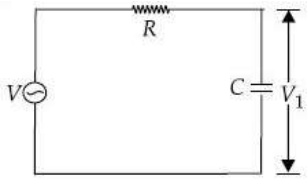
PHYSICS

1. A current of 5.0 A is passed through the coil of a galvanometer having 500 turns and each turn has an average area of 3×10^{-4} m^2. If a torque 1.5 N m is required for this coil carrying same current to set it parallel to a magnetic field, the strength of the magnetic field is

(A) 2 T (B) 5 T
(C) 3 T (D) 1 T

2. In the circuit shown, the voltage V_1, across capacitor C



(A) is in phase with the source voltage V
(B) leads the source voltage V by 90°
(C) leads the source voltage V by an angle between 0° and 90°
(D) lags behind the source voltage V by an angle between 0° and 90°.

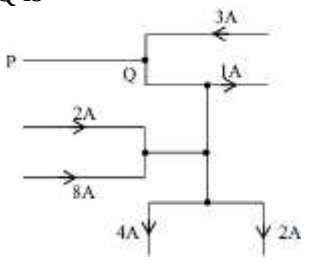
3. The electric potential V at any point (x, y, z) in space is given by $V = 4x^2V$. The electric field at the point (1 m, 0, 2 m) in V m^{-1} is

(A) $-8\hat{i}$ (B) $+8\hat{i}$
(C) $-16\hat{i}$ (D) $16\hat{k}$

4. A transformer with efficiency 80% works at 4 kW and 100 V. If the secondary voltage is 200 V, then the primary and secondary currents are respectively.

(A) 40 A, 16 A (B) 16 A, 40 A
(C) 20 A, 40 A (D) 40 A, 20 A

5. Figure below shows a portion of an electric circuit with the currents in amperes and their directions. The magnitude and direction of the current in the portion PQ is



(A) 0 A (B) 3 A from P to Q
(C) 4 A from Q to P (D) 6 A from Q to P

6. A radioactive nucleus undergoes a series of decay according to the scheme

$$A \xrightarrow{\alpha} A_1 \xrightarrow{\beta} A_2 \xrightarrow{\alpha} A_3 \xrightarrow{\gamma} A_4$$

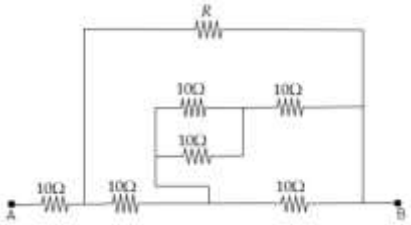
If the mass number and atomic number of A are 180 and 72 respectively, then what are these numbers for A_4.

(A) 172 and 69 (B) 174 and 70
(C) 176 and 69 (D) 176 and 70

7. The reactance of a capacitance *C* is *X*. If both the frequency and capacitance be doubled, then new reactance will be

(A) X (B) 2X
(C) 4X (D) $\frac{X}{4}$

8. For what value of R the net resistance of the circuit will 18 Ω ?



(A) 8 Ω (B) 10 Ω
(C) 16 Ω (D) 24 Ω

9. The semiconductor at room temperature

(A) the valence band is partially empty and the conduction band is partially filled.
(B) the valence band is completely filled and the conduction band is partially filled.
(C) the valence band is completely filled.
(D) the conduction band is completely empty.

10. After absorbing a slowly moving neutron of mass m_N (momentum ~ 0) a nucleus of mass M breaks into two nuclei of masses m_1 and $5m_1$ ($6m_1 = M + m_N$), respectively. If the de Broglie wavelength of the nucleus with mass m_1 is λ, then de Broglie wavelength of the other nucleus will be

(A) 25λ (B) 5λ
(C) $\frac{\lambda}{5}$ (D) λ

11. The refractive index of a material of a plano concave lens is 5/3, the radius of curvature is 0.3 m. The focal length of the lens in air is

(A) – 0.45 m (B) – 0.6 m
(C) – 0.75 m (D) – 1.0 m

12. When a battery connected across a resistor of 16 Ω, the voltage across the resistor is 12 V. When the same battery is connected across a resistor of 10 Ω, voltage across it is 11 V. The internal resistance of the battery is

(A) $\frac{10}{7}\Omega$ (B) $\frac{20}{7}\Omega$

(C) $\frac{25}{7}\Omega$ (D) $\frac{30}{7}\Omega$

13. In the Davission and Germer experiment, the velocity of electrons emitted from the electron gun can be increased by

(A) increasing the potential difference between the anode and filament
(B) increasing the filament current
(C) decreasing the filament current
(D) decreasing the potential difference between the anode and filament

14. A coil has 1,000 turns and 500 cm^2 as its area. The plane of the coil is placed at right angles to a magnetic field of 2×10^{-5} Wb m^{-2}. The coil is rotated through 180° in 0.2 s. The average emf induced in the coil is

(A) 5 mV (B) 10 mV
(C) 15 mV (D) 20 mV

15. The activity of a radioactive sample is measured as N_0 counts per minute at t = 0 and N_0/e counts per minute at t = 5 minutes. The time (in minutes) at which the activity reduces to half its value is

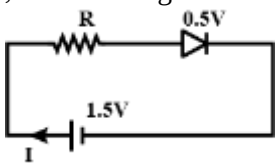
(A) $\ln\frac{2}{5}$ (B) $\frac{5}{\ln 2}$

(C) $5 \log_{10}2$ (D) $5 \ln 2$

16. A concave lens of focal length 20 cm placed in contact with a plane mirror acts as a

(A) convex mirror of focal length 10 cm
(B) concave mirror of focal length 40 cm
(C) concave mirror of focal length 60 cm
(D) concave mirror of focal length 10 cm

17. The diode used in the circuit shown in figure has a constant voltage drop at 0.5 V at all currents and a maximum power rating of 100 mW. What should be the value of the resistor R, connected in series with diode, for obtaining maximum current ?



