07/04/2023

Phase-1
CODE-B

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# FINAL TEST SERIES for NEET-2023

**MM : 720** **Test-6** **Time : 3 Hrs. 20 Mins.**

**Topics covered :**

***Physics*** : Current Electricity, Moving Charges and Magnetism, Magnetism and Matter, Electromagnetic Induction

***Chemistry*** : General Principles and Processes of Isolation of Elements, p-Block Elements (Group 15-18), *d* and *f*-Block Elements, Coordination Compounds

***Botany*** : Principles of Inheritance and Variation, Molecular Basis of Inheritance

***Zoology*** : Reproductive Health, Evolution

**Instructions :**

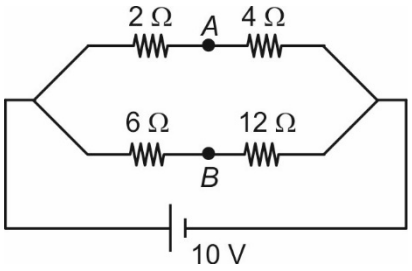
(i) There are two sections in each subject, i.e. Section-A & Section-B. You have to attempt all 35 questions from Section-A & only 10 questions from Section-B out of 15.
(ii) Each question carries 4 marks. For every wrong response 1 mark shall be deducted from the total score. Unanswered / unattempted questions will be given no marks.
(iii) Use blue/black ballpoint pen only to darken the appropriate circle.
(iv) Mark should be dark and completely fill the circle.
(v) Dark only one circle for each entry.
(vi) Dark the circle in the space provided only.
(vii) Rough work must not be done on the Answer sheet and do not use white-fluid or any other rubbing material on the Answer sheet.

## PHYSICS

**Choose the correct answer :**

### SECTION - A

1. A battery of emf 10 V is connected to resistances as shown in the figure. The potential difference between points *A* and *B* is




(1) 5 V (2) 3 V
(3) 6 V (4) Zero

2. Two bulbs *A* and *B* are respectively rated as (25 W – 220 V) and (100 W – 220 V). The ratio of resistance of bulb *A* to that of bulb *B* *i.e.* $R_A : R_B$ is

(1) 1 : 4 (2) 4 : 1
(3) 16 : 1 (4) 1 : 16

3. In a conductor, electric current density $\vec{J}$ is given by ($\rho$ is negative charge density, $\vec{v}$ is drift velocity)

(1) $\vec{J} = \rho\vec{v}$ (2) $\vec{J} = \frac{\vec{v}}{\rho}$

(3) $\vec{J} = \frac{\rho}{\vec{v}}$ (4) Both (2) and (3)

4. A potentiometer wire has length 4 m and resistance 8 Ω. The resistance that must be connected in series with the wire and an accumulator of emf 2 V, so as to get a potential gradient of 1 mV/cm on the wire.
   (1) 40 Ω (2) 44 Ω
   (3) 48 Ω (4) 32 Ω

5. A cell has emf of 4 V and internal resistance 0.6 Ω. The maximum power which it can deliver to any external resistor is
   (1) 2.86 W (2) 6.67 W
   (3) 4.87 W (4) 4.13 W

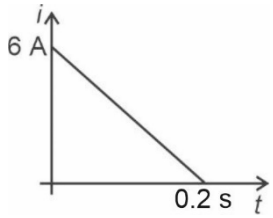
6. Mobility of free electrons in a conductor, in presence of external electric field $E$ is μ. If the external electric field is $2E$, then mobility will be
   (1) 2μ (2) μ
   (3) 3μ (4) $\frac{\mu}{2}$

7. The amount of heat generated in a resistor of resistance 2 Ω, in a time interval of 2 s, if current in it increases uniformly from zero to 4 A in 2 s, is
   (1) 16 J (2) $\frac{81}{5}$ J
   (3) 64 J (4) $\frac{64}{3}$ J

8. A metallic conductor of irregular cross-section is as shown in the figure. A constant potential difference is applied across ends $A$ and $B$. Then,


