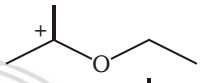
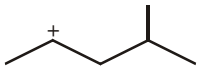
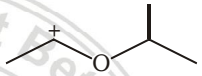
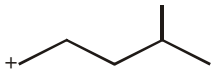
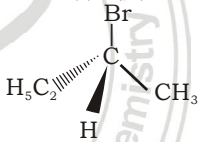
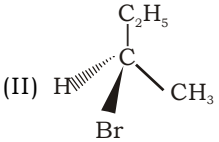
CHEMISTRY

Single Correct Choice Type

This section contains 45 questions numbered 1 to 45. Each question has 4 choices (a), (b), (c) and (d) out of which ONLY ONE is correct.

1. It is easier to liquefy ammonia than oxygen because
   (a) it is easier to compress oxygen than NH_3
   (b) NH_3 has a very low critical temperature as compared to O_2
   (c) O_2 has a higher value of van der Waals constant *a* and higher critical temperature than NH_3
   (d) NH_3 has a higher value of van der Waals constant *a* and higher critical temperature
2. What will be the enthalpy of combustion of carbon to produce carbon monoxide on the basis of data given below:
   $C_{(s)} + O_{2(g)} \longrightarrow CO_{2(g)} - 393.4 \text{ kJ}$
   $CO_{(g)} + \frac{1}{2}O_{2(g)} \longrightarrow CO_{2(g)} - 283.0 \text{ kJ}$
   (a) + 676.4 kJ (b) -676.4 kJ
   (c) -110.4 kJ (d) +110.4 kJ
3. What will be the change in internal energy when 12 kJ of work is done on the system and 2 kJ of heat is given by the system?
   (a) + 10 kJ (b) - 10 kJ
   (c) + 5 kJ (d) - 5 kJ
4. If the equilibrium constant for the reaction, $2XY \rightleftharpoons X_2 + Y_2$ is 81, What is the value of equilibrium constant for the reaction $XY \rightleftharpoons \frac{1}{2}X_2 + \frac{1}{2}Y_2$
   (a) 81 (b) 9
   (c) 6561 (d) 40.5
5. What is the percentage dissociation of 0.1 M solution of acetic acid? ($K_a = 10^{-5}$)
   (a) 10% (b) 100%
   (c) 1% (d) 0.01%
6. Which is not true about the oxidation state of the following elements?
   (a) Sulphur +6 to -2 (b) Carbon +4 to -4
   (c) Chlorine +7 to -1 (d) Nitrogen +3 to -1
7. **Assertion:** Permanent hardness of water can be removed by using washing soda.
   Reason: Washing soda reacts with soluble calcium and magnesium chlorides and sulphates in hard water to form insoluble carbonates
   (a) If both assertion and reason are true and reason is the correct explanation of assertion
   (b) If both assertion and reason are true but reason is not the correct explanation of assertion.
   (c) If assertion is true but reason is false.
   (d) If both assertion and reason are false
8. In the following reactions sequence,
   $(A) + N_2 \xrightarrow{\Delta} (B) \xrightarrow{+H_2O} (C) + (D)$
   white ppt. (C) is formed and gas (D) is evolved. White ppt. (C) dissolves in NaOH solution, while gas (D) gives white fumes in HCl. Thus. (A) is
   (a) B (b) Al
   (c) Ga (d) C
9. **Assertion:** Although aluminium is above hydrogen in electrochemical series, it is stable in air and water.
   Reason: The thin protective layer of oxide (Al_2O_3) on the surface protects the aluminium.
   (a) If both assertion and reason are true and reason is the correct explanation of assertion
   (b) If both assertion and reason are true but reason is not the correct explanation of assertion.
   (c) If assertion is true but reason is false.
   (d) If both assertion and reason are false
10. Glycerine can be purified by
    (a) vacuum distillation (b) simple distillation
    (c) steam distillation (d) fractional distillation
11. The correct stability order for the following species
    (I)  (II) 
    (III)  (IV) 
    (a) (II) > (IV) > (I) > (III) (b) (I) > (II) > (III) > (IV)
    (c) (II) > (I) > (IV) > (III) (d) (I) > (III) > (II) > (IV)
12. The addition of HBr to 1-butene gives a mixture of products (I), (II) and (III):
    (I)  (II) 
    (III) $CH_3—CH_2—CH_2—CH_2—Br$
    The mixture consists of
    (a) (I) and (II) as major and (III) as minor products
    (b) (II) as major, (I) and (III) as minor products
    (c) (II) as minor, (I) and (III) as major products
    (d) (I) and (II) as minor and (III) as major products.
13. Sewage containing organic waste should not be disposed in water bodies because it causes major water pollution. Fish in such a polluted water die because of
    (a) large number of mosquitoes
    (b) increase in the amount of dissolved oxygen
    (c) decrease in the amount of dissolved oxygen in water
    (d) clogging of gills by mud
14. The density of a metal which crystallises in *bcc* lattice with unit cell edge length 300 pm and molar mass 50 g mol^{-1} will be
    (a) 10 g cm^{-3} (b) 14.2 g cm^{-3}
    (c) 6.15 g cm^{-3} (d) 9.32 g cm^{-3}
15. Molar conductivity of NH_4OH can be calculated by the equation
    (a) $\Lambda^0_{NH_4OH} = \Lambda^0_{Ba(OH)_2} + \Lambda^0_{NH_4Cl} - \Lambda^0_{BaCl_2}$
    (b) $\Lambda^0_{NH_4OH} = \Lambda^0_{BaCl_2} + \Lambda^0_{NH_4Cl} - \Lambda^0_{Ba(OH)_2}$
    (c) $\Lambda^0_{NH_4OH} = \frac{\Lambda^0_{Ba(OH)_2} + 2\Lambda^0_{NH_4Cl} - \Lambda^0_{BaCl_2}}{2}$
    (d) None of these

16. The reaction $2NO + Br_2 \longrightarrow 2NOBr$, obeys the following mechanism:

$NO + Br_2 \overset{Fast}{\rightleftharpoons} NOBr_2$; $NOBr_2 + NO \xrightarrow{Slow} 2NOBr$

The rate expression of the above reaction can be written as

(a) $r = k[NO]^2[Br_2]$ (b) $r = k[NO][Br_2]$

(c) $r = k[NO][Br_2]^2$ (d) $r = k[NOBr_2]$

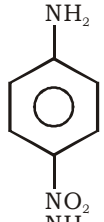
17. **Assertion:** Nickel is purified by reacting it with CO.
Reason: Impurities present, form a volatile complex.
(a) If both assertion and reason are true and reason is the correct explanation of assertion
(b) If both assertion and reason are true but reason is not the correct explanation of assertion.
(c) If assertion is true but reason is false.
(d) If both assertion and reason are false

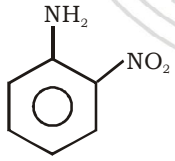
18. Which of the following transition metal ions has highest magnetic moment?
(a) Cu^{2+} (b) Ni^{2+}
(c) Co^{2+} (d) Fe^{2+}

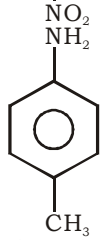
19. $[Co(NH_3)Cl(en)_2]^{2+}$ shows two geometrical isomers *cis* and *trans*. Which of the following statements is correct?
(a) *trans*-isomer will show optical isomerism
(b) *cis*-isomer will show optical isomerism
(c) Both *trans* and *cis*-isomers will show optical isomerism.
(d) Neither *cis* nor *trans*-isomer will show optical isomerism

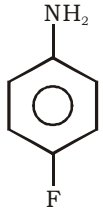
20. The oxidation of toluene to benzaldehyde by chromyl chloride is called
(a) Etard reaction
(b) Riemer-Tiemann reaction
(c) Wurtz reaction
(d) Cannizzaro's reaction

21. The most basic amine among the following is:

(a) 

(b) 

(c) 

(d) 

22. Which of the following is not a target molecule for drug function in body?
(a) Carbohydrates (b) Lipids
(c) Vitamins (d) Proteins

23. The presence or absence of hydroxy group on which carbon atom of sugar differentiates RNA and DNA?
(a) 1st (b) 2nd
(c) 3rd (d) 4th