(A) 6.76 Ω (B) 20 Ω
(C) 5 Ω (D) 5.6 Ω

18. Light from a hydrogen discharge tube is incident on the cathode of a photoelectric cell. The work function of the cathode surface is 4.2 eV. In order to reduce the photocurrent to zero, the voltage of the anode relative to the cathode must be made

(A) – 4.2 V (B) – 9.4 V
(C) – 17.8 V (D) + 9.4 V

19. The weight based ratio of U^{238} and Pb^{226} in a sample of rock is 4 : 3. If the half life of U^{238} is 4.5×10^9 years, then the age of rock is

(A) 9.0×10^9 years (B) 6.3×10^9 years
(C) 4.5×10^9 years (D) 3.78×10^9 years

20. A 16μF capacitor is charged to a 20V potential. The battery is then disconnected and a pure 40mH coil is connected across the capacitor so that LC oscillations are set up. The maximum current in the coil is

(A) 0.2 A (B) 40 mA
(C) 2 A (D) 0.4 A

21. In a common emitter amplifier, using output resistance of 5000 Ω and input resistance of 2000 Ω, if the peak value of input signal voltage is 10 mV and β = 50, then peak value of output voltage is

(A) 5×10^{-6} V (B) 12.5×10^{-4} V
(C) 1.25 V (D) 125 V

22. The maximum wavelength of radiation that can produce photoelectric effect in certain metal is 200 nm. The maximum kinetic energy acquired by electron due to radiation of wavelength 100 nm will be

(A) 12.4 eV (B) 6.2 eV
(C) 100 eV (D) 200 eV

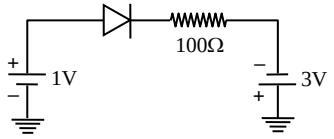
23. The magnifying power of a telescope is 9. When it is adjusted for parallel rays the distance between the objective and eyepiece is 20 cm. The focal length of lenses are

(A) 10 cm, 10 cm (B) 15 cm, 5 cm
(C) 18 cm, 2 cm (D) 11 cm, 9 cm

24. In Young's double slit experiment, the distance between two sources is 0.1 mm. The distance of the screen from the source is 20 cm. Wavelength of light used is 5460 Å. The angular position of the first dark fringe is

(A) 0.08° (B) 0.16°
(C) 0.20° (D) 0.32°

25. What is the current through an ideal p – n junction diode shown below?



(A) Zero (B) 10 mA
(C) 20 mA (D) 40 mA

26. Match the quantities of Column I with their values in Column II and choose the correct option from the codes given below

	Column I		Column II
A.	Planck constant	1.	$\frac{h}{p}$
B.	Stopping potential	2.	$E_0 - KE_{max}$
C.	Work function	3.	$\frac{KE_{max}}{e}$
D.	de-Broglie wavelength	4.	$\frac{E}{v}$

Codes

(A) A – 1, B – 3, C – 2, D – 4

(B) A – 3, B – 2, C – 1, D – 4

(C) A – 4, B – 3, C – 1, D – 2

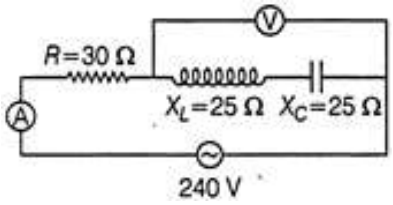
(D) A – 4, B – 3, C – 2, D – 1

27. A voltmeter has a resistance of 90 Ω is connected across a cell of emf 10 V and internal resistance 10 Ω. The voltmeter reads the voltage of

(A) 12 V (B) 6 V

(C) 3 V (D) 9 V

28. In the given circuit (as shown in the figure) neglecting source resistance, then voltmeter and ammeter reading will be



(A) 120 V, 3A (B) 120 V, 6A

(C) 0V, 8A (D) 0V, 3A

29. Electron revolving in circular path of radius r with speed υ produced magnetic field *B* at centre. Then, correct relation among υ, *B* and *r* is

(A) $B \propto \frac{1}{v^2} \propto r^2$ (B) $B \propto v^2 \propto \frac{1}{r^2}$

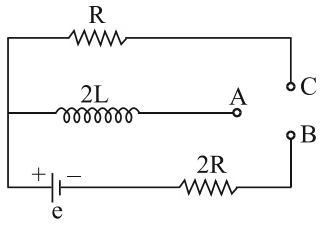
(C) $B \propto v \propto \frac{1}{r^2}$ (D) $B \propto \frac{1}{v} \propto \frac{1}{r^2}$

30. Electron in hydrogen atom first jumps form third excited state to second excited state and then from second excited state to first excited state, then the ratio of wavelengths $\lambda_1 : \lambda_2$ emitted in two cases is

(A) 27 : 5 (B) 7 : 5

(C) 20 : 7 (D) 27 : 20

31. In the circuit shown below, A is joined to B for a long and then, A is joined to C. The total heat produced in R is



(A) $\frac{Le^2}{8R^2}$ (B) $\frac{Le^2}{2R^2}$

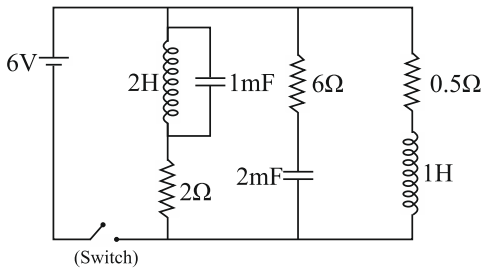
(C) $\frac{Le^2}{4R^2}$ (D) $\frac{Le^2}{R^2}$

32. The width of one slit is double the another slit in Young's double slit experiment, then the ratio of maximum intensities to minimum intensities in the interference pattern is

(A) 9 : 1 (B) 1 : 9

(C) 3 : 1 (D) 1 : 3

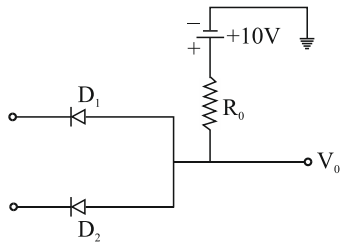
33. In the following circuit, current through 2Ω resistor just after switch closed is



(A) 3A (B) 2.25A

(C) 0.71A (D) 0A

34. The name of the following gate that the circuit shown in the figure



(A) AND gate (B) OR gate

(C) NOT gate (D) NOR gate

35. A ray of light falls on a transparent glass slab of refractive index 1.73. If the reflected ray and the refracted ray are mutually perpendicular, the angle of incidence is

(A) 30° (B) 48°

(C) 60° (D) 75.2°

36. When a proton is released from rest in a room, it starts with an initial acceleration a_0 towards west. When it is projected towards north with a speed v_0 it moves with an initial acceleration $3a_0$ towards west. The electric and magnetic fields in the room are respectively

