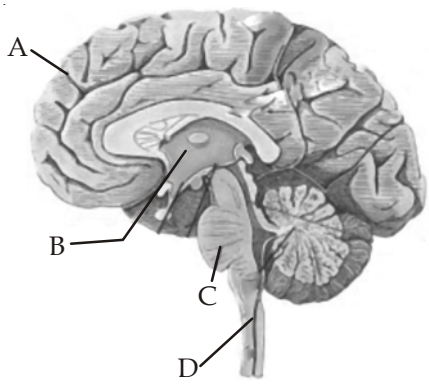
(2) Sarcomere *does not* shorten

(3) A band remain same

(4) A, H and I bands shorten

Answer (3)

155. A sagittal section of human-brain is shown here. Identify at least two labels from A-D.



(1) A – Cerebral hemispheres
B – Cerebellum

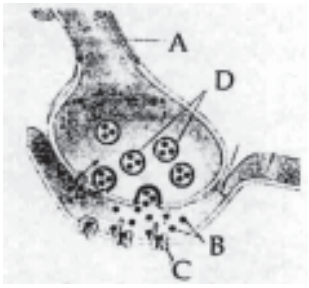
(2) C – Mid brain
D – Cerebellum

(3) A – Cerebrum
C – Pons

(4) B – Corpus callosum
D – Medulla

Answer (3)

156. The figure shows an axon terminal and synapse. Select the option giving correct identifications of tables A-D



(1) A – Axon terminal
B – Serotonin complex

(2) A – Action potential
C – Neurotransmitter

(3) B – Neurotransmitter
D – Receptor capsules

(4) C – Receptor
D – Synaptic vesicles

Answer (4)

157. Which of the following represents the action of insulin?

(1) Increases blood glucose levels by hydrolysis of glycogen

(2) Increases blood glucose levels by stimulating glucagon production

(3) Decreases blood glucose levels of forming glycogen

(4) Increases blood glucose level by promoting cellular uptake of glucose

Answer (3)

158. Norepinephrine:

(a) Is released by sympathetic fibres

(b) Is released by parasympathetic fibres

(c) Increases the heart rate

(d) Decreases blood pressure

Which of the above said statements are correct?

(1) (a) and (d)

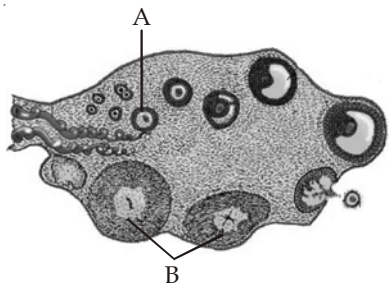
(2) (a) and (c)

(3) (b) and (c)

(4) (b) and (d)

Answer (2)

159. The figure shows a section of human ovary. Select the option which gives the correct identification of A and B with function/characteristic



(1) A – Primary oocyte – it is the prophase – I of the meiotic division

(2) B – Corpus luteum – secretes progesterone

(3) A – Tertiary follicle – forms Graafian follicle

(4) B – Corpus luteum – secretes estrogen

Answer (2)

160. Select the option which correctly matches the endocrine gland with its hormone and its function

	Endocrine gland	Hormone	Function
(1)	Ovary	FSH	stimulates follicular development and the secretion of estrogens.
(2)	Placenta	estrogen	initiates secretion of the milk.
(3)	Corpus luteum	estrogen	essential for maintenance of endometerium.
(4)	Leydig cells	androgen	initiates the production of sperms.

Answer (4)

161. The foetal ejection reflex in humans triggers release of

(1) Oxytocin from maternal pituitary

(2) Oxytocin from foetal pituitary

(3) Human Chorionic Gonadotropin (hCG) from placenta

(4) Human Placental Lactogen (hPL) from placenta

Answer (1)

162. One of the following is **not** a method of contraception – which one?

(1) Tubectomy

(2) Condoms

(3) Pills of a combination of oxytocin and vasopressin

(4) Lippes loop

Answer (3)

Sol. Oxytocin is birth hormone and vasopressin is used to conserve water.

163. Which one of the following statements is correct regarding Sexually Transmitted Diseases (STD)?

(1) The chances of a 5 year boy contacting a STD are very little

(2) A person may contact syphilis by sharing milk with one already suffering from the disease

(3) Haemophilia is one of the STD

(4) Genital herpes and sickle-cell anaemia are both STD

Answer (1)

Sol. STDs are more common in 15-24 yrs. age group.

164. The stage transferred into the uterus after induced fertilization of ova in the laboratory is

(1) Zygote

(2) Embryo at 4 blastomere stage

(3) Embryo at 2 blastomere stage

(4) Morula

Answer (4)

Sol. In Intra-Uterine Transfer (IUT), embryo of 8-celled stage (Morula) is used for transfer.