24. Total volume of atoms present in a face-centred cubic unit cell of a metal is (*r* is atomic radius)
(a) $\frac{20}{3}\pi r^3$ (b) $\frac{24}{3}\pi r^3$
(c) $\frac{12}{3}\pi r^3$ (d) $\frac{16}{3}\pi r^3$

25. The de-Broglie wavelength of a tennis ball of mass 60 g moving with a velocity of 10 m/s is approximately
(Planck's constant, $h = 6.63\times10^{-34}$ Js)
(a) 10^{-33} m (b) 10^{-31} m
(c) 10^{-16} m (d) 10^{-25} m

26. The structure of IF_7 is
(a) square pyramid (b) trigonal bipyramid
(c) octahedral (d) pentagonal bipyramid

27. If at 298 K, the bond energies of $C-H, C-C, C=C$ and $H-H$ bonds are respectively 414, 347, 615 and 435 kJ mol^{-1}, the value of enthalpy change for the reaction,
$H_2C=CH_2(g) + H_2(g) \longrightarrow H_3C-CH_3(g)$ at 298 K will be
(a) + 250 kJ (b) - 250 kJ
(c) + 125 kJ (d) - 125 kJ

28. The degree of dissociation (α) of a weak electrolyte, A_xB_y is related to van't Hoff factor (i) by the expression
(a) $\alpha = \frac{i-1}{(x+y-1)}$ (b) $\alpha = \frac{i-1}{x+y+1}$
(c) $\alpha = \frac{x+y-1}{i-1}$ (d) $\alpha = \frac{x+y+1}{i-1}$

29. The pK_a of a weak acid, HA is 4.80. The pK_b of a weak base, B OH, is 4.78. The pH of an aqueous solution of the corresponding salt, BA, will be
(a) 9.58 (b) 4.79
(c) 7.01 (d) 9.22

30. Consider the reaction equilibrium
$2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$ $\Delta H^0 = -198$ kJ
On the basis of Le-Chatelier's principle, the condition favourable for the forward reaction is
(a) lowering of temperature as well as pressure
(b) increasing temperature as well as pressure
(c) lowering the temperature and increasing the pressure
(d) any value of temperature and pressure

31. The reduction potential of hydrogen half-cell will be negative if
(a) $p(H_2) = 1$ atm and $[H^+]$=2.0 M
(b $p(H_2) = 1$ atm and $[H^+]$=1.0 M
(c) $p(H_2) = 2$ atm and $[H^+]$=1.0 M
(d) $p(H_2) = 2$ atm and $[H^+]$=2.0 M

32. For the redox reaction,
$Zn(s) + Cu^{2+}(0.1M) \longrightarrow Zn^{2+}(1M) + Cu(s)$
taking place in a cell, E^0_{cell} is 1.10 V. E_{cell} for the cell will be $\left(2.303\frac{RT}{F} = 0.0591\right)$
(a) 2.14 V (b) 1.80 V
(c) 1.07 V (d) 0.82 V

33. The coagulating power of electrolytes having ions Na^+, Al^{3+} and Ba^{2+} for arsenic sulphide sol increases in the order
(a) $Al^{3+} > Ba^{2+} < Na^+$ (b) $Na^+ < Ba^{2+} < Al^{3+}$
(c) $Ba^{2+} < Na^{2+} < Al^{3+}$ (d) $Al^{3+} < Na^+ < Ba^{2+}$

34. Which of the following statements is incorrect regarding physisorptions?
(a) It occurs because of van der Waals' forces
(b) More easily liqueflable gases are adsorbed readily
(c) Under high pressure, it results into multi molecular layer on adsorbent surface
(d) Enthalpy of adsorption ($\Delta H_{adsoption}$) is slow and positive

35. Consider the reaction, $2A + B \rightarrow$ product. When concentration of B alone was doubled, the half-life did not change. When the concentration of A alone was doubled, the rate increased by two times. The unit of rate constant for this reaction is
(a) $L\ mol^{-1}\ s^{-1}$ (b) no unit
(c) $mol\ L^{-1}\ s^{-1}$ (d) s^{-1}

36. Among Al_2O_3, SiO_2, P_2O_3 and SO_2 the correct order of acid strength is
(a) $SO_2 < P_2O_3 < SiO_2 < Al_2O_3$
(b) $SiO_2 < SO_2 < Al_2O_3 < P_2O_3$
(c) $Al_2O_3 < SiO_2 < SO_2 < P_2O_3$
(d) $Al_2O_3 < SiO_2 < P_2O_3 < SO_2$

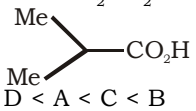
37. Cyanide process is used for the extraction of
(a) barium (b) silver
(c) boron (d) zinc

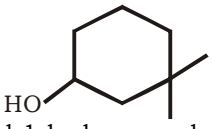
38. The major product obtained on interaction of phenol with sodium hydroxide and carbon dioxide is
(a) benzoic acid (b) salicyladehyde
(c) salicylic acid (d) phthalic acid

39. Identify the incorrect statement among the following
(a) *d*-block elements show irregular and erratic chemical properties among themselves
(b) La and Lu have partially filled *d* orbitals and no other partially filled orbitals
(c) The chemistry of various lanthanoids is very similar
(d) 4*f* and 5*f* orbitals are equally shielded

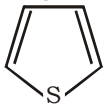
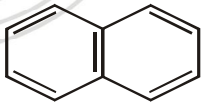
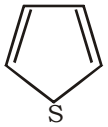
40. The IUPAC name of the coordination compound $K_3[Fe(CN)_6]$ is
(a) tripotassium hexacyanoiron (II)
(b) potassium hexacyanoiron (II)
(c) potassium hexacyanoferrate (III)
(d) potassium hexacyanoferrate (II)

41. The number of stereoisomers possible for a compound of the molecular formula $CH_3 - CH = CH - CH(OH) - Me$ is:
(a) 3 (b) 2 (c) 4 (d) 6

42. The correct order of increasing strength of the compounds is
(a) CH_3CO_2H (b) $MeOCH_2CO_2H$
(c) CF_3CO_2H (d) 
(a) B < D < A < C (b) D < A < C < B
(c) D < A < B < C (d) A < D < C < B

43. The IUPAC name of the compound is

(a) 3, 3-dimethyl-1-hydroxy cyclohexane
(b) 1, 1-dimethyl-3-hydroxy cyclohexane
(c) 3, 3-dimethyl-1-cyclohexanol
(d) 1, 1-dimethyl-3-cyclohexanol

44. Geometrical isomerism is not shown by
(a) 1, 1-dichloro-1-pentene
(b) 1, 2-dichloro-1-pentene
(c) 1, 3-dichloro-2-pentene
(d) 1, 4-dichloro-2-pentene

45. The non-aromatic compound among the following is
(a)  (b) 
(c)  (d) 

PHYSICS

Single Correct Choice Type

This section contains 45 questions numbered 46 to 90. Each question has 4 choices (a), (b), (c) and (d) out of which ONLY ONE is correct.

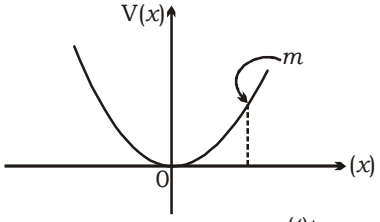
46. Of the following quantities, which one has dimensions different from the remaining three?
(a) Energy per unit volume
(b) Force per unit area
(c) product of voltage and charge per unit volume
(d) Angular momentum

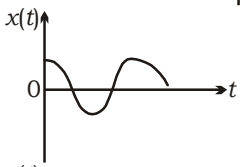
47. A car moves a distance of 200 m. It covers the first half of the distance at speed 40 km/h and the second half of distance at speed *v*. The average speed is 48 km/h. The value of *v* is
(a) 56 km/h (b) 60 km/h
(c) 50 km/h (d) 48 km/h

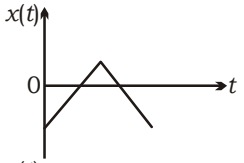
48. A ship *A* is moving Westwards with a speed of 10 km h^{-1} and a ship *B* 100 km South of *A*, is moving Northwards with a speed of 10 km h^{-1}. The time after which the distance between them becomes sortest, is
(a) $5\sqrt{2}$ h (b) $10\sqrt{2}$ h
(c) 0 h (d) 5 h

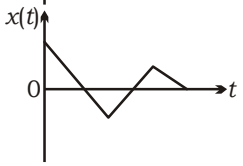
49. A car is moving in a circular horizontal track of radius 10 m with a constant speed of 10 m/s. A bob is suspended from the roof of the car by a light wire of length 1.0 m. The angle made by the wire with the vertical is
(a) $\frac{\pi}{3}$ (b) $\frac{\pi}{6}$ (c) $\frac{\pi}{4}$ (d) 0^0

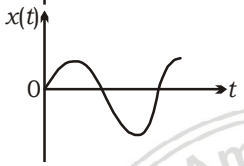
50. A particle of mass m is released from rest and follows a parabolic path as shown. Assuming that the displacement of the mass from the origin is small, which graph correctly depicts the position of the particle as a function of time?