(A) $\frac{ma_0}{e}$ west, $\frac{2ma_0}{ev_0}$ down

(B) $\frac{ma_0}{e}$ east, $\frac{3ma_0}{ev_0}$ up

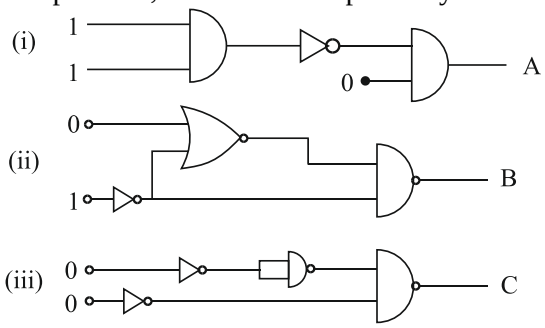
(C) $\frac{ma_0}{e}$ east, $\frac{3ma_0}{ev_0}$ down

(D) $\frac{ma_0}{e}$ west, $\frac{2ma_0}{ev_0}$ up

37. There are 20 cells connected in series, each having emf E and internal resistance r. Some of cells are connected wrongly, A battery of emf 3E and internal resistance 5r is connected with above arrangement, then an ammeter reads 5A, when both add each other and 3A, when both oppose each other. Then, number of cells wrongly connected is

(A) 2 (B) 3
(C) 5 (D) 4

38. In the following combinations of logic gates, the output of A, B and C are respectively



Codes

(A) A – 0, B – 0, C – 0
(B) A – 0, B – 1, C – 1
(C) A – 1, B – 0, C – 0
(D) A – 1, B – 1, C – 1

39. The value of electric field inside the capacitor is 50 V/m. If a dielectric material of dielectric constant 6.5 is filled between the plates of capacitor, then the magnitude of polarisation is

(A) 300 (B) 375
(C) 275 (D) 325

40. A photodetector used to detect the wavelength of 1700 nm, has energy gap of about

(A) 0.82 eV (B) 0.73 eV
(C) 1.13 eV (D) 0.92 eV

41. A charge of q μC is placed at the centre of the line joining two exactly equal positive charge of 60 μC. The system of the three charges will be in equilibrium, if the value of charge q is

(A) 45μC (B) 25μC
(C) 60μC (D) –15μC

42. In the potentiometer experiment, electron in the potentiometer wire experiences a force 4.8×10^{-19} N. The length of potentiometer wire is 4m. The emf of the battery connected across the potentiometer wire is
[given, $e = 1.6 \times 10^{-19}$ C]

(A) 12 V (B) 9 V
(C) 16 V (D) 6 V

43. A magnetic needle lying parallel to a magnetic field requires W units of work to turn it through 60°. What is the torque needed to maintain the needle in this position?

(A) W (B) $\sqrt{2}$ W
(C) $\sqrt{3}$ W (D) 2W

44. Which of the following transitions gives photon of maximum energy?

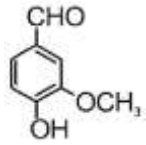
(A) n = 2 to n = 1 (B) n = 1 to n = 2
(C) n = 2 to n = 6 (D) n = 6 to n = 2

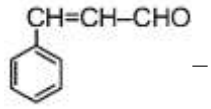
45. Two polaroids P_1 and P_2 are placed with their axis perpendicular to each other. Unpolarised light of intensity I_0 is incident on P_1. A third polaroid P_3 is kept between P_1 and P_2, such that its axis makes an angle 45° with that of P_1. The ratio of intensity of transmitted light to unpolarised light is

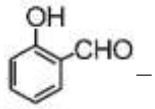
(A) $\frac{1}{4}$ (B) $\frac{1}{2}$
(C) $\frac{1}{8}$ (D) $\frac{1}{16}$

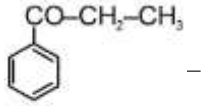
46. Butanol-1 can be synthesized by:
(A) Hydroboration oxidation of butene-1
(B) Reduction of $CH_3CH_2–CH_2–COOH$ by $NaBH_4$
(C) Reduction of $CH_3–CH_2–CH_2–COOCH_3$ by $NaBH_4$
(D) All of these

47. Which one of the incorrect matching?

(A)  - Vanillin

(B)  – Present in cinnamon

(C)  – Present in meadow sweet

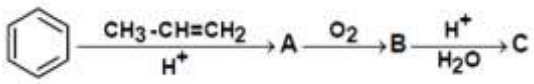
(D)  – Called as propio benzenone

48. At equilibrium which can't be zero
(A) E_{cell} (B) ΔG_{cell}
(C) ΔS (D) $\Delta G°_{cell}$

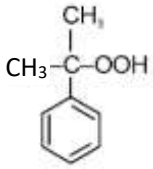
49. The correct equation is
(A) $\Lambda°_{NaBr} - \Lambda°_{KBr} = \Lambda°_{NaCl} - \Lambda°_{KBr}$
(B) $\Lambda°_{NaBr} - \Lambda°_{KBr} = \Lambda°_{NaCl} - \Lambda°_{KCl}$
(C) $\Lambda°_{NaCl} - \Lambda°_{KBr} = \Lambda°_{NaCl} - \Lambda°_{KCl}$
(D) $\Lambda°_{KBr} - \Lambda°_{NaBr} = \Lambda°_{KCl} - \Lambda°_{HBr}$

50. Choose the correct statements:
(i) Dipole moment of phenol is less than cyclohexanol.
(ii) Phenol is acidic in nature due to resonance.
(iii) Boiling point of isobutyl alcohol is less than tertiary butyl alcohol.
(iv) Isobutyl alcohol is primary alcohol.
(A) i, iii, iv (B) ii, iv
(C) i, ii, iv (D) i, ii, iii, iv

51. Molarity and molality of a solution of a liquid (mol. wt. = 50) in aqueous solution is 9 and 10 respectively. What is the density of solution?
(A) 1 g/cc (B) 0.95 g/cc
(C) 1.05 g/cc (D) 1.35 g/cc

52. 

