PHYSICS

(Section A)

1. $\int \frac{x\,dx}{\sqrt{2ax - x^2}} = a^n \sin^{-1}\left[\frac{x}{a} - 1\right]$. The value of n is :

(A) 0 (B) –1

(C) 1 (D) none of these

2. Two bodies are thrown vertically upward, with the same initial velocity of 98 m/s but 4 sec apart. How long after the first one is thrown when they meet ? ($g = 9.8\ m/s^2$)

(A) 10 sec (B) 11 sec

(C) 12 sec (D)13 sec

3. A stone is just released from the window of a train moving along a horizontal straight track. The stone will hit the ground in-

(A) Straight line path (B) Circular path

(C) Parabolic path (D) Hyperbolic path

4. It was calculated that a shell when fired from a gun with a certain velocity and at an angle of elevation $\frac{5\pi}{36}$ rad should strike a given target in the same horizontal plane. In actual practice, it was found that a hill just prevented the trajectory. At what angle of elevation should the gun be fired to hit the target.

(A) $\frac{5\pi}{36}$ rad (B) $\frac{11\pi}{36}$ rad

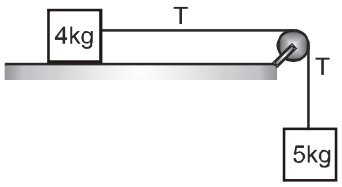
(C) $\frac{7\pi}{36}$ rad (D) $\frac{13\pi}{36}$ rad.

5. A body of mass 40 gm is moving with a constant velocity of 2 cm/sec on a horizontal frictionless table. The force on the table is-

(A) 39200 dyne (B) 160 dyne

(C) 80 dyne (D) zero dyne

6. Two bodies of 5 kg and 4 kg are tied to a string as shown in the fig. If the table and pulley both are smooth, acceleration of 5 kg body will be equal to-



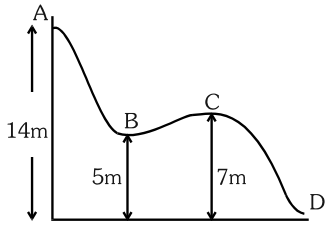
(A) g (B) $\frac{g}{4}$ (C) $\frac{4g}{9}$ (D) $\frac{5g}{9}$

7. The formula for centripetal acceleration in a circular motion is.

(A) $\vec{\alpha} \times \vec{r}$ (B) $\vec{\omega} \times \vec{v}$

(C) $\vec{\alpha} \times \vec{v}$ (D) $\vec{\omega} \times \vec{r}$

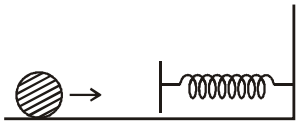
8. Figure shows the vertical section of frictionless surface. A block of mass 2 kg is released from the position A; its KE as it reaches the position C is :-



(A) 180J (B) 140J

(C) 40J (D) 280J

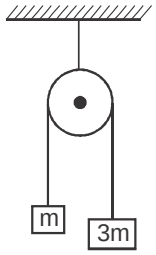
9. A mass of 0.5 kg moving with a speed of 1.5 m/s on a horizontal smooth surface, collides with a nearly weightless spring of force constant k = 50N/m. The maximum compression of the spring would be :-



(A) 0.12 m (B) 1.5 m

(C) 0.5 m (D) 0.15 m

10. If the system is released then the acceleration of the centre of mass of the system :



(A) $\frac{g}{4}$ (B) $\frac{g}{2}$

(C) g (D) 2g

11. A mass of 20 kg moving with a speed of 10 m/s collides with another stationary mass of 5 kg. As a result of the collision, the two masses stick together. The kinetic energy of the composite mass will be :

(A) 600 Joule (B) 800 Joule

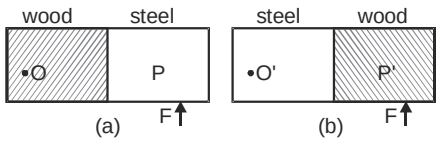
(C) 1000 Joule (D) 1200 Joule

12. The ratio of the radii of gyration of a circular disc about a tangential axis in the plane of the disc and of a circular ring of the same radius about a tangential axis in the plane of the ring is :

(A) 2 : 1 (B) $\sqrt{5}:\sqrt{6}$

(C) 2 : 3 (D) 1 : $\sqrt{2}$

13. In the fig. (a) half of the meter scale is made of wood while the other half of steel. The wooden part is pivoted at O. A force F is applied at the end of steel part. In figure (b) the steel part is pivoted at O' and the same force is applied at the wooden end (In horizontal plane) :



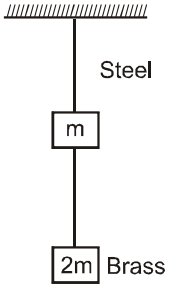
(A) More angular acceleration will be produced in (a)

(B) More angular acceleration will be produced in (b)

(C) Same angular acceleration will be produced in both conditions

(D) Information is incomplete

14. If the ratio of lengths, radii and Young's modulii of steel and brass wires in the figure are a, b, c respectively. Then the corresponding ratio of increase in their lengths would be :



(A) $\frac{2ac}{b^2}$ (B) $\frac{3a}{2b^2c}$

(C) $\frac{3c}{2ab^2}$ (D) $\frac{2a^2c}{b}$

15. A rain drop of radius 0.3 mm has a terminal velocity in air 1m/s. The viscosity of air is 18×10^{-5} poise. The viscous force on it is :–

(A) 101.73×10^{-4} dyne

(B) 101.73×10^{-5} dyne

(C) 16.95×10^{-5} dyne

(D) 16.95×10^{-4} dyne

16. The excess pressure inside one soap bubble is p and that inside a second soap bubble is 3p. Then the ratio of the volumes of the two bubbles is-

(A) 1 : 27 (B) 27 : 1

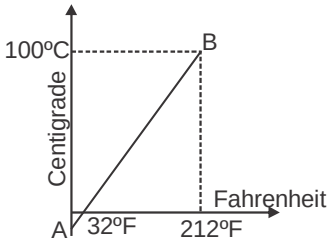
(C) 1 : 9 (D) 9 : 1

17. The slope of indicator curve in adiabatic change relative to volume axis is -

(A) P/V^{γ} (B) $\frac{P^{\gamma}}{V^{\gamma-1}}$

(C) $\frac{P}{\gamma(V)}$ (D) $-\gamma\left(\frac{P}{V}\right)$

18. The graph AB shown in figure is a polt of temperature of a body in degree Celsius and degree Fehrenheit. Then



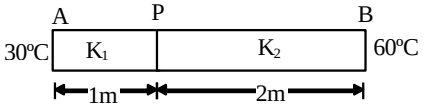
(A) slope of line AB is 9/5

(B) slope of line AB is 5/9

(C) slope of line AB is 1/9

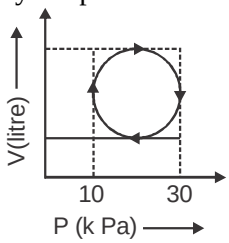
(D) slope of line AB is 3/9

19. Two rods A and B are connected in series as shown in fig. the conductivity of A is K_1 = 100 W/m -°C and conductivity of B is K_2 = 50 W/m - °C. The free ends of the rods A and B has temp. 30° and 60° respectively the temp. of common meeting point will be -



(A) 35°C (B) 40°C
(C) 36°C (D) 50°

20. Heat energy absorbed by a system in going through a cyclic process shown is figure is -

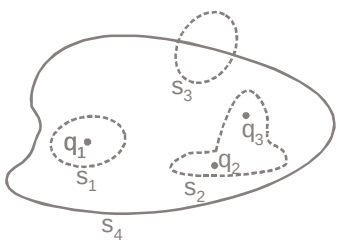


(A) 10^7 πJ (B) 10^4 πJ
(C) 10^2 πJ (D) 10^{-3} π J

21. For forced vibrations which statement is incorrect:
(A) Displacement varies with the frequency of force
(B) Displacement is not in phase with force
(C) Amplitude decreases exponentially with time
(D) Amplitude becomes ∞ if the frequency of force coincides with that of body