(a) 

(b) 

(c) 

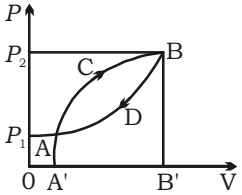
(d) 

51. A disc is rolling, the velocity of its centre of mass is v_{cm}. Which one will be correct?
(a) the velocity of highest point is 2 v_{cm} and point of contact is zero
(b) the velocity of highest point is v_{cm} and point of contact is v_{cm}
(c) the velocity of highest point is $2v_{cm}$ and point of contact is v_{cm}
(d) the velocity of highest point is $2v_{cm}$ and point of contact is $2v_{cm}$.

52. A statellite A of mass m is at a distance of r from the surface of the earth. Another satellite B of mass $2m$ is at a distance of $2r$ from the earth's centre. Their time periods are in the ratio of
(a) 1 : 2 (b) 1 : 16
(c) 1 : 32 (d) $1 : 2\sqrt{2}$

53. 10 gm of ice cubes at 0^0C are released in a tumbler (water equivalent 55 g) at 40^0C. Assuming that negligible heat is taken from the surroundings, the temperature of water in the number becomes nearly (L = 80 cal/g)
(a) 31 ^{0}C (b) 22 ^{0}C
(c) 19 ^{0}C (d) 15 ^{0}C

54. A thermodynamic system is taken from state A to B along ACB and is brought back to A along BDA as shown in the PV diagram. The net work done during the complete cycle is given by the area



(a) $P_1ACBP_2P_1$ (b) $ACBB'A'A$
(c) $ACBDA$ (d) $ADBB'A'A$

55. A mass m is suspended from the two coupled springs connected in series. The force constant for springs are k_1 and k_2. The time period of the suspended mass will be

(a) $T = 2\pi\sqrt{\frac{m}{k_1 - k_2}}$ (b) $T = 2\pi\sqrt{\frac{mk_1k_2}{k_1 + k_2}}$

(c) $T = 2\pi\sqrt{\frac{m}{k_1 + k_2}}$ (d) $T = 2\pi\sqrt{\frac{m(k_1 + k_2)}{k_1k_2}}$

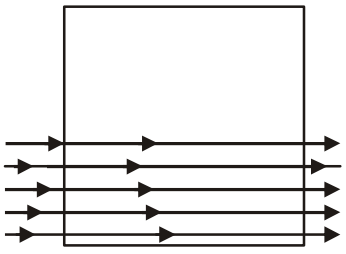
56. The equation of a simple harmonic wave is given by $y = 3\sin\frac{\pi}{2}(50t - x)$, where x and y are in metres and t is in seconds. The ratio of maximum particle velocity to the wave velocity is

(a) 2π (b) $\frac{3}{2}\pi$
(c) 3π (d) $\frac{2}{3}\pi$

57. A wave of frequency 100 Hz travels along a string towards its fixed end. When this wave travels back, after reflection, a node is formed at a distance of 10 cm from the fixed end. The speed of the wave (incident and reflected) is
(a) 20 m/s (b) 40 m/s
(c) 5 m/s (d) 10 m/s.

58. If potential (in volts) in a region is expressed as $V(x, y, z) = 6xy - y + 2yz$, the electric field (in N/C) at point (1, 1, 0) is
(a) $-(2\hat{i} + 3\hat{j} + \hat{k})$ (b) $-(6\hat{i} + 9\hat{j} + \hat{k})$
(c) $-(3\hat{i} + 5\hat{j} + 3\hat{k})$ (d) $-(6\hat{i} + 5\hat{j} + 2\hat{k})$

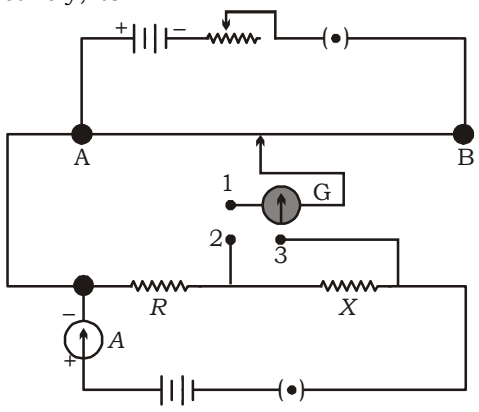
59. A square surface of side L metres is in the plane of the paper. A uniform electric field $\vec{E}$ (volt/m), also in the plane of the paper is limited only to the lower half of the square surface (see figure). The electric flux in SI units associated with the surface is



(a) EL^2 (b) $EL^2/2\varepsilon_0$
(c) $EL^2/2$ (d) Zero

60. A potentiometer circuit is set up as shown. The potential gradient, across the potentiometer wire, is k volt/cm and the ammeter, present in the circuit, reads 1.0 A when two way key is switched off. The balance points,when the key between the terminals (i) 1 and 2 (ii) 1 and 3, is plugged in, are found to be at lengths l_1 cm and l_2 cm respectively. The magnitudes, of the

resistors R and X, in ohms, are then, equal, respectively, to



(a) $k(l_2 - l_1)$ and kl_2 (b) kl_1 and $k(l_2 - l_1)$

(c) $k(l_2 - l_1)$ and kl_1 (d) kl_1 and kl_2

61. A wire 50 cm long and 1 mm^2 in cross-section carries a current of 4 A when connected to a 2 V battery. The resistivity of the wire is

(a) $4 \times 10^{-6}\ \Omega$m (b) $1 \times 10^{-6}\ \Omega$m

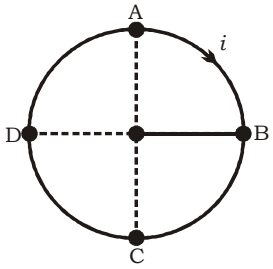
(c) $2 \times 10^{-7}\ \Omega$m (d) $5 \times 10^{-7}\ \Omega$m

62. An electron moving in a circular orbit of radius r makes n rotations per second. The magnetic field produced at the centre has magnitude

(a) $\frac{\mu_0 n^2 e}{r}$ (b) $\frac{\mu_0 ne}{2r}$

(c) $\frac{\mu_0 ne}{2\pi r}$ (d) zero

63. 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



(a) $-\vec{F}$ (b) $3\vec{F}$

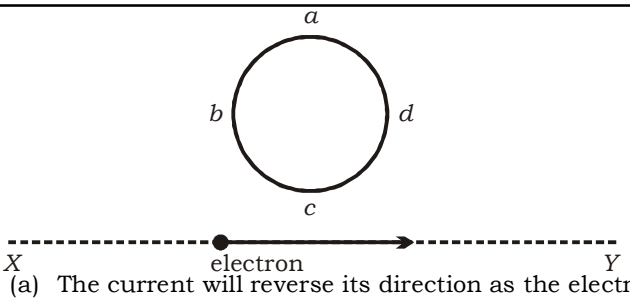
(c) $-3\vec{F}$ (d) $\vec{F}$

64. An inductor 20 mH, a capacitor 50 μF and a resistor 40Ω are connected in series across a source of emf $V = 10\sin 340t$. The power loss in A.C. circuit is

(a) 0.76 W (b) 0.89 W

(c) 0.51 W (d) 0.67 W

65. An electron moves on a straight line path *XY* as shown. The *abcd* is a coil adjacent to the path of electron. What will be the direction of current, if any, induced in the coil?