   (1) Current at cross section $P$ is equal to that of $Q$
   (2) Electric field intensity at $P$ is lesser than that at $Q$
   (3) Both (1) and (2)
   (4) Neither (1) nor (2)

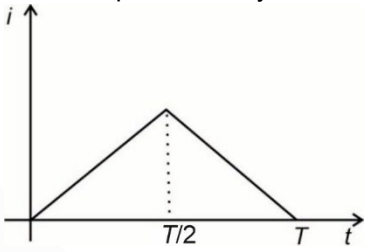
9. Magnetic flux is changed through a coil of resistance 5 Ω. As a result, an induced current is developed in it, which varies with time as shown in the figure. The magnitude of net change in flux through the coil in Wb is




   (1) 2 (2) 3
   (3) 1 (4) 6

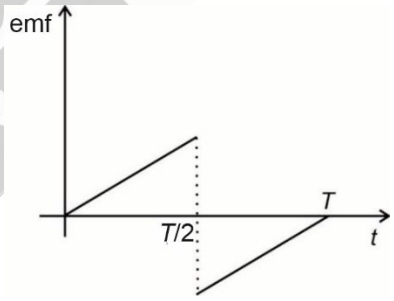
10. A metal rod of length 2 m is rotating about its end with an angular velocity of 100 rad/s in a plane perpendicular to a uniform magnetic field of $B$. If the potential difference between the end of the rod is 60 V. Then magnitude of magnetic field $B$ will be
   (1) 1 T (2) 0.6 T
   (3) 2 T (4) 0.3 T

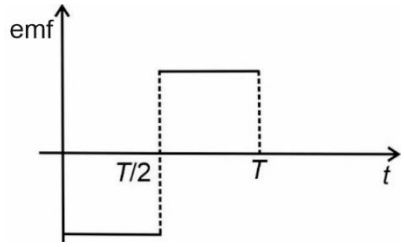
11. The current $i$ in a coil varies with time as shown in the figure. The variation of induced emf with time would be best represented by

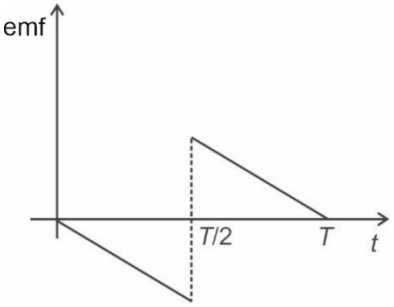



(1)



(2)



(3)


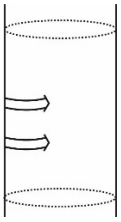

(4)


12. In a solenoid, current is increased at a constant rate, then the induced emf
    (1) Increase with time (2) Decrease with time
    (3) Is constant (4) Is zero

13. A wire carrying current $i$, is kept in $x - y$ plane along the curve $y = A\sin\left(\frac{2\pi x}{\lambda}\right)$. A uniform magnetic field $B$ exists in the Z-direction. The magnitude of magnetic force on the portion of the wire between $x = 0$ and $x = \frac{\lambda}{2}$ is
    (1) $2Bi\lambda$ (2) $\frac{Bi\lambda}{3}$
    (3) $Bi\lambda$ (4) $\frac{Bi\lambda}{2}$

14. Consider the following two statements.
    (a) For any rigid body of mass $m$ and total charge $q$, rotating about an axis, the ratio of magnitude of magnetic moment to that of angular momentum is always $q/2m$.
    (b) Force experienced by a current carrying closed loop in a uniform magnetic field is zero.
    The correct statement(s) is/are
    (1) Only (a) (2) Only (b)
    (3) Both (a) and (b) (4) Neither (a) nor (b)

15. A long hollow cylinder carrying uniform current per unit length $\lambda$ along the circumference as shown. Magnetic field inside the cylinder is



    (1) $\frac{\mu_0\lambda}{2}$ (2) $\mu_0\lambda$
    (3) $\frac{\mu_0\lambda}{4}$ (4) $2\mu_0\lambda$