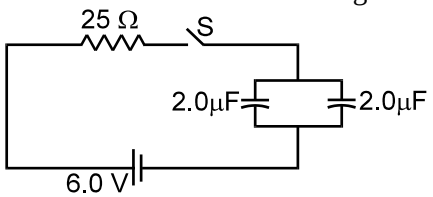
22. A siren emitting sound of frequency 500 Hz is going away from a static listener with a speed of 50 m/sec. The frequency of sound to be heard directly from the siren is-
(A) 434.2 Hz (B) 589.3 Hz
(C) 484.2 Hz (D) 256.5 Hz

23. Three charges $q_1 = 1 \times 10^{-6}$, $q_2 = 2 \times 10^{-6}$, $q_3 = -3 \times 10^{-6}$ C have been placed, as shown in figure, in four surfaces S_1, S_2, S_3 and S_4 electrical flux emitted from the surface S_2 in N–m^2/C will be -



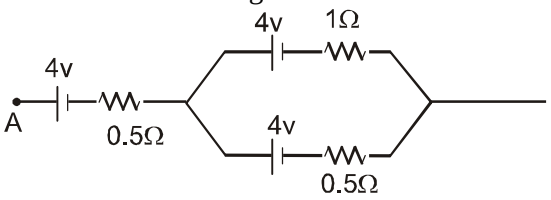
(A) $36\pi \times 10^3$ (B) $-36\pi \times 10^3$
(C) $36\pi \times 10^9$ (D) $-36\pi \times 10^9$

24. The charge on each of the capacitors 0.20 ms after the switch S is closed in figure is :



(A) 24 μC (B) 16.8 μC
(C) 10.37 μC (D) 4.5 μC

25. Find the equivalent emf of the three batteries as shown in the figure.

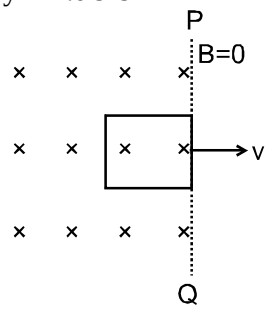


(A) 0 (B) 4 v
(C) 8 v (D) 12 v

26. The sensitivity of a potentiometer is increased by
(A) increasing the emf of the cell
(B) increasing the length of potentiometer wire
(C) decreasing the length of potentiometer wire
(D) None of the above

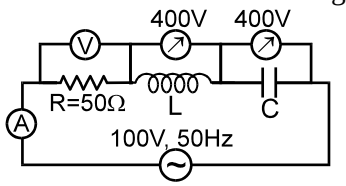
27. The magnetic induction due to circular current carrying conductor of radius a, at its centre is B_C. The magnetic induction on its axis at a distance a from its centre is B_a. The value of $B_c : B_a$ will be -
(A) $\sqrt{2}:2$ (B) $1:2\sqrt{2}$
(C) $2\sqrt{2}:1$ (D) $2:\sqrt{2}$

28. Figure shows a square loop of side 0.5 m and resistance 10 Ω. The magnetic field on left side of line PQ has a magnitude B = 1.0T. The work done in pulling the loop out of the field uniformly in 2.0 s is



(A) 3.125×10^{-3} J (B) 6.25×10^{-4} J
(C) 1.25×10^{-2} J (D) 5.0×10^{-4} J

29. In the series LCR circuit as shown in figure, the voltmeter and ammeter readings are :



(A) V = 100 volt, I = 2 amp
(B) V = 100 volt, I = 5 amp
(C) V = 1000 volt, I = 2 amp
(D) V = 300 volt, I = 1 amp

30. A power (step up) transformer with an 1 : 8 turn ratio has 60 Hz, 120 V across the primary; the load in the secondary is 10^4 Ω. The current in the secondary is
(A) 96 A (B) 0.96 A
(C) 9.6 A (D) 96 mA

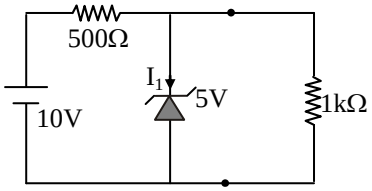
31. A Galileo telescope has an objective of focal length 100 cm & magnifying power 50. The distance between the two lenses in normal adjustment will be
(A) 150 cm (B) 100 cm
(C) 98 cm (D) 200 cm

32. The slits in a Young's double slit experment have equal widths and the source is placed symmetrically relative to the slits. The intensity at the central fringe is I_0. If one of the slits is closed, the intensity at this ponit will be:
(A) I_0 (B) $I_0/4$
(C) $I_0/2$ (D) $4I_0$

33. The relation between λ_1: wavelength of series limit of Lyman series, λ_2: the wavelength of the series limit of Balmer series & λ_3: the wavelength of first line of Lyman series is :
(A) $\lambda_1 = \lambda_2 + \lambda_3$ (B) $\lambda_3 = \lambda_1 + \lambda_2$
(C) $\lambda_2 = \lambda_3 - \lambda_1$ (D) none of these

34. The energy of the reaction $Li^7 + p \longrightarrow 2\ He^4$ is (the binding energy per nucleon in Li^7 and He^4 nuclei are 5.60 and 7.06 MeV respectively.)
(A) 17.3 MeV
(B) 1.73 MeV
(C) 1.46 MeV
(D) depends on binding energy of proton

35. The current flowing through the zener diode in figure is-



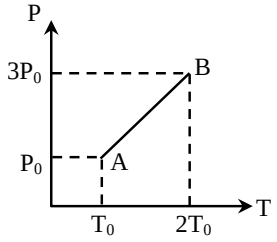
(A) 20 mA (B) 25 mA
(C) 15 mA (D) 5 mA

(Section B)

36. A block of mass 1 kg lies on a horizontal surface in a truck. The coefficient of static friction between the block and the surface is 0.6 If the acceleration of the truck is 5 m/s^2, the frictional force acting on the block is :
(A) 5 N
(B) 6 N
(C) 10 N
(D) 15 N

37. If M_e is the mass of earth and M_m is the mass of moon ($M_e = 81\ M_m$). The potential energy of an object of mass m situated at a distance R from the centre of earth and r from the centre of moon will be:
(A) $-GmM_m\left(\frac{R}{81}+r\right)\frac{1}{R^2}$
(B) $-GmM_e\left(\frac{81}{r}+\frac{1}{R}\right)$
(C) $-GmM_m\left(\frac{81}{R}+\frac{1}{r}\right)$
(D) $GmM_m\left(\frac{81}{R}-\frac{1}{r}\right)$

38. Pressure versus temperature graph of an ideal gas is as shown in figure. Density of the gas at point A is ρ_0. Density at B will be



(A) $\frac{3}{4}\rho_0$ (B) $\frac{3}{2}\rho_0$

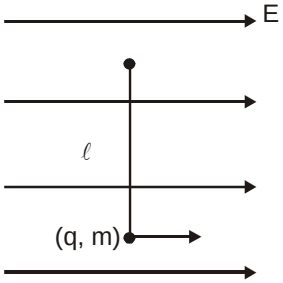
(C) $\frac{4}{3}\rho_0$ (D) $2\rho_0$

39. The linear density of a vibrating string is 1.3×10^{-4} kg/m. A transverse wave is propagating on the string and is described by the equation $y = 0.021 \sin (x + 30t)$ where x and y are measured in meter and t in second the tension in the string is :–