(a) The current will reverse its direction as the electron goes past the coil

(b) No current induced

(c) *abcd*

(d) *adcb*

66. The interference pattern is obtained with two coherent light sources of intensity ratio n. In the interference pattern, the ratio $\frac{I_{max} - I_{min}}{I_{max} + I_{min}}$ will be

(a) $\frac{\sqrt{n}}{n+1}$ (b) $\frac{2\sqrt{n}}{n+1}$

(c) $\frac{\sqrt{n}}{(n+1)^2}$ (d) $\frac{2\sqrt{n}}{(n+1)^2}$

67. A beam of light of $\lambda = 600$ nm from a distant source falls on a single slit 1 mm wide and the resulting diffraction pattern is observed on a screen 2 m away. The distance between first dark fringes on either side of the central bright fringe is

(a) 1.2 cm (b) 1.2 mm

(c) 2.4 cm (d) 2.4 mm

68. Light of wavelength 500 nm is incident on a metal with work function 2.28 eV. The de Broglie wavelength of the emitted electron is

(a) $\geq 2.8 \times 10^{-9}$ m (b) $\leq 2.8 \times 10^{-12}$ m

(c) $< 2.8 \times 10^{-10}$ m (d) $< 2.8 \times 10^{-9}$ m

69. The transition from the state $n = 3$ to $n = 1$ in a hydrogen like atom results in ultraviolet radiation. Infrared radiation will be obtained in the transition from

(a) $2 \to 1$ (b) $3 \to 2$

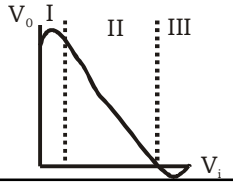
(c) $4 \to 2$ (d) $4 \to 3$

70. A *npn* transistor is connected in common emitter configuration in a given amplifier. A load resistance of 800Ω is connected in the collector circuit and the voltage drop across it is 0.8 V. If the current amplification factor is 0.96 and the input resistance of the circuit is 192Ω, the voltage gain and the power gain of the amplifier will respectively be

(a) 4, 4 (b) 4, 3.69

(c) 4, 3.84 (d) 3.69, 3.84

71. Transfer characteristics [output voltage (V_0) vs input voltage (V_i)] for a base biased transistor in CE configuration as shown in the figure. For using transistor as a switch, it is used

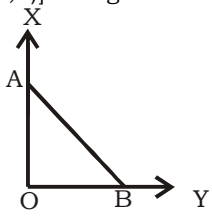


(a) in region III
(b) both in region (I) and (III)
(c) in region II
(d) in region I

72. Light of wavelengths λ falls on a metal having work function $\frac{hc}{\lambda_0}$. Photoelectric effect will take place only

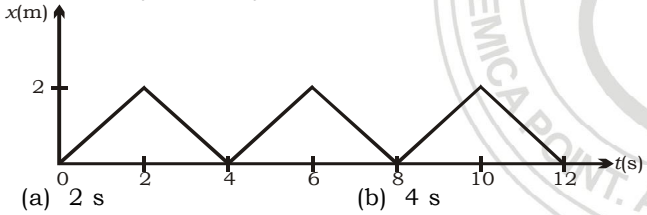
(a) $\lambda \geq \lambda_0$ (b) $\lambda \leq \lambda_0$
(c) $\lambda \geq 2\lambda_0$ (d) $\lambda = 4\lambda_0$

73. As per the diagram a point charge +q is placed at the origin O. Work done in taking another point charge -Q from the point A [Coordinates (O,Q)] to another point B [Coordinates (a,0)] along the straight line AB is



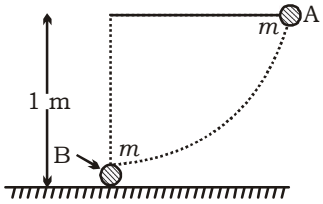
(a) Zero (b) $\left(\frac{qQ}{4\pi\varepsilon_0}\frac{1}{a^2}\right)\sqrt{2a}$
(c) $\left(\frac{-qQ}{4\pi\varepsilon_0}\frac{1}{a^2}\right)\sqrt{2}a$ (d) $\left(\frac{qQ}{4\pi\varepsilon_0}\frac{1}{a^2}\right)\frac{a}{\sqrt{2}}$

74. Figure shows the position-time $(x-t)$ graph of one dimensional motion of a body of mass 500 g. What is the time interval between two consecutive impulses received by the body?



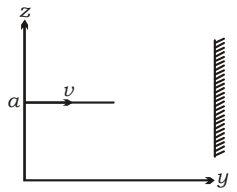
(a) 2 s (b) 4 s
(c) 6 s (d) 8 s

75. The bob A of a pendulum of mass m released from horizontal to the vertical hits another bob B of the same mass at rest on a table as shown in figure. If the length of the pendulum is 1 m, what is the speed with which bob B starts moving. (Neglect the size of the bobs and assume the collision to be elastic) (Take $g = 10\,ms^{-2}$)



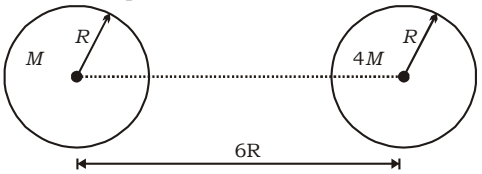
(a) $4.47\,\text{m s}^{-1}$ (b) $5.47\,\text{m s}^{-1}$
(c) $6.47\,\text{m s}^{-1}$ (d) $3.47\,\text{m s}^{-1}$

76. A particle of mass m is moving in yz-plane with a uniform velocity v with its trajectory running parallel to $+ve$ y-axis and intersecting z-axis at $z = a$. The change in its angular momentum about the origin as it bounces elastically from a wall at y = constant is



(a) $mva\hat{e}x$ (b) $2mva\hat{e}x$
(c) $ymv\hat{e}x$ (d) $2ymv\hat{e}x$

77. Two uniform solid spheres of equal radii R, but mass M and $4M$ have a centre to centre separation $6R$, as shown in figure. A projectile of mass m is projected from the surface of the sphere of mass M directly towards the centre of the second sphere. The minimum speed of the projectile so that it reaches the surface of the second sphere is

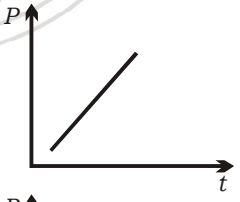


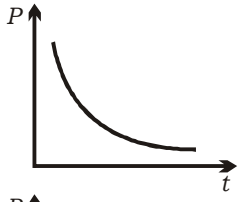
(a) $\sqrt{\frac{4}{5}\frac{GM}{R}}$ (b) $\sqrt{\frac{5}{4}\frac{GM}{R}}$
(c) $\sqrt{\frac{3}{5}\frac{GM}{R}}$ (d) $\sqrt{\frac{5}{3}\frac{GM}{R}}$

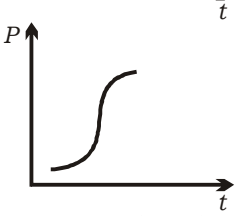
78. A stone of mass m tied to one end of a wire of length L. The diameter of the wire is D and it is suspended vertically. The stone is now rotated in a horizontal plane and makes an angle θ with the vertical. If Young's modulus of the wire is Y, then the increase in the length of the wire is

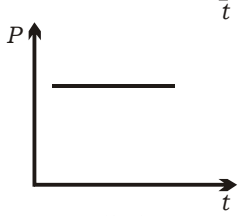
(a) $\frac{4mgL}{\pi D^2 Y}$ (b) $\frac{4mgL}{\pi D^2 Y\sin\theta}$
(c) $\frac{4mgL}{\pi D^2 Y\cos\theta}$ (d) $\frac{4mgL}{\pi D^2 Y\tan\theta}$

79. A soap bubble formed at the end of the tube is blown very slowly. The graph between excess of pressure inside the bubble with time is

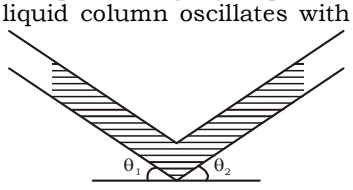
(a) 

(b) 

(c) 

(d) 