Select the correct statement about above reaction:
(A) A is cumene

(B) B is 

(C) C is phenol
(D) All are correct

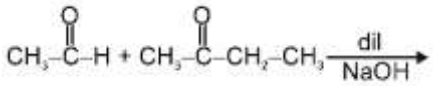
53. The electrophile in Kolbe reaction is :
(A) CCl_4 (B) CO_2
(C) H^+ (D) None of these

54. The freezing point (°C) of a solution containing 0.1 g of $K_3[Fe(CN)_6]$ (molecular weight 329) in 100g of water
(K_f =1.86 K kg mol^{-1}) : -
(A) -2.3×10^{-2} (B) -5.7×10^{-2}
(C) -5.7×10^{-3} (D) -1.20×10^{-2}

55. The resistance of 0.5 M solution of an electrolyte in a cell was found to be 50 Ω. If the electrodes in the cell are 2.2 cm apart and have an area of 4.4 cm^2 then the molar conductivity (in S m^2 mol^{-1}) of the solution is
(A) 0.2 (B) 0.02
(C) 0.002 (D) None of these

56. A solution containing one mole per litre each of AX, BX, CX_2 and DX_2 is electrolysed using inert electrodes. The values of the standard potentials for reduction reactions of A^+ | A, B^+ | B, C^{2+} | C and D^{2+}| D at 25°C are + 0.80, + 0.34, –0.76 and – 1.66V respectively. The correct sequence in which these metals will be deposited on the cathode is
(A) A B C D (B) D C B A
(C) A C B D (D) D B C A

57. How many types of aldols are formed in following reaction?

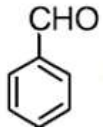


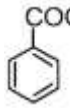
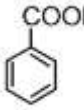
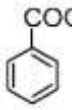
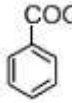
(A) 2 (B) 4
(C) 6 (D) 8

58. Which of the following techniques is based on adsorption phenomenon?
(A) Gas chromatography
(B) Pollution control technique
(C) Purification process in chemical industry
(D) All of these

59. Which of the following has minimum flocculation value of positively charged sol?
(A) Cl^- (B) SO_4^{2-}
(C) PO_4^{3-} (D) $[Fe(CN)_6]^{4-}$

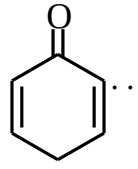
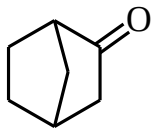
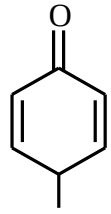
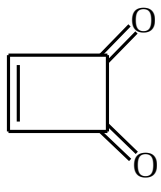
60. All aldehydes reduces :
(A) Tollen's reagent
(B) Fehling solution
(C) Benedict solution
(D) All of the above

61. 

$+[Ag(NH_3)_2]^+ + OH^- \rightarrow A + B + NH_3 + H_2O$
Identify A and B.
(A)  and NH_4^+
(B)  and Ag
(C)  and Ag
(D)  and Ag

62. KI and $CuSO_4$ solutions on mixing produces
(A) Cu_2I_2 only (B) $Cu_2I_2 + KI_3 + K_2SO_4$
(C) K_2SO_4 only (D) $CuI_2 + KI_3 + K_2SO_4$

63. For a weak electrolyte A_2B_3, where A is trivalent cation and B is divalent anion, if the degree of dissociation is 'α' then van't Hoff factor is given as
(A) $4 + \alpha$ (B) $1 + 4\alpha$
(C) $1 + 2\alpha$ (D) $1 + \alpha$

64. Which of the following compounds cannot show keto-enol form?
(A) 
(B) 
(C) 
(D) 

65. $CH_3 - CH_2OH \xrightarrow{PCC} A$
$\downarrow KMnO_4$
B
Identify A and B compounds respectively:
(A) CH_3COOH and CH_3CHO
(B) CH_3COOH and CH_3COOH
(C) CH_3CHO and CH_3COOH
(D) CH_3CHO and CH_3CHO

66. The rate of formation of B $\left(\frac{d[B]}{dt}\right)$ in the following reaction with respect to A is
$3A \rightarrow 2B$
(A) $\frac{-3}{2}\frac{d[A]}{dt}$ (B) $\frac{-1}{2}\frac{d[A]}{dt}$
(C) $\frac{-1}{3}\frac{d[A]}{dt}$ (D) $\frac{-2}{3}\frac{d[A]}{dt}$

67. If 70 % of first order reaction was completed in 52 minutes, 50% of the same reaction would be completed in approximately (log 3 = 0.47)
(A) 30 minutes (B) 42 minutes
(C) 40 minutes (D) 52 minutes

68. Select the incorrect statement about ozone.
(A) Its formation is endothermic
(B) During its formation from oxygen entropy increases
(C) Its pure liquid form is dark blue
(D) It is thermodynamically unstable

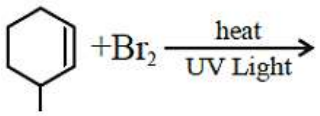
69. Select the correct option (s) about SO_2 molecule
(A) It is angular
(B) It has two canonical forms
(C) Its liquid solution is used as solvent to dissolve organic and inorganic compounds
(D) All of these

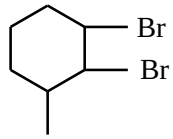
70. If NaCl is droped with 10^{-5} mol% of $SrCl_2$, the concentration of cation vacancies will be
($N_A = 6.02 \times 10^{23}\ mol^{-1}$)
(A) $6.02 \times 10^{23}\ mol^{-1}$
(B) $6.02 \times 10^{16}\ mol^{-1}$
(C) $6.02 \times 10^{27}\ mol^{-1}$
(D) $6.02 \times 10^{14}\ mol^{-1}$

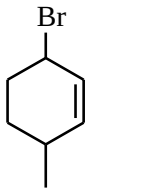
71. In which case alkylamine is not formed?
(A) $R - X + NH_3 \rightarrow$
(B) $R{-}CH = NOH + [4H] \xrightarrow[C_2H_5OH]{Na}$
(C) $R{-}CN + H_2O \xrightarrow{H^+}$
(D) $RCONH_2 + 4[H] \xrightarrow{LiAlH_4}$

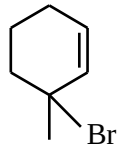
72. In a solid, A atoms are in FCC arrangement. B atoms are at edge centre. If one of A atoms at corner is missing and one atom of type B is replaced by C then what is formula of compound?
(A) $A_{31}B_{22}C_2$ (B) $A_7B_{22}C_2$
(C) $A_{24}B_{22}C_2$ (D) ABC

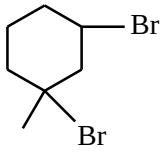
73. Product of this reaction is



(A) 

(B) 

(C) 

(D) 

74. Which one of the following is antibiotic?
(A) Aspirin (B) Brufen
(C) Chloromycetin (D) Chloroquine

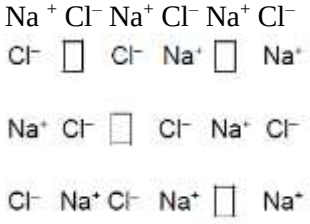
75. Which of the following gas can be dried by conc.H_2SO_4?
(A) HCl (B) HBr
(C) HI (D) H_2S

76. In which of the following ions, the colour is not due to d-d transition?
(A) $[Co(NH_3)_6]^{3+}$ (B) $[Fe(CN)_6]^{3-}$
(C) MnO_4^- (D) $[Mn(H_2O)_6]^{2+}$