(A) 0.12 N (B) 0.48 N

(C) 1.20 N (D) 4.80 N

40. A simple pendulum has a length ℓ, mass of bob m. The bob is given a charge q coulomb. The pendulum is suspended in a uniform horizontal electric field of strength E as shown in figure, then calculate the time period of oscillation when the bob is slightly displace from its mean position is :



(A) $2\pi\sqrt{\frac{\ell}{g}}$

(B) $2\pi\sqrt{\left\{\frac{\ell}{g+\frac{qE}{m}}\right\}}$

(C) $2\pi\sqrt{\left\{\frac{\ell}{g-\frac{qE}{m}}\right\}}$

(D) $2\pi\sqrt{\frac{\ell}{\sqrt{g^2+\left(\frac{qE}{m}\right)^2}}}$

41. The hysteresis loop for the material of a permanent magnet is :

(A) short and wide (B) tall and narrow

(C) tall and wide (D) short and narrow

42. A thin linear object of size 1 mm is kept along the principal axis of a convex lens of focal length 10 cm. The object is at 15 cm from the lens. The length of the image is:

(A) 1 mm (B) 4 mm

(C) 2 mm (D) 8 mm

43. The energy of a photon of frequency ν is $E = h\nu$ and the momentum of a photon of wavelength λ is $p = h/\lambda$. From this statement one may conclude that the wave velocity of light is equal to :

(A) 3×10^8 ms^{-1} (B) $\frac{E}{p}$

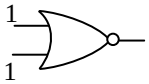
(C) Ep (D) $\left(\frac{E}{p}\right)^2$

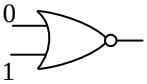
44. A sample of radioactive element containing 4×10^{16} active nuclei. Half life of element is 10 days, then number of decayed nuclei after 30 days :

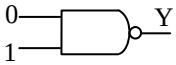
(A) 0.5×10^{16} (B) 2×10^{16}

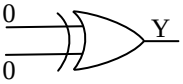
(C) 3.5×10^{16} (D) 1×10^{16}

45. Which of the following will have an output of 1 -

(a) 

(b) 

(c) 

(d) 

(A) a (B) c (C) b (D) d

46. A ball is thrown upwards. It returns to ground describing a parabolic path. Which of the following remains constant?

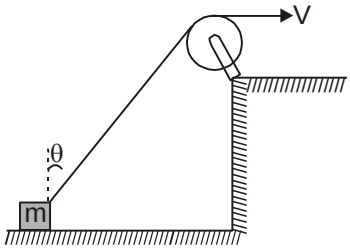
(A) speed of the ball

(B) kinetic energy of the ball

(C) vertical component of velocity

(D) horizontal component of velocity.

47 A block is dragged on smooth plane with the help of a rope which moves with velocity v. The horizontal velocity of the block is :



(A) v (B) $\frac{v}{\sin\theta}$

(C) v sin θ (D) $\frac{v}{\cos\theta}$

48. The moments of inertia of two rotating bodies A and B are I_A and I_B ($I_A > I_B$) and their angular momentum are equal. If their kinetic energies be K_A and K_B, respectively, then

(A) $\frac{K_A}{K_B} > 1$ (B) $\frac{K_B}{K_A} > 1$

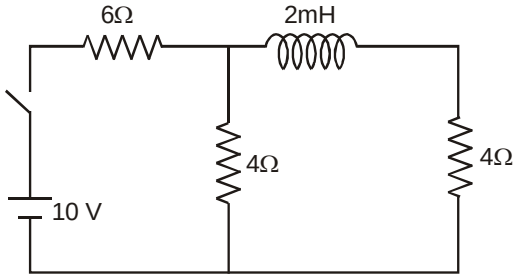
(C) $\frac{K_A}{K_B} = 1$ (D) $\frac{K_A}{K_B} = \frac{1}{2}$

49. A thin circular ring of mass M and radius R is rotating about its axis with a constant angular velocity ω. Two objects each of mass m, are attached gently to the opposite ends of a diameter of the ring. The ring now rotates with an angular velocity ?

(A) $\frac{\omega M}{M+m}$ (B) $\frac{\omega(M-2m)}{M+2m}$

(C) $\frac{\omega M}{M+2m}$ (D) $\frac{\omega(M+2m)}{M}$

50. In the given circuit find the ratio of i_1 to i_2. Where i_1 is the initial (at t = 0) current, and i_2 is steady state (at t = ∞) current through the battery :



(A) 1.0 (B) 0.8

(C) 1.2 (D) 1.5

CHEMISTRY

Section-A

51. A gaseous mixture contains oxygen & nitrogen gas in the ratio 1 : 7 by weight. Therefore the ratio of the no. of molecules is
(A) 1 : 4 (B) 1 : 8 (C) 7 : 32 (D) 3 : 16

52. The number of mole of oxalate ions oxidized by one mole of MnO_4^- ion is –
(A) 1/5 (B) 2/5
(C) 5/2 (D) 5

53. If a_0 be the radius of first Bohr's orbit of H-atom, the de-broglie's wavelength of an electron revolving in the second Bohr's orbit will be: -
(A) $6\pi a_0$ (B) $4\pi a_0$
(C) $2\pi a_0$ (D) None of these

54. Which one of the following statements is not true about the effect of an increase in temperature on the distribution of molecular speeds in a gas?
(A) The area under the distribution curve remains the same as under the lower temperature
(B) The distribution becomes broader
(C) The fraction of the molecules with the most probable speed increases
(D) The most probable speed increases

55. Heat of formation of H_2O (g) at 1 atm and 25°C is – 243 kJ. ΔU for the reaction,

$H_2(g) + \frac{1}{2}O_2(g) \rightarrow H_2O(g)$ at 25°C is:

(A) 241.8 kJ (B) −241.8 kJ
(C) − 243 kJ (D) 243 kJ

56 For the following three reaction, I, II and III. equilibrium constants are given.
(I) $CO_{(g)} + H_2O_{(g)} \rightleftharpoons CO_{2(g)} + H_{2(g)}; K_1$
(II) $CH_{4(g)} + H_2O_{(g)} \rightleftharpoons CO_{(g)} + 3H_2\,O_{(g)}; K_2$
(III) $CH_{4(g)} + 2H_2O_{(g)} \rightleftharpoons CO_{2(g)} + 4H_{2(g)}; K_3$
Which of the following relations is correct?
(A) $K_1\sqrt{K_2} = K_3$ (B) $K_2K_3 = K_1$
(C) $K_3 = K_1K_2$ (D) $K_3K_2^3 = K_1^2$

57. A buffer solution is prepared by mixing 0.1 M ammonia & 1.0 M ammonium chloride. At 298K, The pK_b of NH_4OH is 5.0. The pOH of the buffer is :
(A) 10.0 (B) 9.0
(C) 6.0 (D) 8.0

58. In NaCl the centres of two nearest opposite charged ions are present at a distance of
(A) $\frac{\sqrt{2}a}{2}$ (B) $\frac{a}{2}$
(C) $\frac{\sqrt{3}a}{2}$ (D) $\frac{2a}{\sqrt{2}}$

59. Which one of the following aqueous solution will exhibit highest boiling point?
(A) 0.01 M Na_2SO_4 (B) 0.015 M glucose
(C) 0.015 M urea (D) 0.001 NaCl

60. The standard reduction potential for Fe^{+2}|Fe and Sn^{+2}| Sn electrodes are –0.44V & –0.14 V respectively.
For the cell reaction, $Fe^{+2} + Sn \rightarrow Fe + Sn^{+2}$
The standard emf is
(A) + 0.30 V (B) – 0.58 V
(C) + 0.58 V (D) – 0.30 V