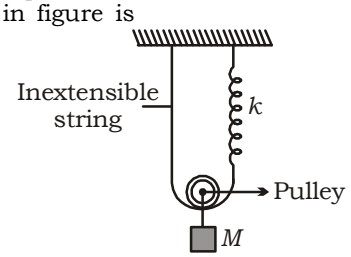
80. A non viscous liquid of density ρ is filled in a tube with A as the area of cross section, as shown in the figure. If the liquid is slightly depressed in one of the arms, the liquid column oscillates with a frequency



(a) $\frac{1}{2\pi}\sqrt{\frac{\rho g A \sin\left(\frac{\theta_1+\theta_2}{2}\right)}{m}}$ (b) $\frac{1}{2\pi}\sqrt{\frac{\rho g A(\sin\theta_1-\sin\theta_2)}{m}}$

(c) $\frac{1}{2\pi}\sqrt{\frac{\rho g A(\sin\theta_1+\sin\theta_2)}{m}}$ (d) $\frac{1}{2\pi}\sqrt{\frac{\rho g A \sin\left(\frac{\theta_1-\theta_2}{2}\right)}{m}}$

81. The time period of mass M when displaced from its equilibrium position and then released for the system as shown in figure is



(a) $2\pi\sqrt{\frac{M}{k}}$ (b) $2\pi\sqrt{\frac{M}{2k}}$

(c) $2\pi\sqrt{\frac{M}{4k}}$ (d) $2\pi\sqrt{\frac{2M}{k}}$

82. An air chamber of volume V has a neck of cross-sectional area a into which a light ball of mass m just fits and can move up and down without friction. The diameter of the ball is equal to that of the neck of the chamber. The ball is pressed down a little and released. If the bulk modulus of air is B, the time period of the oscillation of the ball is:

(a) $T = 2\pi\sqrt{\frac{Ba^2}{mV}}$ (b) $T = 2\pi\sqrt{\frac{BV}{ma^2}}$

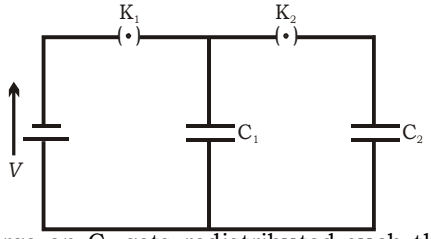
(c) $T = 2\pi\sqrt{\frac{mB}{Va^2}}$ (d) $T = 2\pi\sqrt{\frac{mV}{Ba^2}}$

83. A capacitor is made of two circular plates of radius R each, separated by a distance $d << R$. The capacitor is connected to a constant voltage. A thin conducting disc of radius $r << R$ and thickness $t << r$ is placed at the centre of the bottom plate. Find the minimum voltage required to lift the disc if the mass of the disc is m.

(a) $\frac{\sqrt{mgd}}{\pi\varepsilon_0 r^2}$ (b) $\sqrt{\frac{mgd}{\pi\varepsilon_0 r}}$

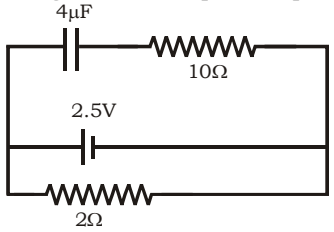
(c) $\sqrt{\frac{mgd^2}{\pi\varepsilon_0 r^2}}$ (d) $\sqrt{\frac{mgd}{\pi\varepsilon_0 r^2}}$

84. In the given circuit, initially K_1 is closed and K_2 is open. Then K_1 is opened and K_2 is closed. If q_1' and q_2' are charges on C_1 and C_2 and V_1 and V_2 are the voltage respectively, then



(a) charge on C_1 gets redistributed such that $V_1 = V_2$
(b) charge on C_1 gets redistributed such that $q_1' = q_2'$
(c) charge on C_1 gets redistributed such that $C_1V_1 = C_2V_2 = C_1V$
(d) charge on C_1 gets redistributed such that $q_1' + q_2' = 2q$

85. A capacitor of $4\mu F$ is connected as shown in the circuit. The internal resistance of the battery is 0.5Ω. The amount of charge on the capacitor plates will be



(a) 0 (b) $4\mu C$

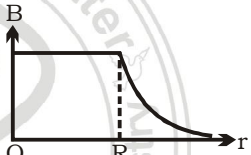
(c) $16\mu C$ (d) $8\mu C$

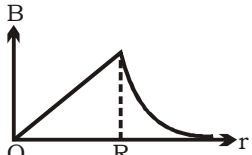
86. A 4A current carrying loop consists of three identical quarter circles of radius 5 cm lying in the positive quadrants of the $x-y, y-z$ and $z-x$ planes with their centres at the origin joined together, value of $\vec{B}$ at the origin is

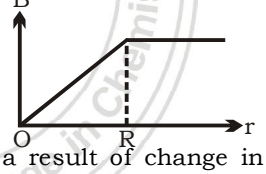
(a) $\frac{\mu_0}{10}\left(\hat{i}+\hat{j}-\hat{k}\right)T$ (b) $\frac{\mu_0}{10}\left(-\hat{i}+\hat{j}+\hat{k}\right)T$

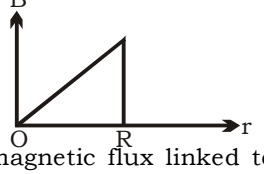
(c) $\frac{\mu_0}{5}\left(\hat{i}+\hat{j}+\hat{k}\right)T$ (d) $10\,\mu_0\left(\hat{i}+\hat{j}+\hat{k}\right)T$

87. The correct plot of the magnitude of magnetic field $\vec{B}$ vs distance r from centre of the wire is, if the radius of wire is R

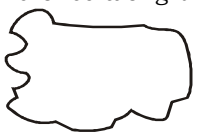
(a) 

(b) 

(c) 

(d) 

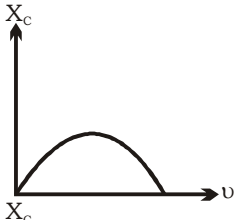
88. As a result of change in the magnetic flux linked to the closed loop shown in figure, an emf, V volt is induced in the loop. The work done (in joule) in taking a charge q coulomb once along the loop is

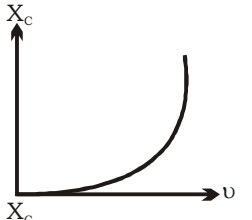


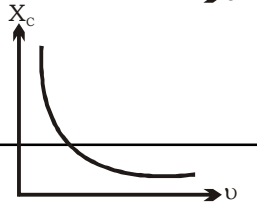
(a) qV (b) zero

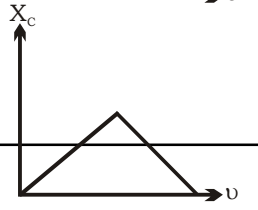
(c) $2qV$ (d) $\frac{qV}{2}$

89. Which of the following graphs represents 'the correct variation of capacitive reactance X_C with frequency υ?

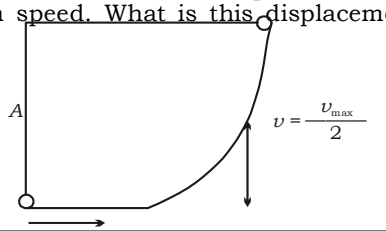
(a) 

(b) 

(c) 

(d) 

90. A particle starts with S.H.M. from the mean position as shown in the figure. Its amplitude is A and its time period is T. At one time, its speed is half that of the maximum speed. What is this displacement?



(a) $\frac{2A}{\sqrt{3}}$
(b) $\frac{3A}{\sqrt{2}}$
(c) $\frac{\sqrt{2}A}{3}$
(d) $\frac{\sqrt{3}A}{2}$

BIOLOGY

Single Correct Choice Type

This section contains 90 questions numbered 91 to 180. Each question has 4 choices (a), (b), (c) and (d) out of which ONLY ONE is correct.