77. Which of the following does not decolourise iodine?
(A) Na_2SO_3 (B) $Na_2S_2O_3$
(C) NaCl (D) NaOH

78. Which of the following species have S-S single bond?
(A) $H_2S_2O_7$ (B) $H_2S_2O_8$
(C) $H_2S_2O_3$ (D) $H_2S_2O_6$

79. What type of crystal defect is indicated in the diagram below :



(A) Frenkel defect
(B) Schottky defect
(C) Interstitial defect
(D) Frenkel and Schottky defects

80. The catalytic activity of transition metals and their compounds is ascribed mainly to :
(A) their magnetic behaviour
(B) their unfilled d-orbitals
(C) their ability to adopt variable oxidation states
(D) their chemical reactivity

81. In alkaline medium, iodide ion is changed in following compounds by $KMnO_4$:
(A) I_2 (B) KI
(C) IO_2^- (D) IO_3^-

82. The most characteristic oxidation state of lanthanides is :
(A) +2 (B) +3
(C) +4 (D) None

83. Element which has one electron in '5s' orbital is
(A) Cd (B) Y
(C) Ag (D) Zr

84. Which of the following complex shows G.I.?
(A) $[Ma_4]$ (B) $[Ma_5b]$
(C) $[Ma_4b_2]$ (D) $[M(\widehat{AA})_2]$

85. Which of the following complexes will show optical isomerism?
(A) $[Cr(NH_3)_6]^{2+}$ (B) $[Ni(H_2O)_6]^{2+}$
(C) $[Pt(NH_3)_3Br]NO_3$ (D) $[Cr(en)_3]Cl_3$

86. Crystal field stabilization energy for complex $[Co(CN)_6]^{-3}$ will be :-
(A) $-2.4\,\Delta_0 + 2P$ (B) $+2.4\,\Delta_0 + 2P$
(C) $-3.6\,\Delta_0 + 2P$ (D) $-1.8\,\Delta_0 + 2P$

87. In the metallurgy of iron, when limestone is added to the blast furnace, the calcium ions end up in :-
(A) Calcium silicate (Slag)
(B) Gangue
(C) Metallic calcium
(D) Calcium carbonate

88. Which is amorphous solid among the following?
(A) NaCl (B) CaO
(C) Rubber (D) ZnS

89. Arrange compounds in order of increasing boiling points.
(i) 1-Chloropropane,
(ii) Isopropyl chloride,
(iii) 1-Chlorobutane
(A) 2, 1, 3 (B) 3, 2, 1
(C) 1, 2, 3 (D) 1, 3, 2

90. The number of unpaired electrons in gaseous species of Mn^{3+}, Cr^{3+} and V^{3+} respectively are:
(A) 4, 4 and 2 (B) 3, 3 and 2
(C) 4, 3 and 2 (d) 3, 3 and 3

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91. The male gametes of rice plant have 12 chromosomes in their nucleus. The chromosome number in the female gametes, zygote and the cells of the seeding will be, respectively
(A) 12, 24, 12 (B) 24, 12, 12
(C) 12, 24, 24 (D) 24, 12, 24

92. Device to discourage self-pollination or increase cross-pollination
(A) Pollen release and stigma receptivity are not synchronized
(B) Anther and stigma placed at different position
(C) Same height of stamen and stigma
(D) Both a and b

93. The events in pollen-pistil interaction are given below
I. Pollen grain germinates to form pollen tube
II. Pollen tube enters the ovule through micropyle
III. Pollen grain reaches the stigma
IV. Pollen tube grows through the tissues of stigma and style and reaches the ovary
The sequential order of their occurrence is
(A) III – I – IV – II (B) II – IV – III – I
(C) III – IV – II – I (D) II – III – I – IV

94. Autogamy can occur in a chasmogamous flower if
(A) Pollen matures before maturity of ovule
(B) Ovules mature before maturity of pollen
(C) Both pollen and ovules mature simultaneously
(D) Both anther and stigma are of equal length

95. In an embryo sac, the cells that degenerate after fertilization are
(A) Synergids and primary endosperm cell
(B) Synergids and antipodals
(C) Antipodals and primary endosperm cell
(D) Egg and antipodals

96. A multicellular, filamentous alga exhibits a type of sexual life cycle in which the meiotic division occurs after the formation of zygote, the adult filament of this alga has
(A) Haploid vegetative cells and diploid gametangia
(B) Diploid vegetative cells and diploid gametangia
(C) Diploid vegetative cells and haploid gametangia
(D) Haploid vegetative cells and haploid gametangia

97. Linked genes that were observed by Morgan were present on
(A) X-chromosomes
(B) Different chromosomes
(C) Heterologous chromosome
(D) Paired chromosomes

98. A normal woman whose father was colourblind, marries a normal man, what kinds of children can be expected and in what proportion?
(A) All daughter normal, 50 % of sons colourblind
(B) All daughter normal and all sons colourblind
(C) 50% daughters colourblind and all sons normal
(D) All daughters colourblind and all sons normal

99. Select the incorrect statement
(A) RBCs become sickle shaped under low oxygen tension in sickle cell anaemia
(B) Phenylpyruvic acid gets accumulated in brain and excreted in urine due to poor absorption by kidney
(C) In thalassemia, alpha and beta globin chains are altogether absent in body
(D) Thalassemia is an autosome linked recessive disease

100. Consider the following statements with respect to complete linkage
I. 100% parental combinations are found in F_2 generation
II. F_2 phenotypic ratio is 3:1 in dihybrid cross
III. Dihybrid test cross ratio is 3:1 in F_2 generation
IV. Linked genes tends to separate frequently
Which of the statement given above are correct?
(A) I, II, IV (B) I, III and IV
(C) II, III and IV (D) I and II

101. Which one of the following pairs is wrongly matched?
(A) XO type of sex – determination – grasshopper
(B) ABO blood grouping – codominance
(C) Starch synthesis in pea – multiple allele
(D) TH Morgan – linkage

102. Part of chromatin which is densely packed, stain darkly and is transcriptionally inactive is called
(A) Euchromatin (B) Chromatosome
(C) Heterochromatin (D) Chromosomes

103. DNA polymerase is
(A) DNA dependent (B) DNA independent
(C) RNA dependent (D) RNA independent

104. Which of the following enzymes are required in protein synthesis?
I. Ligase
II. Permease
III. Endonuclease
IV. Ribozyme
V. RNA polymerase
VI. Peptidyl transferase
VII. Amino acid activating enzyme
Choose the correct option
(A) IV, VI, and VII (B) I, II, and III
(C) II, III, IV and V (D) All of these