61. The time taken for the completion of 3/4 of a first order reaction is –
(A) $\left(\frac{2.303}{K}\right)\log\frac{3}{4}$ (B) $\left(\frac{2.303}{K}\right)\log 4$
(C) $\left(\frac{2.303}{K}\right)\log\left(\frac{1}{4}\right)$ (D) $\left(\frac{2.303}{0.75}\right)\log K$

62. Complete the following two reaction
i. $4LiNO_3 \longrightarrow x + O_2$
ii. $2NaNO_3 \longrightarrow y + O_2$
(A) x = $LiNO_2$, y = $NaNO_2$
(B) x = $Li_2O + NO_2$, y = $Na_2O + NO_2$
(C) x = $Li_2O + NO_2$, y = $NaNO_2$
(D) x = $LiNO_2$, y = $Na_2O + NO_2$

63. What is X in the following reaction ?

$2SO_2(g) + O_2(g) \xrightarrow{X} 2SO_3(g)$

(A) V_2O_5 (B) CuO

(C) $CuCl_2$ (D) MnO_2

64. Phosphine is not obtained by which of the following reaction

(A) White P is heated with NaOH

(B) Red P is heated with NaOH

(C) Ca_3P_2 reacts with water

(D) Phosphorus trioxide is boiled with water

65. Bayer's reagent used to detect olefinic double bond is :

(A) acidified $KMnO_4$

(B) aqueous $KMnO_4$

(C) 1% alkaline $KMnO_4$ solution

(D) $KMnO_4$ is benzene

66. Which of the following compound has tetrahedral geometry ?

(A) $[Ni(CN)_4]^{2-}$ (B) $[Pd(CN)_4]^{2-}$

(C) $[PdCl_4]^{2-}$ (D) $[NiCl_4]^{2-}$

67. Among the following metal carbonyls, The C–O bond order is lowest in

(A) $[Mn(CO)_6]^+$ (B) $[Fe(CO)_5]$

(C) $[Cr(CO)_6]$ (D) $[V(CO)_6]^-$

68. Copper matte contains :

(A) Sulphide of copper (II) and iron (II)

(B) Sulphide of copper (II) and iron (III)

(C) Sulphide of copper (I) and iron (II)

(D) Sulphide of copper (I) and iron (III)

69. Which of the following compound during the preparation of Na_2CO_3 by solvay process?

(A) NH_3, $CaCO_3$, NaCl

(B) NH_4, ClCaO, NaCl

(C) $CaCO_3$, NaCl

(D) NaCl, NH_4HCO_3

70. Which among the given pairs do not have the same bond order?

(A) F_2 *and* O_2^{2-} (B) N_2^+ *and* O_2^+

(C) C_2 and O_2 (D) F_2 and Be_2

71. Match Column-I (molecule) with Column-II (type of hybridisation) and choose the correct option from the codes given below.

Column-I (Molecule)	**Column-II** (Type of hybridisation)
(A) SF_6	(p) sp^3d
(B) PF_5	(q) sp^3
(C) BCl_3	(r) sp^3d^2
(D) C_2H_6	(s) sp^2

(A) A – (r), B – (p), C – (s), D – (q)

(B) A – (r), B – (p), C – (q), D – (s)

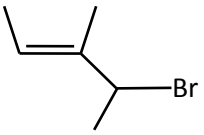
(C) A – (p), B – (r), C – (q), D – (s)

(D) A – (p), B – (r), C – (s), D – (q)

72. Magnetic moment of x^{+3} ion of 3d series is $\sqrt{35}$ B.M. What is the atomic number of x^{+3}?

(A) 24 (B) 25

(C) 26 (D) 27

73. The IUPAC name of  is :

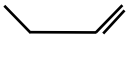
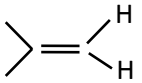
(A) 2-bromo-3-methylbut-3-ene

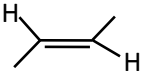
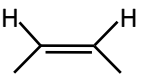
(B) 4-bromo-3-methylpent-2-ene

(C) 2-bromo-3-methylpent-3-ene

(D) 4-bromo-2, 3-dimethylbut-2-ene

74. An structural isomer of molecular formula C_4H_8 show geometrical isomerism. It have A and B geometrical isomers in which B has mare boiling point than A. Possible structure of B is

(A)  (B) 

(C)  (D) 

75. The most stable carbonium ion among the following

(A) $C_6H_5\overset{+}{C}HC_6H_5$ (B) $C_6H_5\overset{+}{C}H_2$

(C) $CH_3\overset{+}{C}H_2$ (D) $C_6H_5CH_2\overset{+}{C}H_2$

76. Which of the following compound on treatment with zinc metal to form ethene

(A) CH_3–CH_2–Br (B) CH_3–$CHBr_2$

(C) $BrCH_2$–CH_2Br (D) Br_2CH–$CHBr_2$

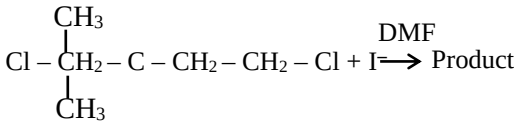
77. Mixing the solution of freshly prepared diazonium salt with cuprous halide (x = –Cl, Br), this reaction is called as

(A) Gattermann formylation reaction

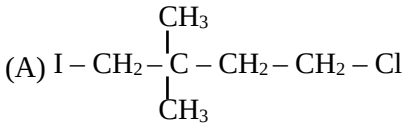
(B) Bulz schiemann reaction

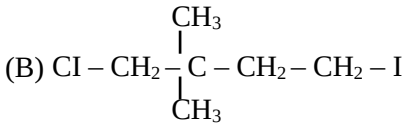
(C) Sandmeyer reaction

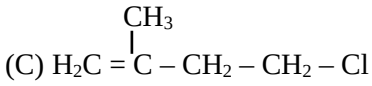
(D) Coupling reaction

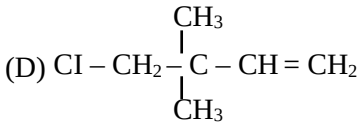
78. 

Major product of this reaction is:

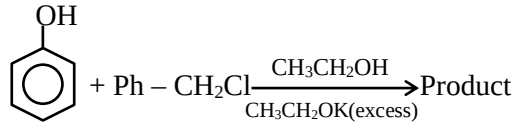
(A) 

(B) 

(C) 

(D) 

79. What is the final product of reaction.

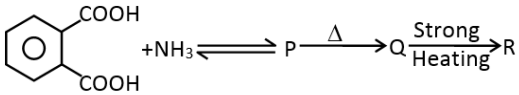


(A) Ph–CH_2–O–CH_2–Ph

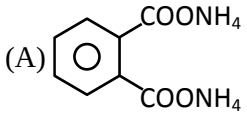
(B) Ph–CH_2–O–CH_3

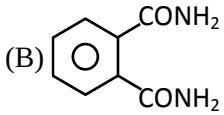
(C) Ph–CH_2–O–CH_2–CH_3

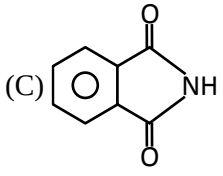
(D) CH_3–CH_2–O–CH–CH_3

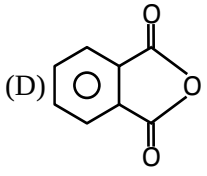
80. 