91. **Assertion (A)** The scientific name *Malus malus* is illegitimate.
Reason (R) It is tautonym.
(a) Both A and R are correct and R is the correct explaination of A
(b) Both A and R are correct, but R is not the correct explanation of A
(c) A is correct, but R is incorrect
(d) A is incorrect, but R is correct

92. Two kingdoms constantly figured in all biological classification are
(a) Plantae and Animalia (b) Monera and Animalia
(c) Protista and Animalia (d) Protista and Plantae

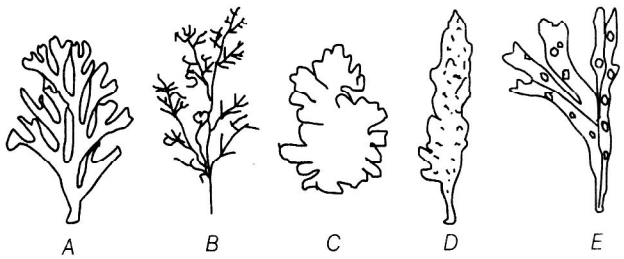
93. Genophore term was coined by Hans Ris for
(a) genetic material of virus
(b) stack on which spore originated
(c) bacterial chromosome
(d) fungal chromosome

94. In *Vorticella*, the total number of micronuclei formed at the end of pre-zygotic nuclear division in female gamete is
(a) 4 (b) 6
(c) 8 (d) 5

95. Which one of the following is wrongly matched?
(a) *Puccinia* - Smut
(b) Root - Exarch protoxylem
(c) *Cassia* - Imbricate aestivation
(d) Root pressure - Guttation

96. Phylogenetic system of classification is based on
(a) evolutionary relationships
(b) morphological features
(c) chemical constituents
(d) floral characters

97. In the diagram given above, the algae have been labelled as *A, B, C, D* and *E*. These algae are respectively identified as



(a) A-*Dictyota* B-*Polysiphonia* C-*Porphyra* D-*Fucus* E-*Laminaria*
(b) A-*Porphyra* B-*Dictyota* C-*Laminaria* D-*Fucus* E-*Polysiphonia*
(c) A-*Dictyota* B-*Polysiphonia* C-*Porphyra* D-*Laminaria* E-*Fucus*
(d) A-*Fucus* B-*Porphyra* C-*Dictyota* D-*Polysiphonia* E-*Laminaria*

98. Match the following columns.

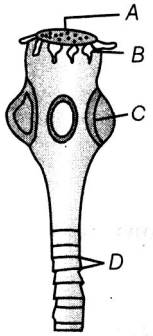
Column I	**Column II**
A. Coleorhiza	1. Development of sporophyte directly from gametophyte without intervention of gametes
B. Apogamy	2. Development of gametophyte directly from sporophyte without the involvement of reduction division.
C. Indusium	3. An unbranched columnar stem with a crown of leaves
D. Caudex	4. Protective covering of radicle.
	5. Protective structure of a sorus

Codes:

	A	B	C	D		A	B	C	D
(a)	5	2	4	1	(b)	4	1	5	3
(c)	3	5	2	4	(d)	2	3	1	5

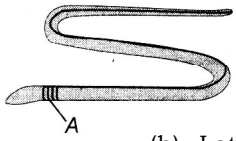
99. Biradial symmetry and lack of cnidoblasts are the characteristics of
(a) Starfish and sea anemone
(b) Ctenoplana and Beroe
(c) Aurelia and Paramecium
(d) Hydra and starfish

100. In the given diagram, different parts are indicated by alphabets. Choose the answer, in which these alphabets correctly match with the parts they indicate.



(a) A-Rostellum B-Hooks C-Sucker D-Proglottids
(b) A-Suctorial mouth B-Hooks C-Sucker D-Segments
(c) A-Mouth B-Tentacles C-Sucker D-Segments
(d) A-Sucker B-Hairs C-Ring D-Proglottids

101. In the given diagram, what does *'A'* represent?



(a) Heart (b) Lateral vessel
(c) Ventral vessel (d) Dorsal vessel

102. Match the name of the animal column I with one characteristics column II and the phylum/class column III to which it belongs.

	Column I	**Column II**	**Column III**
(a)	*Petromyzon*	Ectoparasite	Cyclostomata
(b)	*Ichthyophis*	Terrestrial	Reptilia
(c)	*Limulus*	Body covered by chitinous exoskeleton	Pisces
(d)	*Adamsia*	Radially symmetrical	Porifera

103. Ginger is an underground stem. It is distinguished from root because it
(a) lacks chlorophyll
(b) stores food
(c) has nodes and internodes
(d) has xylem and vessels

104. Identify the incorrect statements from the following
I. Cymose inflorescene found in *Hibiscus* sp.
II. Hypanthodium is found in *Ficus benghalesis.*
III. Synardrous stamen is found in *Calotropis.*
IV. Hesperidium type of fruit is mango.
Codes:
(a) III and IV (b) I and II
(c) II and III (d) I and IV

105. Match the following columns.

Column I	**Column II**
A. Gall flowers	1. Spikelet
B. Involucre	2. Hypanthodium
C. Spathe	3. Cyathium
D. Lemma	4. Umbel
	5. Spadix

Codes

	A	B	C	D
(a)	2	4	5	3
(b)	3	4	2	5
(c)	2	3	5	1
(d)	3	4	2	1

106. Maize grain is
(a) seed (b) embryo
(c) ovule (d) fruit

107. Which of the following are the characteristic features of Solanaceae?
I. Exstipulate leaves II. Persistent calyx
III. Racemose inflorescence
IV. Unilocular ovary
V. Fruits are either berry or capsule of these
Codes
(a) I, II and V (b) I, III and IV
(c) Only I (d) Only II
(e) V and IV

108. Match the following columns:

Column I	**ColumnII**
A. Extrafoliar nectaries	1. Achras
B. Schizogenous cavities	2. Tropaeolum
C. Laticiferous ducts	3. Passiflora
D. Hydathodes	4. Eucalyptus
	5. Pius

Codes

	A	B	C	D		A	B	C	D
(a)	3	1	2	4	(b)	2	1	3	4
(c)	3	5	1	2	(d)	5	2	1	3

109. Identify the correct order of the components with reference to their arrangement from outer side to inner side in a woody dicot stem.
I. Secondary cortex II. Autumn wood
III. Secondary phloem IV. Phellem
Choose the correct option
(a) II, III, I, IV (b) III, IV, II, I
(c) IV, I, III, II (d) I, II, IV, III

110. Match the following columns.

Column I	**Column II**
A. Columnar epithelium	1. Larynx
B. Ligaments	2. Eosinopenia
C. Chondroblast	3. Elastic tissue
D. Acidophils	4. Urinary bladder
E. Uninucleated spindle-shaped muscle fibres	5. Microvilli

Codes

	A	**B**	**C**	**D**	**E**
(a)	5	3	1	2	4
(b)	5	1	3	2	4
(c)	1	5	3	2	4
(d)	5	3	1	4	2

111. Which is the cutting organ in the mouth parts of cockroach?
(a) Labrum (b) Labium
(c) Maxillary palp (d) Mandible

112. Cellulose, the most important constituent of plant cell wall is made up of
(a) branched chain of glucose molecules linked by α, 1-6 glycosidic bond at the site of branching
(b) unbranched chain of glucose molecules linked by α, 1-4 glycosidic bond
(c) branched chain of glucose molecules linked by β, 1-4 glycosidic bond in straight chain and α, 1-6 glycosidic bond at the site of branching
(d) unbranched chain of glucose molecules linked by β, 1-4 glycosidic bond

113. Flagella of prokaryotic and eukaryotic cells differ in
(a) type of movement and placement in cell
(b) location in cell and mode of functioning
(c) microtubular organisation and type of movement
(d) microtubular organisation and function

114. In which one of the following sets of three items each belong to the category mentinoed against them?
(a) Lysine, glycine and thiamine - Amino acids
(b) Myosin, oxytocin and gastric - Hormones
(c) Rennin, helicase and hyaluro - Enzymes

nidase
(d) Optic nerve, oculomotor and vagus - Sensory nerves

115. Select the correct option with respect to mitosis.
(a) Chromatids start moving towards opposite poles in telophase
(b) Golgi complex and endoplasmic reticulum are still visible at the end of prophase
(c) Chromosomes move to the spindle equator and get aligned along equatorial plate in metaphase
(d) Chromatids separate but remains in the centre of the cell in anaphase

116. Match the following columns.

Column I		Column II
A. Leptotene	1.	Terminalisation of chiasma
B. Zygotene	2.	Crossing over and recombination
C. Pachytene	3.	Synapsis
D. Diakinesis	4.	Visibility of chromosomes