165. Which one is the **incorrect** statement with regards to the importance of pedigree analysis?

(1) It helps to trace the inheritance of a specific trait

(2) It confirms that DNA is the carrier of genetic information

(3) It helps to understand whether the trait in question is dominant or recessive

(4) It confirms that the trait is linked to one of the autosome

Answer (2)

Sol. In the pedigree analysis the inheritance of a particular trait is represented in the family tree over generation.

166. In our society women are blamed for producing female children. Choose the correct answer for the sex-determination in humans

(1) Due to some defect in the women

(2) Due to some defect like aspermia in man

(3) Due to the genetic make up of the particular sperm which fertilizes the egg

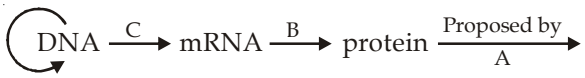
(4) Due to the genetic make up of the egg

Answer (3)

Sol. All ova are alike.

167. Down's syndrome in humans is due to
(1) Two 'Y' chromosomes
(2) Three 'X' chromosomes
(3) Three copies of chromosome 21
(4) Monosomy

Answer (3)

168. 

The figure gives an important concept in the genetic implication of DNA. Fill the blanks A, B and C.
(1) A – Francis Crick
B – translation
C – transcription
(2) A – Maurice Wilkins
B – transcription
C – translation
(3) A – James Watson
B – replication
C – extension
(4) A – Erwin Chargaff
B – translation
C – replication

Answer (1)

Sol. Francis Crick proposed the central dogma in molecular biology which states that the genetic information flows from
DNA → RNA → Protein

169. In an inducible operon, the genes are
(1) Always expressed
(2) Usually not expressed unless a signal turns them "on"
(3) Usually expressed unless a signal turns them "off"
(4) Never expressed

Answer (2)

Sol. Inducible operons are usually switched off.

170. The finch species of Galapagos Islands are grouped according to their food sources. Which of the following is not a finch food?
(1) Seeds (2) Carrion
(3) Insects (4) Tree buds

Answer (2)

Sol. Carrion are dead bodies. No finches feed on carrion.

171. Dinosaurs dominated the world in which of the following geological era?
(1) Devonion (2) Coenozoic
(3) Jurassic (4) Mesozoic

Answer (4)

172. Identify the site where *Wuchereria bancrofti* is normally found on human body
(1) Lymphatic vessels of the lower limbs
(2) Muscles of the legs
(3) Blood vessels of the thigh region
(4) Skin between the fingers

Answer (1)

173. Which one of the following is a hallucinogenic drug?
(1) Opium
(2) Caffeine
(3) Morphine
(4) Lysergic acid diethylamide

Answer (4)

174. Tissue culture technique can produce infinite number of new plants from a small parental tissue. The economic importance of the technique is in raising
(1) Variants through picking up somaclonal variations
(2) Genetically uniform population identical to the original parent
(3) Homozygous diploid plants
(4) Development of new species

Answer (2)

Sol. The method of producing thousands of plants through tissue culture is called micro-propagation. Each of these plants will be genetically identical to the original plant from which they were grown, i.e. they are somaclones. Many important food plants like tomato, banana, apple have been produed on commercial scale using this method.

175. Microbe used for biocontrol of pest butterfly caterpillars is
(1) *Trichoderma sp.*
(2) *Saccharomyces cerevisiae*
(3) *Bacillus thuringiensis*
(4) *Streptococcus sp.*

Answer (3)

Sol. Microbial biocontrol agent that can be introduced in order to control butterfly caterpillars is the bacteria *Bacillus thuringiensis (Bt).*

176. The age pyramid with broad base indicates

(1) High percentage of young individuals

(2) High percentage of old individuals

(3) Low percentage of young individuals

(4) A stable population

Answer (1)

Sol. Triangular age pyramid

177. When man eats fish which feeds on zooplankton which have eaten small plants, the producer in the chain is

(1) Zooplankton (2) Small plants

(3) Fish (4) Man

Answer (2)

Sol. Small Plants (Pri.Producer) → Zoo Planktons (Primary Consumer) → Fish (Sec.Consumer) → Man (Ter.Consumer)

178. Which one of the following is **not** a parasitic adaptation?

(1) Loss of unnecessary sense organs

(2) Development of adhesive organs

(3) Loss of digestive organs

(4) Loss of reproductive capacity

Answer (4)

Sol. Parasites have very high reproduction capacity.

179. Climate of the world is threatened by

(1) Increasing concentration of atmospheric oxygen

(2) Decreasing amount of atmospheric oxygen

(3) Increasing amount of atmospheric carbondioxide

(4) Decreasing amount of atmospheric carbondioxide

Answer (3)

Sol. Global warming is due to increasing amount of atmospheric carbondioxide (Green house gases).

180. Which one of the following is **not correct** as regards the harmful effects of particulate matter of the size 2.5 micro meters or less?

(1) It can be inhaled into the lungs

(2) It can cause respiratory problems

(3) It can directly enter into our circulatory system

(4) It can cause inflammation and damage to the lungs

Answer (3)

Sol. The particulate matter of the size 2.5 micro meters or less can indirectly enter into our circulatory system.

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