Q is

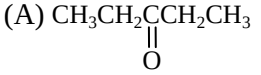
(A) 

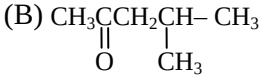
(B) 

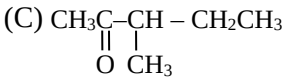
(C) 

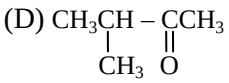
(D) 

81. An optically active compounds (X) reacts with phenyl hydrazine to form phenylhydrazone derivative. The compound X, gives a yellow precipitate of iodoform with I_2 and NaOH. The compound X is -

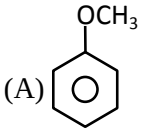
(A) 

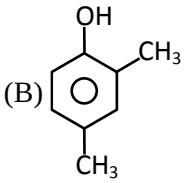
(B) 

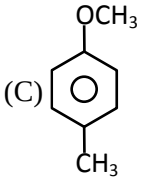
(C) 

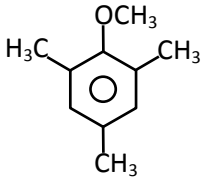
(D) 

82. When C_6H_5OH is treated with aq. NaOH it gives A which on reaction with methyl chloride gives B. What is the final product obtained when B is treated with methyl chloride in presence of Anhy. $AlCl_3$.

(A) 

(B) 

(C) 

(D) 

83. Glycosidic linkage present in sucrose :-

(A) C_1 of α-D-glucose and C_2 of β-D- fructose

(B) C_2 of α-D-glucose and C_1 of β-D- fructose

(C) C_1 of α-D-glucose and C_4 of α-D- fructose

(D) C_1 of α-D-glucose and C_4 of β-D-fructose

84. Identify the incorrect statement in the following?

(A) Acid rain is mostly because of the oxides of nitrogen and sulphur

(B) CFCs are responsible for ozone layer depletion

(C) Greehouse effect is responsible for global warming

(D) Ozone layer does not permit ultraviolet radiation from the sun to reach the earth.

85. Bacteriostatic antibiotic is

(A) Penicillin (B) Chloramphenicol

(C) Ofloxacin (D) All

Section-B

86. Ratio of time period of electron in first and second orbit of H–atom would be

(A) 1 : 18 (B) 1 : 8

(C) 1 : 2 (D) 2 : 1

87. $S + \frac{3}{2}O_2 \rightarrow SO_3 + 2xkcal$

$SO_2 + \frac{1}{2}O_2 \rightarrow SO_3 + ykcal$

Find out the heat of formation of SO_2.

(A) y – 2x (B) 2x – y

(C) x – y (D) 2x/y

88. The solubility of AgCI in water at 10° C is 6×10^{-6} mol/L. The K_{sp} of AgCI is :

(A) $(6\times10^{-6})^{1/2}$ (B) $6\times(10^{-6})^2$

(C) $(6)^2\times10^{-6}$ (D) $(6\times10^{-6})^2$

89. In a mixture of A and B, components show positive deviation when:

(A) A – B interaction is stronger than A – A and B – B interaction

(B) A – B interaction is weaker than A – A and B – B interaction

(C) ΔV mix < 0, ΔS mix > 0

(D) ΔV mix = 0, ΔS mix > 0

90. The E*a* for exothermic reaction A → B, 80 KJ/mol. the heat of reaction is 200 KJ/mol. Then Ea for B → A ?

(A) 80 (B) 120

(C) 40 (D) 280

91. Which of the following is not correct?

(A) Enthalpy of physical Adsorption is less compared to enthalpy of chemical Adsorption.

(B) Milk is an example of emulsion

(C) Physical Adsorption increases with the increase in temperature.

(D) Smoke is an Aerosol.

92. Match the items of column-I with items of column-II and assign the correct code –

	Column-I		**Column-II**
A.	Hydraulic washing	i.	Al
B.	Blast furnace	ii.	Difference between specific gravity
C.	Reverberatory furnace	iii.	Pig iron
D.	Hall-Heroult process	iv.	Heating of sulphide ore in presence of air

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

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

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

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

93. Consider the reactions

(A) $H_2O_2 + 2HI \longrightarrow I_2 + 2H_2O$

(B) $HOCl + H_2O_2 \longrightarrow H_3O^+ + Cl^- + O_2$

In these reaction which of following is correct for H_2O_2 ?

(A) Act as oxidising agent in both A & B

(B) Act as reducing agent in both A & B

(C) Act as oxidising agent in (A) & as reducing agent in (B)

(D) Act as reducing agent in (A) & as Oxidising agent in (A).

94. Which of them have highest covalent character ?

(A) NaCl (B) $MgCl_2$

(C) $AlCl_3$ (D) $SiCl_4$

95. The successive ionization energies (in kJ/mol) for an element are shown below.

E_1	E_2	E_3	E_4	E_5
577	1820	2470	11600	14800

What is the electron configuration of this element?

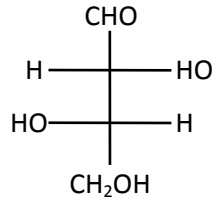
(A) $1s^2\ 2s^2\ 2p^6\ 3s^1$

(B) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^1$

(C) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^3$

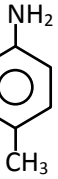
(D) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3P^6 3d^3$

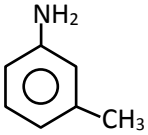
96. Assign R/S configuration in the given molecule?

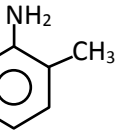


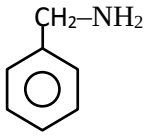
(A) 2R, 3R (B) 2R, 3S
(C) 2S, 3R (D) 2S, 3S

97. Which of the following is strongest base ?

(A) 

(B) 

(C) 

(D) 

98. Select the incorrect statement about Lucas test ?

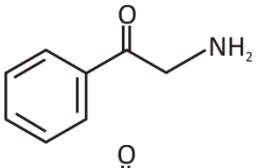
(A) Lucas test is used to distinguish between 1°, 2° and 3° alcohols

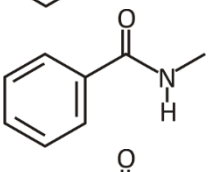
(B) Lucas reagent is conc. HCl and anhy $ZnCl_2$

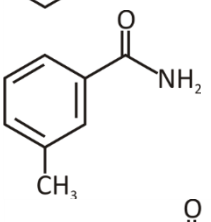
(C) Alcohols are insoluble in Lucas reagent.

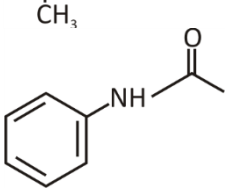
(D) Tertiary alcohol produce turbidity immediately.

99. Which of the following undergo Hofmann's bromamide reaction ?

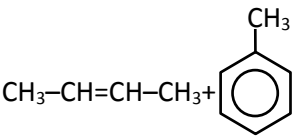
(A) 

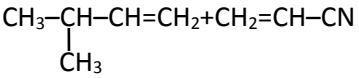
(B) 

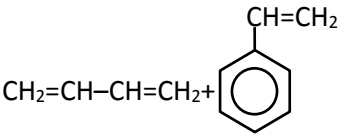
(C) 

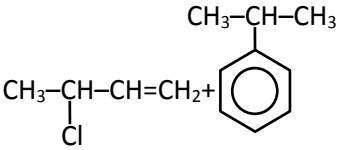
(D) 

100. The correct structure of monomers of buna-S is :

(A) 

(B) 

(C) 

(D) 

BOTANY

(Section-A)

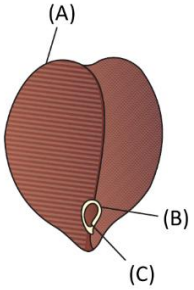
101. Poales is an order in which class ?
(A) Monocotyledonae
(B) Mammalia
(C) Insecta
(D) Dicotyledonae

102. Whittaker's kingdom are
(A) Plantae and Animalia
(B) Monera and Protista
(C) Fungi
(D) All of these

103. Most extensive metabolic diversity is found in
(A) Protozoans (B) Amphibian
(C) Bacteria (D) Fungi

104. In Pinus, if the endosperm has 12 chromosomes, then how many chromosomes will be there in the pollen grain?
(A) 6 (B) 24
(C) 12 (D) 36

105. Identify A, B, C. in the given diagram of a dicot seed.



(A) A-Seed coat, B-Micropyle, C-Hilum
(B) A-Seed coat, B-Hilum, C-Micropyle
(C) A-Hilum, B-Seed coat, C-Micropyle
(D) A-Micropyle, B-Seed coat, C-Hilum

106. Function of root cap is
(A) to store food products
(B) Absorb nutrient
(C) Provide protection to root tip
(D) None of these

107. Pulp of fruit is made up of mainly
(A) Sclerenchyma (B) Collenchyma
(C) Sclereids (D) Parenchyma

108. Unicellular organisms are capable of –
(A) Independent existence
(B) Performing the essential functions of life
(C) Behaving equivalent to an individual.
(D) All of the above.