16. Consider the following two statements regarding moving coil galvanometer.
    a. Increasing the current sensitivity of a moving coil galvanometer necessarily increases the voltage sensitivity.
    b. To convert a moving coil galvanometer, to a voltmeter, a small resistance is connected in series.
    The correct statement(s) is/are
    (1) Only a (2) Only b
    (3) Both a and b (4) Neither a nor b

17. A horizontal overhead powerline carries a current of 40 A in North to South direction. Magnetic field, due to the wire, 2 m below the wire is
    (1) 4 $\mu$T towards West (2) 2 $\mu$T towards East
    (3) 6 $\mu$T towards West (4) 4 $\mu$T towards East

18. A particle of mass $m$, charge $Q$ and kinetic energy $T$ enters a transverse uniform magnetic field induction $\vec{B}$. After 3 s, the kinetic energy of the particle will be
    (1) $3T$ (2) $T$
    (3) $4T$ (4) $\frac{T}{3}$

19. A charged particle (of charge $q$) is moving in a circle of radius $R$ with uniform speed $v$. The associated magnetic moment $\mu$ is given by
    (1) $qvR^2$ (2) $\frac{qvR^2}{2}$
    (3) $qvR$ (4) $\frac{qvR}{2}$

20. A paramagnetic liquid is filled in a glass U-tube of which one limb is placed between the pole pieces of an electromagnet. When the field is switched on the liquid in the limb which is in the field will
    (1) Rise (2) Fall
    (3) Remains stationary (4) First rise then fall

21. A small bar magnet of magnetic moment 1.44 A $m^2$ is placed horizontally with the north pole pointing towards magnetic north. The position of the neutral point if the horizontal component of earth's magnetic field is 18 $\mu$T
    (1) At a distance 10 cm on the axial line
    (2) At a distance 20 cm on the equatorial line
    (3) At a distance 10 cm on the equatorial line
    (4) At a distance 20 cm on the axial line

22. A solenoid has a core of material with relative permeability 400. The winding of the solenoid are insulated from the core and carry a current 4 A. If the number of turns is 2000 per metre. The value magnetic field $B$ inside the solenoid is nearly
    (1) 1 T (2) 4 T
    (3) 2 T (4) 6 T

23. A paramagnetic sample shows net magnetization of 4 A $m^{-1}$ when placed in external magnetic field of 0.3 T at temperature of 4 K. When the same sample is placed in an external magnetic field of 0.1 T at a temperature of 12 K, the magnetization will be

(1) $\frac{2}{3}$A $m^{-1}$ (2) $\frac{4}{3}$A $m^{-1}$

(3) $\frac{4}{9}$A $m^{-1}$ (4) $\frac{2}{9}$A $m^{-1}$

24. A long solenoid has 500 turns per metre and carries a current of 2 A. It has a soft iron core of $\mu_r$ = 1000. The core is heated beyond the curie temperature

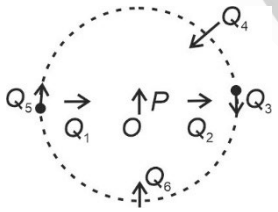
(1) The *H* and *B* fields in the solenoid are nearly unchanged

(2) The *H* field in the solenoid is (nearly) unchanged but the *B* field decrease drastically

(3) The *H* and *B* field decreased drastically

(4) The *H* field in the solenoid decrease drastically and *B* field is (nearly) unchanged

25. A small magnetised needle *P* placed at a point *O*. The arrow shows the direction of its magnetic moment. The other arrows show different positions and orientations of the magnetic moment of another identical magnetised needle *Q*. As shown in the figure in which configuration the system is in unstable equilibrium?




(1) $PQ_5$ (2) $PQ_3$

(3) $PQ_1$, $PQ_2$ (4) $PQ_2$, $PQ_3$

26. The area of hysteresis loop of a ferromagnetic material represents

(1) Energy loss per unit volume per unit cycle.

(2) Energy loss per unit volume.

(3) Coercivity of the material.

(4) Retentivity of the material.