105. Choose the incorrect statement about the semiconservative scheme of DNA replication
(A) Watson and Crick proposed the scheme for replication of DNA in 1953
(B) The scheme suggested that the two strand would separate and act as a template for the synthesis of new complementary strand
(C) Griffith proposed the scheme of semiconservative DNA replication
(D) After the completion of replication, each DNA molecule would have one parental and one newly synthesized strand

106. Choose the incorrect statement about the experiment conducted by Meselson and Stahl's that
(A) Equal amount of light DNA and hybrid DNA was observed in E. coli culture after two generations
(B) The generation time of E. coli culture was 20 minutes
(C) The equal amount of light DNA and hybrid DNA was observed in E. coli culture after three generations
(D) Both A and B

107. If the sequence of nitrogen bases of the coding strand of DNA in a transcription unit is
5' – ATGAATG – 3'
The sequence of bases in its RNA transcript would be
(A) 5' – AUGAAUG -3'
(B) 5' – UACUUAC – 3'
(C) 5' – CAUUCAU – 3'
(D) 5' – GUAAGUA – 3'

108. The net electric charge on DNA and histones is
(A) Positive
(B) Negative
(C) Negative and positive respectively
(D) Zero

109. 250 g of Methylophilus methylotrophus bacterium has been used to produce
(A) 15 tonnes of proteins
(B) 25 tonnes to proteins
(C) 35 tonnes of proteins
(D) 50 tonnes of proteins

110. The deficiency of essential micronutrients in food may
I. Increase risk for disease
II. Reduce mental ability
III. Reduce life span
Choose the correct option
(A) I, II and III (B) I and III
(C) Only I (D) I and II

111. In mung bean, resistance to yellow mosaic virus and powdery mildew were brought about by
(A) Mutation breeding
(B) Biofortification
(C) Tissue culture
(D) Hybridization and selection

112. What would happen if oxygen availability to activated sludge flocs is reduced?
(A) It will slow down the rate of degradation of organic matter
(B) The centre of flocks will become anoxic, which would cause death of bacteria and eventually breakage of flocs
(C) Flocs would increase in size as anaerobic bacteria would grow around flocs
(D) Protozoa would grow in large numbers

113. BOD of waste water is estimated by measuring the amount of
(A) Total organic matter
(B) Biodegradable organic matter
(C) Oxygen evolution
(D) Oxygen consumption

114. Technique used to detect mutated genes is called
(A) Gel electrophoresis
(B) Polymerase chain reaction
(C) Gene therapy
(D) Autoradiography

115. Very small animals are rarely found in polar region because
(A) Small animals have a larger surface area relative to their volume, so they lose body heat very when it is cold outside
(B) Small animals have a smaller surface relative to their volume so they lose body heat very fast when it is cold outside
(C) Small body volume makes internal heat production very difficult
(D) None of the above

116. In the exponential growth equation, it b – d is represented by 'r' , then 'r' may be called as
(A) Intrinsic rate of natural increase
(B) Extrinsic rate of natural increase
(C) Morphological rate of natural increase
(D) Phenotypical rate of natural increase

117. Which of the following would necessarily decrease the density of a population in a given habitat?
(A) Natality > mortality
(B) Immigration > emigration
(C) Mortality and emigration
(D) Natality and immigration

118. Net primary productivity is equal to
(A) Organic matter synthesized by photosynthesis plus utilization in respiration and other losses
(B) Organic matter synthesized by photosynthesis minus utilization in respiration and other losses
(C) Rate of increase in body weight of producers plus loss suffered through respiration and damages

(D) Rate of resynthesis of organic matter by the consumes

119. PAR stand for
(A) Photosynthesis Active Reaction
(B) Photosynthesis Absorb Radiation
(C) Photosynthetically Active Radiation
(D) Photosynthetically active Reaction

120. Choose the incorrect option
(A) GFC(grazing food chain) begins with producers at first trophic level
(B) GFC binds up inorganic nutrients while detrius chain helps in releasing inorganic nutrients to the cycling pool
(C) Both a and b
(D) Detritus chain account for less energy flow than grazing food chain

121. Primary succession on rocks starts with
(A) Lichen (B) Grass
(C) Mosses (D) Ferns

122. Consider the following statements
I. In a food chain, one organism holds only one position
II. In a food chain the flow of energy can be easily calculated
III. In food chain, competition is limited to the members of same trophic level
Which of the statements given above are correct?
(A) I, II and III (B) I and II
(C) I and III (D) II and III

123. Exploitation of molecular, genetic and species level diversity for novel products of economic importance is known as
(A) Biopiracy (B) Bioenergetic
(C) Bioremediation (D) Bioprospecting

124. In situ strategies include
I. National parks
II. Wildlife sanctuaries
III. Biosphere reserves
IV. Sacred groves
Choose the correct option
(A) I and II (B) II, III and IV
(C) I, II and III (D) I, II, III and IV

125. Which one of the following is not used for ex situ plant conservation?
(A) Field gene bank (B) Seed bank
(C) Shifting bank (D) Botanical bank

126. Catalytic converters possesses which one of the following metals as catalyst?
(A) Platinum (B) Palladium
(C) Rhodium (D) All of these

127. The air prevention and control of pollution act came into force in
(A) 1985 (B) 1990
(C) 1975 (D) 1981

128. What step should be taken for the disposal of nuclear waste?
(A) Nuclear waste should be pre-treated
(B) It should be stored in shields containers
(C) It should be buried about 500 m deep with in rock
(D) All of the above

129. Reptiles and birds are
(A) Oviparous
(B) Viviparous
(C) Ovoviviparous
(D) Viviparous and oviparous respectively

130. Micropyle is found in
(A) Seed
(B) Ovule
(C) Both ovule and seed
(D) Fruit

131. In 1900 Mendelism was discovered by
I. Morgan II. De Vries
III. Correns IV. Tschermak
(A) I, III, IV (B) I, II, III, IV
(C) II, III, IV (D) I, II, III

132. In a family pedigree
I. Circle represent males
II. Squares represent females
III. A solid/blackened symbol represents the individual with a recessive trait always
IV. Mating is shown by a horizontal line connecting a male and a female symbol
(A) Only I (B) Only II
(C) Only III (D) Only IV

133. If the P allele is completely dominant over the p allele, what percentage of the resulting offspring will have the dominant phenotype when Pp and Pp individuals mate?
(A) 25% (B) 50%
(C) 75% (D) 100%