Codes

	A	B	C	D		A	B	C	D
(a)	1	2	3	4	(b)	1	3	2	4
(c)	4	3	2	1	(d)	4	1	2	3

117. When the concentration of the soil solutes is low, the absorption of water
(a) remains normal (b) is stopped
(c) is increased (d) is decreased

118. Stomatal opening is affected by
(a) nitrogen concentration, carbon dioxide concentration and light
(b) carbon dioxide concentration, temperature and light
(c) nitrogen concentration, light and temperature
(d) carbon dioxide concentration, nitrogen concentration and temperature

119. About 98% of the mass of every living organism is composed of just six elements including carbon, hydrogen nitrogen, oxygen and
(a) phosphorus and sulphur
(b) sulphur and magnesium
(c) magnesium and sodium
(d) calcium and phosphorus

120. The macronutrient which is an essential component of all organic compounds, yet not obtained by plants from soil is
(a) nitrogen (b) carbon
(c) phosphorus (d) magnesium

121. Consider the following statements.
I. The portion of the spectrum between 300-500 nm is also referred to as Photosynthetically Active Radiation (PAR).
II. Magnesium, calcium and chloride ions play prominent role in the photolysis of water.
III. In cyclic photophosphory lation, oxygen is not released (as there is no photolysis of water) and NADPH is also not produced.
(a) I is correct; but II and III are incorrect
(b) I and II are incorrect; but III is correct
(c) II is correct; but I and III are incorrect
(d) I and III are correct; but II is incorrect

122. Which of the following is maximum is chloroplast?
(a) RuBP carboxylase (b) Hexokinase
(c) Phosphatase (d) Nuclease

123. When respiratory quotient is less than 1.0 in a respiratory metabolism, it means that
(a) carbohydrates are used as respiratory substrate
(b) volume of carbon dioxide evolved is less than volume of oxygen consumed
(c) volume of carbon dioxide evolved is more than volume of oxygen consumed
(d) volume of carbon dioxide evolved is equal to volume of oxygen consumed

124. Which one of the following is correct sequence in glycolysis?
(a) G-6-P → PEP → 3-PGAL → 3-PGA
(b) G-6-P → 3-PGAL → 3-PGA → PEP
(c) G-6-P → PEP → 3-PGA → 3-PGAL
(d) G-6-P → 3-PGA → 3-PGAL → PEP

125. Induction of flowering by low temperature treatment is
(a) vernalisation (b) cryobiology
(c) photoperiodism (d) prunning

126. Geotropic response is perceived by
(a) mature roots (b) elongating roots
(c) root cap (d) root hairs

127. The back flow of faecal matter in the large intestine is prevented by the presence of
(a) epiglottis
(b) sphincter of Oddi
(c) ileo-caecal valve
(d) gastric-oesophageal sphincter

128. Which one of the following is the correct matching of the site of action on the given substrate, the enzyme acting upon it and the end-product?
(a) Duodenum - Triglycerides $\xrightarrow{\text{Trypsin}}$ Monoglycerides
(b) Small intestine - Starch $\xrightarrow{\alpha\text{-amylase}}$ Disaccharide (maltose)
(c) Small intestine - Proteins $\xrightarrow{\text{Pepsin}}$ Amino acids
(d) Stomach - Fats $\xrightarrow{\text{Lipase}}$ Micelles

129. The volume of 'Anatomical Dead Space' air is normally
(a) 230 mL (b) 210 mL
(c) 190 mL (d) 150 mL

130. Match the following columns.

Column I		Column II
A. Polyuria	1.	WBCs pus in urine
B. pyuria	2.	High level of uric acid in blood
C. Gout	3.	Excess of urine output
D. Haematuria	4.	Presence of blood (RBCs) in urine

Codes

	A	B	C	D		A	B	C	D
(a)	3	1	2	4	(b)	2	3	1	4
(c)	1	2	3	4	(d)	4	3	2	1

131. The pH of blood is
(a) between 7-8 (b) between 2-4
(c) between 12-14 (d) between 2-5

132. RAAS secretes which of the following hormone?
(a) Mineralocorticoids (b) Glucocorticoids
(c) Both (a) and (b) (d) None of these

133. Match the following columns.

Column I (Function)		Column II (Part of Excretory System)
A. Ultrafiltration	1.	Henle's loop
B. Concentration of urine	2.	Ureter
C. Transport of urine	3.	Urinary bladder
D. Storage of urine	4.	Malpighian corpuscle

5. Proximal convoluted tubule

Codes

	A	B	C	D		A	B	C	D
(a)	4	1	2	3	(b)	4	3	2	1
(c)	5	4	1	3	(d)	5	4	1	2

134. Which of the following is the smallest cranial nerve?
(a) Abducent (b) Optic
(c) Trochlear (d) Facial

135. Which is not a reflex action?
(a) Salivation
(b) Eye opening and closing
(c) Response to pinching pin in a frog leg
(d) Sweating

136. Muscular tetany can be caused by deficiency of
(a) Thyroxine (b) oxytocin
(c) STH (d) parathyroid hormone

137. Which of the following hormones are produced in the hypothalamus and stored in the posterior pituitary?
(a) FSH and LH (b) ADH and oxytocin
(c) TSH and STH (d) ACTH and MSH

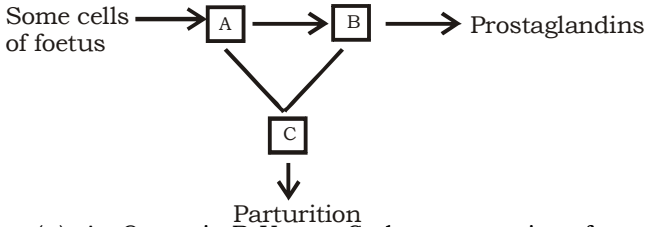
138. The embryo sac of angiosperms contains
(a) 3 celled egg apparatus, 3 antipodal cell and 2 polar nuclei
(b) 2 celled egg apparatus, 3 antipodal cell and 2 polar nuclei
(c) 3 celled egg appartus, 2 antipodal cell and 1 polar nuclei
(d) 3 celled egg apparatus, 1 antipodal cell and 2 polar nuclei

139. Match the following columns.

Column I	**Column II**	**Column III**
1. Interstitial cells	a. Cortex of ovary	I. Follicular fluid
2. Sertoli cells	b. Ovarian follicle	II. Progesterone
3. Granulosa cells	c. Testis	III. Attachment of sperm bundle
4. Cells of corpus luteum	d. Seminiferous tubules	IV. Testosterone

(a) 2-a-III, 1-c-IV, 3-b-I, 4-d-II
(b) 1-c-IV, 2-d-III, 3-b-I, 4-a-II
(c) 1-d-III, 2-a-IV, 3-b-I, 4-c-II
(d) 2-d-III, 1-c-IV, 3-a-II, 4-b-IV

140. What does A, B and C represents in the following flow chart



(a) A - Oxytocin B-Uterus C-slow contraction of uterus
(b) A-Progesterone B-Oxytocin C-slow contraction of uterus
(c) A-Placenta B-Oxytocin C-Vigorous contraction of uterus
(d) A-Oxytocin B-Placenta C-Vigorous contraction in uterus

141. Identify the correctly matched pairs of the germ layers and their derivatives.
I. Ectoderm Epidermis
II. Endoderm Dermis
III. Mesoderm Muscles
IV. Mesoderm Notochord
V. Endoderm Enamel of teeth
(a) I, III and IV (b) I, II, III and V
(c) I and IV (d) I and II

142. Assisted reproductive technology, IVF involves transfer of
(a) ovum into the Fallopian tube
(b) zygote into the Fallopian tube
(c) Zygote into the uterus
(d) embryo with 16 balastomers into the Fallopian tube

143. Some genomic representation of skin colour are given below.
I. AA bb CC II. AA bb cc
III. AA BB CC IV. aa bb cc
Which of the option is correct for showing the darkness of colour of the skin in decreasing order?
(a) III → II → I → IV (b) I → IV → II → III
(c) III → I → II → IV (d) I → III → II → IV

144. A gene that masks another gene's expression, is called
(a) dominant (b) recessive
(c) epistatic (d) assorted

145. Select the incorrect statement from the following:
(a) Linkage is an exception to the principle of independent assortment in heredity
(b) Galactosemia is an inborn error of metabolism
(c) Small population size results in random genetic drift in a population
(d) Baldness is a sex-limited trait