27. A charged particle moves in a circle which is perpendicular to the uniform magnetic field. Its time period of revolution is independent of

(1) Charge of the particle

(2) Mass of the particle

(3) Magnetic field

(4) Velocity of the particle

28. Two parallel wires carrying currents in opposite direction. They

(1) Attract each other

(2) Repel each other

(3) Apply no force on each other

(4) May attract or repel depending on the magnitude of current

29. Value of angle of dip is 90° at

(1) Equator (2) Poles

(3) Both (1) and (2) (4) Neither (1) nor (2)

30. Magnetic flux linked with a coil is given by $\phi = 4t^2 + 3$, where *t* is in s and $\phi$ is in Wb. The magnitude of induced emf in the coil at *t* = 3 s will be

(1) Zero (2) 4 V

(3) 27 V (4) 24 V

31. Two concentric circular loops of different radii lie in the same plane. The current in the outer loop is clockwise and decreasing with time. Then the induced current in the inner loop is

(1) Anticlockwise

(2) Clockwise

(3) Zero

(4) Either clockwise or anticlockwise

32. To induce an emf in a coil, the associated magnetic flux with the coil

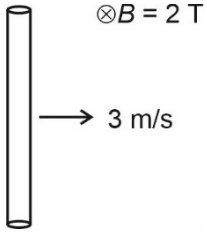
(1) Must increase

(2) Must decrease

(3) Must remain constant

(4) May increase or decrease

33. A conducting rod of length 10 cm is moved with 3 m/s in a uniform transverse magnetic field of magnitude 2 T, then the potential difference across its two ends is




(1) Zero (2) 0.2 V

(3) 0.6 V (4) 1 V

34. Mutual inductance of two coils can be increased by

(i) Decreasing the number of turns in the coils

(ii) Increasing the number of turns in the coils

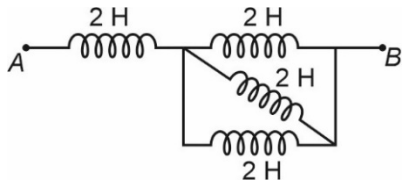
(iii) Winding the coils on steel core

Select the correct option.

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

(3) (i), (ii) and (iii) (4) None of these

35. The equivalent inductance between points *A* and *B* for the given combination of inductors is

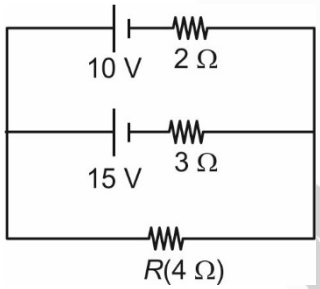



(1) 8 H (2) 6 H

(3) $\frac{4}{3}$H (4) $\frac{8}{3}$H

## SECTION – B

36. The current through the load resistance *R* in the circuit as shown in the figure is




(1) $\frac{30}{13}$A (2) $\frac{30}{7}$A

(3) $\frac{6}{83}$A (4) $\frac{7}{20}$A

37. Match the column and tick the correct option (symbols have their usual meanings).

| | **Column-I** | | **Column-II** |
|---|---|---|---|
| (A) | Expression of magnetic field on the axis of a short dipole | (P) | Positive |
| (B) | Expression of magnetic field on the equatorial position of a short dipole | (Q) | Negative |
| (C) | Magnetic susceptibility of diamagnetic substance | (R) | $\frac{\mu_0 M}{4\pi r^3}$ |
| (D) | Magnetic susceptibility of paramagnetic substance | (S) | $\frac{\mu_0 2M}{4\pi r^3}$ |

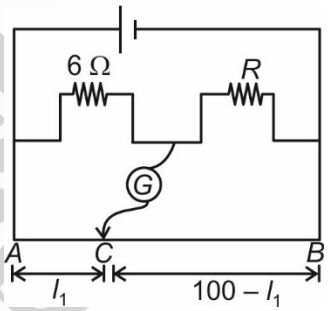
(1) A→P, B→Q, C→R, D→S

(2) A→S, B→R, C→P, D→Q

(3) A→S, B→R, C→Q, D→P

(4) A→S, B→Q, C→R, D→P

38. The resistance in the two arms of the meter bridge are 6 Ω and *R* Ω respectively. The balance point is at distance *AC* = $l_1$. If the resistance *R* is shunted with an equal resistance, the new balance point shifts by a length $0.4l_1$ towards *B*. The resistance *R* is