109. Which of the following is not related to plant cell?
(A) Plasma membrane
(B) Nucleus
(C) Centrioles
(D) Vacuole

110. Which of the following cell organelle is found in both prokaryotic and eukaryotic cell?
(A) Lysosome (B) Ribosome
(C) Mitochondria (D) Golgi body

111. Which of the following is a function of Antibodies ?
(A) Fight against infections agents
(B) Helps in sensory reception
(C) Enables glucose transport into cells
(D) Increase the rate of chemical reaction.

112. If a cell in G_1 phase has 2C amount of DNA and number of chromosomes 2n than what will be in G_2 phase-
(A) Amount of DNA 2C and number of chromosome 4n
(B) Amount of DNA 4C and number of chromosome 4n
(C) Amount of DNA 2C and number of chromosome 2n
(D) Amount of DNA 4C and number of chromosome 2n

113. In land plants, guard cells differ from other epidermal cell is having:
(A) mitochondria
(B) Endoplasmic reticulum
(C) chloroplast
(D) cytoskeleton

114. Essential elements are
(A) Necessary for the growth but not for reproduction
(B) Not specific and replaceable by any other element
(C) Involved in the metabolism of plant body
(D) Required in large quantity

115. By using radio isotope technique it was proved that:-
(A) CO_2 is used during light reaction
(B) O_2 released comes from CO_2
(C) O_2 released comes from H_2O
(D) $C_6H_{12}O_6$ is oxidised during photosynthesis

116. "Plants restore to the air whatever breathing animals and burning candies remove". This was hypothesized for:
(A) CO_2 (B) O_2 (C) H_2O (D) Glucose

117. How many molecules of ATP are produced in each turn of Krebs cycle through ETS ?
(A) 12 (B) 24
(C) 11 (D) 9

118. In fermentation there is a net gain of only
(A) 4 ATP (B) 2 ATP
(C) 6 ATP (D) 8 ATP

119. Succinate dehydrogenase is present in which complex of ETS?
(A) Complex-I (B) Complex-IV
(C) Complex-III (D) Complex-II

120. A farmer grows cucumber plants in his field. He wants to increase the number of female flowers in them. Which plant growth regulator can be applied to achieve this ?
(A) ABA (B) Ethylene
(C) GA (D) Cytokinins

121. Match Column–I with Column–II and select the correct option from the codes given below :

Column–I		**Column–II**	
A.	Auxin	i.	Fruit ripening
B.	Cytokinins	ii.	Phototropism
C.	Abscisic acid	iii.	Antagonist to GA's
D.	Ethylene	iv.	Growth of lateral buds

(A) A–iv, B–ii, C–iii, D–I
(B) A–ii, B–iv, C–iii, D–i
(C) A–ii, B–iii, C–iv, D–I
(D) A–iii, B–iv, C–ii, D–i

122. Which is the most common method of reproduction in majority of fungi ?
(A) Binary fission (B) Multiple fission
(C) Budding (D) Spore formation

123. Number of chromosomes is 12 in endosperm. What shall be the number in megaspore mother cell ?
(A) 8 (B) 36 (C) 12 (D) 18

124. Which of the following parental combination will not produce 'O' Blood group in offsprings?
(A) A × A (B) A × B
(C) AB × O (D) O × O

125. A Dihybrid plant in which complete linkage is present, which of the following is incorrect about this plant?
(A) On selfing, it produces 3 : 1 phenotypic ratio
(B) On test cross, it produces 1 : 1 genotypic ratio
(C) It produces some new combination in offsprings
(D) It produces two types of gametes.

126. A cross produced both tall and dwarf plants. The genotype of the crossed plants can not be :–
(A) Tt × TT (B) Tt × Tt
(C) tt × tt (D) Both (A) and (C)

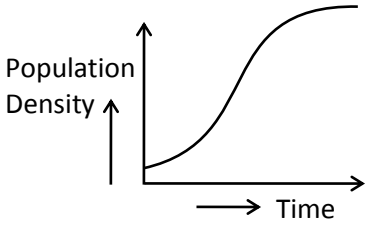
127. Heterozygous plants of garden pea were self-fertilized. In the progeny 750 round seeded plants were obtained. How many plants in the progeny will have intermediate size starch grains?
(A) 500 (B) 250 (C) 125 (D) 750

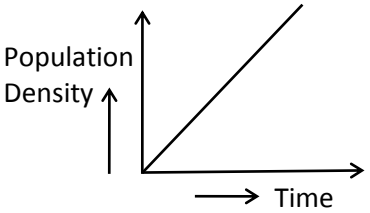
128. Regulation of lac operon by repressor is referred to as
(A) Negative regulation
(B) Positive regulation
(C) Inhibition
(D) All of the above

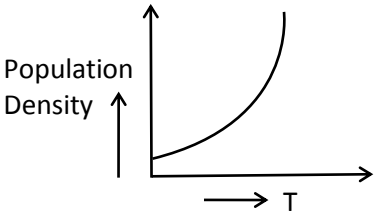
129. Which histone is not the part of histone octamer?
(A) H_2A (B) H_3 (C) H_4 (D) H_1

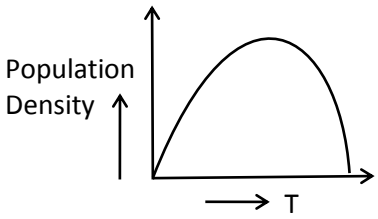
130. In HGP, sequencing of which chromosome was completed in last?
(A) Chromosome-1 (B) Y-chromosome
(C) X- chromosome (D) 22nd chromosome

131. Which of the following graph represents Verhulst pearl logistic growth of a population?

(A)


(B)


(C)


(D)


132. "Sexual deceit" for its benefit is shown by –
(A) Ophrys
(B) Fig
(C) Yucca
(D) Bumblebee

133. For a tree ecosystem pyramid of biomass is -
(A) upright
(B) Inverted
(C) Spindle shaped
(D) Urn-shaped

134. Which of the following radiation cause snow blindness?
(A) UV-A
(B) UV-B
(C) UV-C
(D) All

135. Which is not an advantage of CNG fuel?
(A) CNG burns more efficiently
(B) CNG is cheaper
(C) Easily transported
(D) Decreases pollution

(Section-B)

136. Which of the following statement is not true?
(A) Growth and Reproduction are characteristics of cells.
(B) Cell cycle, cell division and DNA Replication occur in Random way.
(C) M phase starts with Nuclear Division
(D) Interphase takes more than 95% of the duration of total cell cycle

137. Photosynthesis is a/an :-
(A) Endergonic process
(B) Exergonic process
(C) Physico-chemical process
(D) Both (A) and (C)

138. Aristotle classified plants in herbs, shrubs and trees on the basis of
(A) Anatomical feature
(B) Morphological characters
(C) Physiological characters
(D) Biochemical characters

139. Which of the following statements is/are true for a leaf?
(A) It is a lateral, flattened structure
(B) It originates from shoot apical meristem in acropetal succession
(C) It is a vegetative organ and bears axillary bud in its axil.
(D) All of the above

140. Cells at the end of prophase do not show-
(A) Golgi complex
(B) Endoplasmic Reticulum
(C) Nucleolus
(D) All of the above

141. Amides are
(A) Asparagine and glutamine
(B) Contain more nitrogen than amino acids
(C) Transported to the other part of plant via xylem
(D) All of these.