134. The technique of DNA fingerprinting was initially developed by
(A) Griffith (B) Mirsky
(C) Meischer (D) Alec-Jeffreys

135. Triplet codon refers to sequence of three bases on
(A) tRNA (B) rRNA
(C) mRNA (D) all of these

136. Choose the correct statement :
(A) Size of testis is 4-5 cm in length and 1 cm in width
(B) The scrotum is maintained at body temperature
(C) The testes are situated outside the abdominal cavity in humans

(D) The earliest stages of spermatogenesis occur closest to the lumen of seminiferous tubules

137. In males, excretory and reproductive systems share the:
(A) Testes (B) Vas deferens
(C) Seminal vesicle (D) Urethra

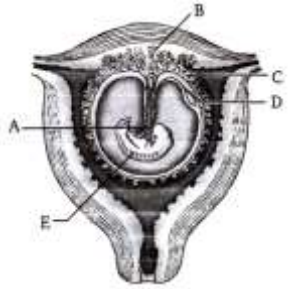
138. Seminiferous tubule :
(A) Is lined by two types of cells called spermatogonia and Sertoli cells
(B) Contains huge number of Leydig cells inside it
(C) Contains huge number of interstitial cells inside it
(D) Open directly into vasa efferentia

139. Th vulva :
(A) Consists of the external genitalia of a woman
(B) Includes mons pubis, labia majora, labia minora, clitoris and hymen
(C) Both (A) and (B)
(D) Includes mons pubis, labia majora, labia minora, clitoris and vagina

140. The part of fallopian tube near uterus is called _____ and near ovary is called _____ .
(A) Uterus; Isthmus
(B) Cervical canal; Isthmus
(C) Isthmus: Ampulla
(D) Isthmus: Infundibulum

141. In humans, during ovulation :
(A) The Graafian follicle ruptures to release the primary oocyte
(B) The Graafian follicle do not rupture
(C) Sharp decline in the level of LH and FSH occurs
(D) The Graafian follicle ruptures to release the secondary oocyte

142. Identify A, B, C, D and E in the diagram showing human foetus within the uterus :



	A	B	C	D	E
(A)	Umbilical cord	Placental villi	Yolk sac	Uterus cavity	Embryo
(B)	Placental villi	Umbilical cord	Uterus cavity	Yolk sac	Embryo
(C)	Umbilical cord	Placental villi	Uterus cavity	Yolk sac	Embryo
(D)	Umbilical cord	Placental villi	Uterus cavity	Yolk sac	Zygote

143. Chose the odd one out w.r.t. placental hormone :
(A) hCG and hPL
(B) Estrogen and progesterone
(C) Relaxin and prolactin
(D) Human placenal lactogen and progesterone

144. Match the coloumn:

	Column-I		Column-II
A.	Parturition	(i)	Milk production
B.	Lactation	(ii)	Initial milk with several antibodies, healthy protein and less fat
C.	Colostrum	(iii)	Foetus delivery
D.	Oxytocin	(iv)	Uterine contraction

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

145. Which one is true for the oral contraceptive 'SAHELI' ?
(A) It is 'once a week' pill
(B) It has multiple side effects
(C) It is non-steroidal with high contraceptive value
(D) Both (a) and (c)

146. An ideal contraceptive should:
(A) Interfere with sexual act of the user
(B) Interfere with the sexual drive of the user
(C) Always be used orally
(D) Easily available, user-friendly, effective and reversible with no side effects

147. Match the column:

	Column-I		Column-II
A.	Condom	(i)	Oral
B.	Pills	(ii)	LNG-20
C.	Implants	(iii)	Barrier
D.	IUD	(iv)	Under-skin

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

148. Which of the following is correct ?
(A) Sperms survives for about 72 hours
(B) Ova survives for about 24 hours
(C) Ovulation occurs approximately on the 14^{th} day (middle of cycle)
(D) All the above

149. In Which ART, the semen is artificially introduced into the female ?
(A) IUI (B) ET
(C) IUT (D) GIFT

150. Two contraceptive Methods that are generally irreversible and which block the gametes from moving o a site wherefertilisation can occur are :
(A) Male condom and oral contraceptives

(B) Male condom and female condom
(C) Vasectomy and tubectomy
(D) Coitus interruptus and rhythm method

151. Good health :
(A) Means absence of disease and physical fitness of the body
(B) Is the state of complete physical, mental and social well-being
(C) Increases longevity of people and reduces infant and material mortality
(D) Is related to all of the above

152. The sustained fever of 39^0 - 40^0 C, weakness, stomach pain, constipation, headache and loss of appetite are the common symptoms of :
(A) Typhoid (B) Pneumonia
(C) Amoebiasis (D) Filariasis

153. The most serious type of malaria is _____ caused by _____
(A) Malignant malaria ; *Plasmodium falciparum*
(B) Quartan malaria ; *Plasmodium malaria*
(C) Benign tertian malaria; *Plasmodium ovale*
(D) Mild tertian malaria; *Plasmodium ovale*

154. Common cold infects:
(A) Lungs
(B) Nasal and respiratory passage
(C) Both (A) and (B)
(D) Lungs and heart

155. The heavy and light chains of an antibody are connected by:
(A) Phosphoester bond
(B) Phosphodiester bond
(C) Disulphide bonds
(D) Glycosidic bonds

156. In an infected human body, the 'HIV-factory' is:
(A) Sperm
(B) Ova
(C) Macrophages
(D) Helper T-lymphocytes

157. Which of the genes when activated in a normal human body can cause cancer?
(A) Cellular-oncogene
(B) c-oncogene
(C) Proto-oncogene
(D) All of these

158. Read the following statements about a drug and identify the drug.
I. These are known for their effects on cardiovascular system of the body
II. These interact with the receptors present principally in brain
III. Generally taken by inhalation and oral ingestion
(A) *Papaver sominiferum*
(B) *Erythroxylem coca*
(C) *Atropa belladona*
(D) *Cannabis sativa*

159. Insertional inactivation if related to:
(A) Microinjection
(B) Gene gum
(C) Gel electrophoresis
(D) Selection of recombinants

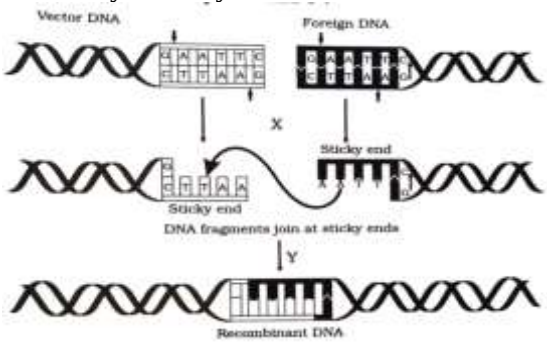
160. The DNA fragments separated can be visualised only after staining DNA with a compound followed by exposure to radiations:
(A) Methylene blue, visible
(B) Ethidium bromide, UV
(C) Giemsa, visible
(D) Quinacrine, visible