146. Point mutation involves
(a) insertion
(b) change in single base pair
(c) duplication
(d) deletion

147. A couple, both carriers for the gene sickle-cell anaemia planning to get married, wants to know the chances of having anaemic progeny
(a) 100% (b) 75%
(c) 50% (d) 25%

148. Match the following columns

Column I (Scientist)	**Column II (Concept)**
A. Taylor and Colleagues	1. *lac* operon
B. Hershey and Chase	2. DNA replicates semi conservatively
C. Griffith	3. Transforming principle
D. Jacob and Monod	4. DNA is the genetic material
	5. Transcription

Codes

	A	B	C	D		A	B	C	D
(a)	2	5	1	3	(b)	3	4	2	1
(c)	2	4	3	1	(d)	1	5	4	2

149. Choose the correct statement with reference to organic evolution.
I. Fippers of whale and wing of bat exhibit analogy
II. Wing of butterfly and wing of brid exhibit homology
III. Organs with dissimilar structure are called analogous organs
IV. Organs with similar structure and origin are called

homologous organs
(a) I and II (b) II and IV
(c) I and II (d) III and IV

150. Darwin proposed the theory of
(a) inheritance of acquired characters
(b) natural selection
(c) recapitulation
(d) continuity of germplasm

151. Match the following columns.

Column I	**ColumnsII**
A. Neurosis	1. Maladaptive habit
B. Hypochondria	2. Undue concern about health
C. Insomnia	3. Lack of sleep
D. Phobia	4. Intense fear

Codes

	A	B	C	D		A	B	C	D
(a)	2	1	4	3	(b)	2	1	3	4
(c)	4	1	3	2	(d)	1	2	3	4

152. A person showing unperdictable moods, outbursts of emotions, quarrelsome behaviour and conflicts with others is suffering from
(a) schizophrenia
(b) Borderline Personality Disorder (BPD)
(c) mood disorders
(d) addictive disorders

153. Ergotamine tartarate extracted from *Claviceps*, is used for cure of
(a) bodyache (b) headache
(c) fever (d) severe stomach pain

154. The pioneer country in the production of fuel-alcohol is
(a) Saudi Arabia (b) Iran and Iraq
(c) Brazil (d) Japan

155. The protein products of the following *Bt* toxin genes *cry* I Ac and *cry* II Ab are responsible for controlling.
(a) bollworm (b) roundworm
(c) moth (d) fruit fly

156. A technology, which has found immense use in solving cases of disputed parentage, is
(a) polymerase chain reaction
(b) DNA fingerprinting
(c) monoclonal antibody production
(d) recombinant DNA technology

157. The change in population size at a given time interval t, is given by the expression, $N_t = N_0 + B + I - D - E$ I, B and D stands respectively for
(a) rate of immigration, mortality rate, natality rate
(b) rate of immigration, natality rate, rate of emigration
(c) mortality rate, natality rate, rate of immigration
(d) rate of immigration, natality rate, mortality rate

158. Which one of the following is not observed in biodiversity hot spots?
(a) Edenism
(b) Accelerated species loss
(c) Lesser interspecific competition
(d) Species richness

159. Which one of the following shows, the hierarchical arrangement of taxonomic categories of plants in descending order?

(a)	(b)	(c)	(d)
Kingdom	Kingdom	Kingdom	Kingdom
↑	↑	↓	↓
Division	Division	Division	Division
↑	↑	↓	↓
Class	Order	Order	Class
↑	↑	↓	↓
Order	Class	Class	Order
↑	↑	↓	↓
Family	Family	Family	Family
↑	↑	↓	↓
Species	Genus	Genus	Genus
↑	↑	↓	↓
Genus	Species	Species	Species

160. New systematics introduced by Sir Julian Huxley is also called
(a) Phenetics (b) cladistics
(c) biosystematics (d) numerical taxonomy

161. On high mountains, difficulty in breathing is due to
(a) decrease in partial pressure of oxygen
(b) decrease in amount of oxygen
(c) increase in carbon dioxide concentration
(d) All of the above

162. Axis vertebra is identified by
(a) sigmoid notch (b) deltoid ridge
(c) odontoid process (d) centrum

163. The sensation of fatigue in the muscles after prolonged strenous physical work, is caused by
(a) a decrease in the supply of oxygen
(b) minor wear and tear of muscle fibres
(c) the depletion of glucose
(d) the accumulation of lactic acid

164. Malignant malaria is caused by
(a) Plasmodium falciparum
(b) Plasmodium ovale
(c) Plasmodium vivax
(d) Plasmodium malariae

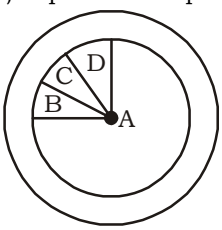
165. The method, which yields the best pictorial form and does not expose the patient to potentially harmful ionising radiations is
(a) X-ray radiography
(b) angiography
(c) computed tomography
(d) magnetic resonance imaging

166. Lindeman for the first time gave energy transfer law, which states that
(a) only 20% of the energy is transferred to each trophic level
(b) only 10% of the energy is transferred to each trophic level
(c) only 30% of the energy is transferred to each trophic level
(d) only 50% of the energy is transferred to each trophic level

167. Which one of the following is one of the characteristics of a biological community?
(a) Stratification (b) Natality
(c) Mortality (d) Sex ratio

168. Given below is the representation of the extent of golbal diversity of invertebrates. What groups the four

portions (A - D) represent respectively?



(a) A-Insects B-Crustaceans C-Crustaceans D-Molluscs
(b) A-Crustacean B-Insects C-Molluscs D-Other animal groups
(c) A-Molluscs B-Other animal groups C-Crustaceans D-Insects
(d) A-Insects B-Molluscs C-Crustaceans D-Other animal groups

169. If there was no carbon dioxide in the earth's atmosphere, the temperature of the earth's surface would be
(a) same as the present level
(b) more than the present level
(c) less than the present level
(d) dependent on the oxygen content in the atmosphere

170. Increase in atmospheric temperature due to CO_2 is called
(a) Pasteur effect (b) Greenhouse effect
(c) Blackman effect (d) Emerson effect

171. In which of the following gametophyte is not independent free-living?
(a) Funaria (b) Marchantia
(c) Pteris (d) Pinus

172. True nucleus is absent in
(a) Anabaena (b) Mucor
(c) Vaucheria (d) Volvox

173. Which of the following animals is not viviparous?
(a) Flying fox (bat) (b) Elephant
(c) Platypus (d) Whale

174. A major characteristic of the monocot root is the presence of
(a) open vascular bundles
(b) scattered vascular bundles
(c) vasculature without camblum
(d) cambium sandwiched between phloem and xylem along the radius

175. The structures that are formed by stacking of organised flattened membranous sacs in the chloroplasts are
(a) cristae (b) grana
(c) stroma lamellae (d) stroma

176. Which one of the following statements is incorrect?
(a) A competitive inibitor reacts reversibly with the enzyme to form an enzyme-inhibitor
(b) In competitive inhibition the inhibitor molecue is not chemically changed by the enzyme.
(c) The competitive inhibitor does not affect the rate of breakdown of the enzyme-substrate complex
(d) The presence of the competitive inhibitor decreases the km of the enzyme for the substrate

177. What causes a green plant exposed to the light on only one side, to bend toward the source of light as it grows?
(a) Green plants need light to perform photosynthesis
(b) Green plants seek light because they are phototropic
(c) Light stimulates plant cells on the lighted side to grow faster
(d) Auxin accumulates on the shaded side, stimulating greater cell elongation there

178. Which one of the following is correct?
(a) Plasma = Blood - Lymphocytes
(b) Serum = Blood + Fibrinogen
(c) Lymph = Plasma + RBC + WBC
(d) Blood = Plasma + RBC + WBC + Platelets

179. A population will not exist in Hardy-Weinberg equilibrium if
(a) individuals mate selectively
(b) there are no mutations
(c) there is no migration
(d) the population is large

180. HIV that causes AIDS, first starts destroying
(a) B-lymphocytes (b) leucocytes
(c) helper T-lymphocytes (d) thrombocytes