142. Photosynthetic productivity of which of the following plants would increases highest if grown in CO_2 rich greenhouses?
(A) C_3 plants (B) C_4 plants
(C) CAM plants (D) None of these

143. The site of perception of Photoperiod (light/dark duration) are the :
(A) Meristems (B) Floral buds
(C) Leaves (D) Lateral buds

144. Triple fusion produces –
(A) Polar nucleus
(B) Secondary nucleus
(C) Zygotic nucleus
(D) Primary ensoperm nucleus

145. Mendel was not able to discover linkage because
(A) Genes for characters he studied are located on different chromosomes
(B) Genes for characters he studied are either on different chromosome or the dihybrid cross he studied showed 50% recombination in gamete formation
(C) Pea is not suitable for studying linkage
(D) All of the above

146. The sensitivity of the DNA fingerprinting technique has been increased by use of
(A) PCR (B) Probes
(C) Gel (D) DNase

147. Indian Patent bill is related to
(A) Control of deforestation
(B) Application of bioresources and traditional knowledge in health care.
(C) Preventing unauthorized exploitation of bio-resources and traditional knowledge.
(D) Control of Genetically Modified Crops.

148. Agrochemical based agriculture includes :-
(A) Fertilisers and pesticides
(B) Genetically modified crops
(C) RNA interference
(D) DNA interference

149. Species diversity increase as one proceeds from
(A) high altitude to low altitude and high latitude to low latitude.
(B) low altitude to high altitude and high latitude to low latitude.
(C) low altitude to high altitude and low latitude to high latitude.
(D) high altitude to low altitude and low latitude to high latitude.

150. 'Flocs' refer to
(A) Masses of bacteria associated with fungal filaments to from mesh-like sturcture
(B) Primary sluge formed in the ETP
(C) The remainng part of the sludge
(D) 'Biogases' formed from the fermentation of organix waste

ZOOLOGY

Section-A

151. Animals belonging to phylum Chordata are fundamentally characterised by the presence of a :
(A) Dorsal solid nerve cord
(B) Single hollow nerve cord
(C) Double ventral nerve cord
(D) Single, solid and ventral nerve cord

152. Find out the correctly matched pairs :
(P) Poikilothermous - Birds and mammals
(Q) Agnatha - Petromyzon and Myxine
(R) Tunicates - Salpa and Doliolum
(S) Cartilaginous fishes - Betta and Labeo
(A) P and Q (B) P, Q and R
(C) Q and R (D) P, Q and S

153. Which Epithelial tissue having thin flat cells and is involved in forming a diffusion boundary ?
(A) Cuboidal Epithelium
(B) Columnar Epithelium
(C) Ciliated Epithelium
(D) Squamous Epithelium

154. Which cells of connective tissue are involved in formation of collagen and elastin ?
(A) Macrophages (B) Fibroblasts
(C) Mast cells (D) Chondrocytes

155. Main excretory product of cockroach is :
(A) Urea (B) Ammonia
(C) Uric acid (D) Amino acid

156. Read the below statements and find out True (T) and False (F) and select the correct option:
(i) Amylase hydrolyzes proteins into amino acids
(ii) Pancreatic amylase hydrolyses polysaccharides to disaccharides
(iii) Enteropeptidase activates pepsinogen to pepsin
(iv) Trypsin coagulates the milk protein casein

	(i)	(ii)	(iii)	(iv)
(A)	T	T	F	F
(B)	F	T	F	T
(C)	F	T	F	F
(D)	F	T	T	F

157. The most important muscular structure in respiratory system of human is _____ .
(A) External intercostal muscles
(B) Internal intercostal muscles
(C) Diaphragm
(D) Vertebral column

158. Which of the following structure is not supported by incomplete cartilaginous rings ?
(A) Trachea
(B) Secondary bronchi
(C) Alveolar duct
(D) Primary bronchi

159. Match the columns and choose correct option:

Column I	Column II
1. Superior Vena Cava	a. Carries deoxygenated blood to lungs
2. Inferior Vena Cava	b. Carries oxygenated blood from lungs
3. Pulmonary Artery	c. Brings deoxygentated blood from lower parts of body to right atrium
4. Pumonary Vein	d. Brings deoxygenated blood from upper parts of body into right atrium

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

160. In a healthly individual, normal cardiac output is :
(A) 15 Litres/min. (B) 5 Litres × 72/min.
(C) 5 Litres/min. (D) 5/72 Litres/min.

161. Other than the kidneys, which of the following organs also help in the elimination of excretory wastes ?
a. Lungs b. Liver
c. Sweat glands d. Sebaceous glands
(A) a only (B) a and b
(C) a, b and c (D) a, b, c and d

162. Which one of the following group is having ureotelic animals ?
(A) Mammals, many terrestrial amphibians and marine fishes
(B) Primates, all amphibians, aquatic arthropods
(C) Protochordates, fishes, aves
(D) Birds, bony fishes, aquatic arthropods

163. The muscles involved in the transportation of food through digestive tract and in changes of body postures are respectively :-
(A) Cardiac and skeletal
(B) Smooth and skeletal
(C) Skeletal and unstriated
(D) Unstriated only

164. How many tarsal bones are present in each hind limb ?
(A) 14 (B) 7 (C) 6 (D) 5

165. Match the below columns and identify the correct option :

Parts of human brain	**Functions**
1. Cerebrum	(i) Controls urge for drinking
2. Cerebellum	(ii) Controls gastric secretions
3. Hypothalamus	(iii) Controls the rate Of heart beat
4. Medulla	(iv) Memory and communication
	(v) Maintains body posture

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

166. Cochlea of ear is divided into three chambers by two membranes. These are :
(A) Basilar membrane and Tectorial membrane
(B) Basilar membrane and Otolith membrane
(C) Otolith membrane and Tectorial membrane
(D) Basilar membrane and Reissner's membrane

167. Which one pituitary hormone controls the protein metabolism and growth of skeleton ?
(A) Adrenaline
(B) Thyrocalcitonin
(C) Growth hormone
(D) Oxytocin

168. The function of norepinephrine is :
(A) Almost similar to epinephrine
(B) Similar to ADH
(C) Opposite to epinephrine
(D) Opposite to ADH

169. In gametogenesis, reduction division take place during :
(A) Multiplication phase
(B) Growth phase
(C) Maturation phase
(D) Insemination

170. Find out the correct sequence of secreted hormone from beginning of menstruation :
(A) FSH $\rightarrow$ progesterone $\rightarrow$ estrogen
(B) Estrogen $\rightarrow$ FSH $\rightarrow$ progesterone
(C) FSH $\rightarrow$ estrogen $\rightarrow$ progesterone
(D) Esterogen $\rightarrow$ progesterone $\rightarrow$ FSH

171. In which of the following stage of embryonic development, differentiation of cells occur ?
(A) Blastula (B) Morula
(C) Gastrula (D) Neurula

172. Which of the below statement is correct regarding IUDs ?
(A) IUDs are generally inserted by the user herself
(B) IUDs increase phagocytosis reaction in the uterus
(C) IUDs suppress gametogenesis
(D) IUDs once inserted need not be replaced

173. Find out the incorrect statement with respect to MTP :
(A) MTPs are considered relatively safe upto 24 weeks of pregnancy
(B) Government of India legalised MTP in 1971
(C) Nearly 25 to 30 million MTPs are performed in a year all over the world
(D) Both (A) and (C)

174. Theory of special creation was greatly challenged during :
(A) 19th Century (B) 18th Century
(C) 17th Century (D) 20th Century

175. When more than one adaptive radiations appear in an isolated geographical area, than it is called :
(A) Natural selection
(B) Convergent evolution
(C) Divergent evolution
(D) Retrogressive evolution

176. Variations through mutations are :
(A) Random and directionless
(B) Random and directional
(C) Random and small
(D) Random, small and directional

177. Which of the following statement is not related with Lamarckian theory ?
(A) Direct effect of environment or environmental pressure causes variation
(B) Survival of fittest
(C) Inheritance of acquired character
(D) If an organ is used constantly it will continuously increase its size.