161. The techniques in which a foreign DNA if precipitated on the surface of the tungsten of gold particles and shot into the targert cells is known as:
(A) Microinjection
(B) Chemical-mediated genetic transformation
(C) Elecroporation
(D) Biolistics

162. Which of the following method can be used for making the bacterial cell 'competent'?
(A) Treating with specific concentration of divalent cation (Ca^{2+})
(B) Treating with specific concentration of monovalent cartion (K^+)
(C) Heat shock
(D) Both (A) and (C)

163. An enzyme catalysis the removal of nucleotides from the ends of DNA is:
(A Endonuclease (B) Exonuclease
(C) DNA ligase (D) Hind-II

164. The transfer of genetic material from one bacterium to identify the enzyme X and Y?

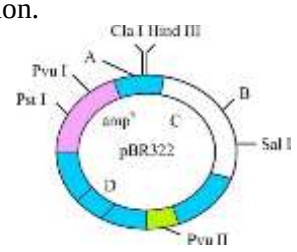


(A) X = Sma I, Y = DNA ligase
(B) X = Bam HI, Y = RNA ligase
(C) X = Eco RI, Y = DNA ligase
(D) X = Hind III, Y = RNA ligase

165. Which of the following is true for downstream processing?
(A The product is formulated with suitable preservatives
(B) The formulations undergo clinical trial in case of drugs

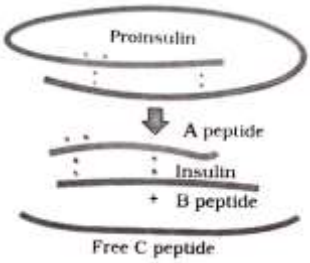
(C) Strict quality control testing for each product is done
(D) All of these

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



	A	B	C	D
(A)	Hind II	EcoR I	amp^R	Ori
(B)	Hind II	BamH I	Kan^R	amp^R
(C)	BamH I	Pst I	Ori	amp^R
(D)	EcoR I	BamH I	tet^R	ori

167. What does the diagram depicts?



(A Degradation of insulin
(B) Formation of proinsulin
(C) Maturation of pro-insulin into insulin
(D) Addition of C-peptide to proinsulin

168. Which of the following is correct?
(A A nematode *Meloidegyne incognitia* infects the roots of tobacco plants and causes a great reduction in yield
(B) Nematode infection can be prevented in tobacco plants by RNAi technology
(C) RNA interference takes place in all eukaryotic organisms as a method of cellular defence
(D) All of these

169. Which step of Government of India has taken to cater to the requirement of patent terms and other emergency provisions in regards?
(A Biopiracy act
(B) Indian Patents bill
(C) RTI act
(D) Negotiable instruments act

170. Crystals of Bt toxin produced by some bacteria do not kill the bacteria themselves because:
(A Bacteria are resistant to the toxin
(B) Toxin is immature
(C) Toxin if inactive
(D) Bacteria encloses toxin in a special sac

171. What is not true amongst the following w.r.t transgenic cows?
(A The milk had a protein called human α-lactalbumin
(B) The 1st transgenic cow was called Rosie
(C) The milk produced was more balanced for humans than ordinary cow's milk
(D) The protein content was 3.4gm/litre of the milk

172. Match the terms given in column I with their descriptions given in column II and select the correct option from the given codes.

	ColumnI		**Column II**
A.	Out-corssing	(i)	Mating of closely related individuals within the same breed
B.	Interspecific hybridisation	(ii)	Mating of animals of same breed but having no common ancestors on either side of their pedigree for 4-6 generations
C.	Cross-breeding	(iii)	Mating of animals of two different species
D.	Inbreeding	(iv)	Mating of animals belonging to different breeds

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

173. Which of the following are common freshwater fishes?
(A) Mackerel and rohu
(B) Rohu, common carp and Catla
(C) Hilsa and sardine
(D) None of these

174. According to Charles Drawin:
(A) There has been gradual evolution of life forms
(B) Every population has its own characteristics features that differ from the characteristics of other populations
(C) Both (A) and (B)
(D) He did not believe in 'descent with modification' concept

175. Read the following statements w.r.t. Industrial melanism in England.
(i) before industrialisation (1850s), there were more white-winged moths on trees than dark-winged or melanised moths
(ii) After industrialisat8ion (1920), there were more dark-winged moths in the same area
(iii) Dark-winged moths became fitter, after industrialisation, to survive and reproduce as they were better camoulflaged
(iv) Before industrialisation, thick growth of almost white-coloured lichen covered the trees in whose background the white-winged moth survived but dark-winged moth were picked by the predators

(v) In a mixed population of moths, those could better-adapt, survived and increased in population size

How many of the above statements are correct

(A) Three (B) Five
(C) Four (D) Two

176. According to Lamarckism, long necked giraffes evolved because:
(A) nature selected only long necked animals
(B) Of stretching of necks by short one over many generations
(C) Mutation
(D) Humans preferred long necked animals

177. Which of the following is correct according to Hugo de Vries?
(A) Saltation cause speciation
(B) Mutations can be predicted
(C) Natural selection is the cause of evolution but not mutation
(D) Saltation is single step minor mutation

178. Find the True (T) / false (F) statements and choose the correct option:
(I) Agriculture came around 10,000 years back and human settlement started
(II) The Neanderthal man with a brain size 1000 cc lived and near east and central asia between 1,00,000–40,000 years back
(III) During ice-age between 75,000 – 10,000 years ago modern *Homo sapiens* arose.
(IV) *Homo sapiens* arose in Africa and moved across continents and developed into distinct races

	I	II	III	IV
(A)	T	T	T	T
(B)	T	F	T	F
(C)	F	F	T	T
(D)	T	F	T	T

179. Select the analogous structures:
(A) Wings of butterfly and birds
(B) Flippers of penguins and dolphins
(C) Thorns of Bougainvillea and tendrils of Cucurbita
(D) Both A and B

180. The Tasmanian wolf is an Australian marsupial is similar in appearance to a placental wolf. This is due to the fact that:
(A) Marsupial and placental wolf are very closely related
(B) These showed divergent evolution
(C) They underwent similar selection pressure
(D) Marsupium and placenta are vestigial structures