178. The chemical test that is used for diagnosis of typhoid is :
(A) ELISA Test (B) ESR Test
(C) PCR Test (D) Widal Test

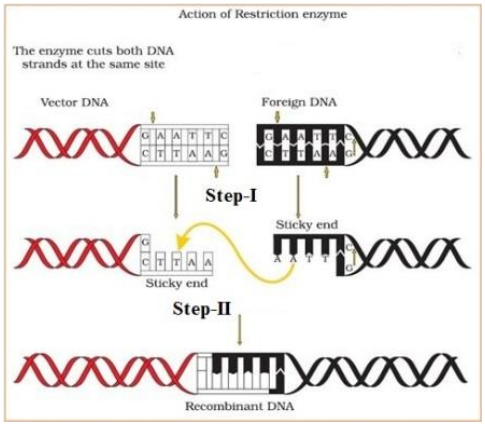
179. Which the following statement is correct regarding immunity ?
(A) Acquired immunity is a non-specific type of defence
(B) Innate immunity is present at the time of birth
(C) Innate immunity is characterised by memory
(D) All of the above

180. Which of the following statements is incorrect ?
(A) The principle of immunisation or vaccination is based on the property of 'memory' of the immune system
(B) The use of adrenalin quickly reduce the symptoms of allergy
(C) Active immunity is slow and takes time to give its full effective response
(D) Antitoxin is a preparation containing antigens to the toxin

181. Read the below statements and select the correct option regarding the characteristics of acquired immunity:
(i) Cell-mediated immunity is responsible for graft rejection
(ii) It produces a primary response of low intensity
(iii) Active and passive immunity are types of acquired immunity
(iv) Polymorphonuclear leucocytes (PMNL) and natural killer cells are involved in acquired immunity
(A) (i), (ii) and (iii) (B) (i), (iii) and (iv)
(C) (i) and (iv) only (D) (i) and (iii) only

182. Read the below statements and find out the correct option:
(i) It is estimated that more then 70 % of the world livestock population is in India and China
(ii) Poultry is the class of domesticated fowl (birds) used for food or for their eggs
(iii) Out-breeding is the breeding between closely related animals
(iv) Cross-breeding allows the desirable qualities of same breeds to be combined
(A) (i) and (ii) (B) (iii) and (iv)
(C) (i) and (iv) (D) (ii) and (iii)

183. Study the given diagram and identify the enzymes A and B involves in steps I and II.



	Step I	Step II
(A)	Eco RI	DNA ligase
(B)	Pst I	DNA ligase
(C)	Hind II	DNA polymerase
(D)	Restriction endonuclease	DNA polymerase

184. Erythrocytes are

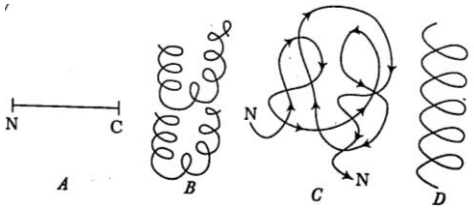
(A) Non-living cells, as nucleus absent

(B) Living cells, as nucleus present

(C) Non-living cells to carry oxygen

(D) Living cells, as metabolism present

185. What kind of structures of proteins are shown in the figure given below ?



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

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

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

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

(Section-B)

186. Which of the following are the characteristic feature of Echinodermata ?

(A) Smooth skin and radial symmetry

(B) Spiny skin and radial symmetry

(C) Spiny skin and bilateral symmetry

(D) Smooth skin and bilateral symmetry

187. In jaundice, _____ is affected, skin and eyes turn yellow due to the deposit of bile pigments.

(A) Liver

(B) Intestine

(C) Brain

(D) Pancreas

188. Find out incorrect statement about red muscle fibers ?

(i) More myoglobin found

(ii) More mitochondria found

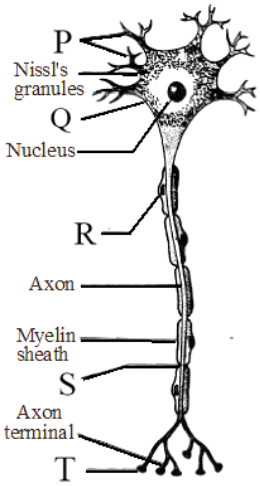
(iii) More sarcoplasmic reticulum found

(iv) Depend on anaerobic process for energy

(A) (i), (ii) (B) (iii), (iv)

(C) (ii), (iii) (D) (iv) only

189. Identify A to E in below diagram of neuron structure and choose correct option.



	P	Q	R	S	T
(A)	Nerve fibre	Cyton	Schwann cell	Node of ranvier	Synaptic vesicle
(B)	Dendrites	Cyton	Schwann cell	Node of ranvier	Synaptic knob
(C)	Dendrites	Nerve cell	Schwann cell	Node of ranvier	Synaptic knob
(D)	Dendrites	Cyton	Nerve cell	Node of ranvier	Synaptic vesicle

190. Which of the following male reproductive gland is unpaired ?

(A) Seminal vesicle (B) Cowper's gland

(C) Prostate gland (D) Lacrimal gland

191. Which of the following method is not legitimate for reducing birth rate ?
(A) Ban on marriages
(B) Sterilisation method
(C) Use of IUDs
(D) Use of contraceptive pills

192. Evolutionary biology is :
(A) Study of history of life forms on earth
(B) Understanding life
(C) Study of organisms habitat
(D) Study of history of life forms in universe

193. _____ is the most primitive ancestor of man ?
(A) Homo habilis
(B) Ramapithecus
(C) Australopithecus
(D) Homo neanderthalensis

194. Level of which hormones get elavated by the intake of nicotine?
(A) FSH, LH
(B) Thyroxine, progesterone
(C) Oxytocin, prolactin
(D) Adrenaline, nor-adrenaline

195. '*Hisardale*' is a breed of sheep developed by crossing :-
(A) Bikaneri ewes and marino rams
(B) Marino ewes and bikaneri rams
(C) Deccani ewes and bikaneri rams
(D) Marino ewes and Deccani rams

196. Which of the following is correct source for morphine and charas respectively?
(A) *Claviceps* and *Papaver somniferum*
(B) *Claviceps* and Coca plant
(C) *Papaver somniferum* and *Cannabis*
(D) *Cleviceps* and *Cannabis*

197. A women that cannot produce ovum but can provide suitable environment for fertilisation and further development. Which method can be used in this condition ?
(A) IUD (B) GIFT (C) IUI (D) ICSI

198. During pregnancy, which of the following placental hormone takes over the function of LH and maintains corpus luteum ?
(A) Human chorionic somatomammotropin
(B) Human chorionic corticotropin
(C) Human chorionic thyrotropin
(D) Human chorionic gonadotropin

199. Eli Lilly is
(A) A girl in which gene therapy was recently conducted
(B) An American company related to recombinant insulin production
(C) An American company related to gene therapy
(D) A plant related to cancer drug

200. Transgenic mice are being used for testing of polio vaccine, in place of
(A) Monkeys (B) Cattles
(C) Pigs (D) Rabbits