(1) 8 Ω (2) 6 Ω

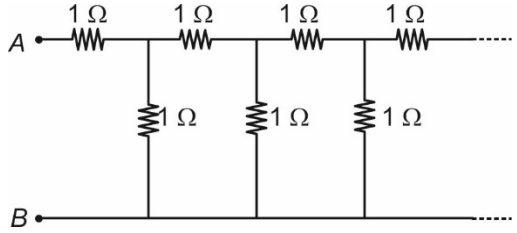
(3) 2 Ω (4) 4 Ω

39. A cell of emf *E* and internal resistance *r* is connected in series with an external resistance *nr*. The terminal potential difference across the cell will be

(1) $\frac{E}{n+1}$ (2) $\frac{E}{n}$

(3) $\frac{(n+1)E}{n}$ (4) $\left(\frac{n}{n+1}\right)E$

40. The equivalent resistance between points *A* and *B* in the infinite ladder circuit is




(1) $\frac{\sqrt{5}+1}{2}\Omega$ (2) $\frac{\sqrt{5}-1}{2}\Omega$

(3) 3 Ω (4) $\sqrt{5}$ Ω

41. Effective temperature coefficient of series combination of two resistors with respective temperature coefficient of resistance $\alpha_1$ and $\alpha_2$ is (The resistance of two conductors at 0°C is same)

(1) $2(\alpha_1 + \alpha_2)$ (2) $\frac{\alpha_1\alpha_2}{\alpha_1 + \alpha_2}$

(3) $\frac{\alpha_1 - \alpha_2}{2}$ (4) $\frac{\alpha_1 + \alpha_2}{2}$

42. **Assertion (A):** Needle of a dip circle aligns itself horizontally on magnetic equator.

**Reason (R):** Horizontal component of earth's magnetic field is zero at magnetic equator.

(1) Only (A) is correct

(2) Only (R) is correct

(3) Both (A) and (R) are correct but (R) is not the correct explanation of (A)

(4) Both (A) and (R) are correct and (R) is correct explanation of (A)

43. Two identical heaters, when used individually take 5 minutes to boil a certain amount of water. The time taken to boil the water, when both heaters are used together in parallel is

(1) 1.25 minutes

(2) 10 minutes

(3) 2.5 minutes

(4) 5 minutes

44. Two coils of turns 5 and 10 respectively are kept close to each other. Current passing through the first is reduced at rate *r* and emf 6 mV is developed across the other coil. If second coil carries current which is reduced at the rate 2*r*, the emf induced across the first coil will be

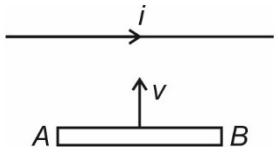
(1) 6 mV

(2) 3 mV

(3) 9 mV

(4) 12 mV

45. The current carrying wire and the rod *AB* are in the same plane. The rod moves perpendicular to the wire with velocity *v* as shown in figure. Which one of the following statements is true about induced emf in the rod?



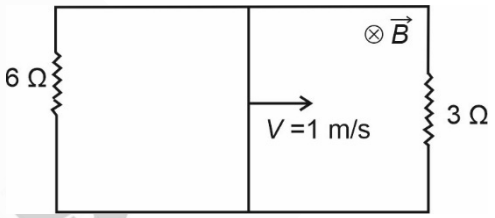

(1) End *A* will be at higher potential with respect to end *B*

(2) End *A* will be at lower potential with respect to end *B*

(3) There will be no induced emf in the rod

(4) End *A* and *B* will be at same potential

46. A rectangular loop with sliding connector of length $\ell$ = 1.0 m is situated in a uniform magnetic field *B* = 2 T (directed into the plane). Two resistances of 6 Ω and 3 Ω are connected as shown in figure. If resistance of the connector is zero, then force required to keep the connector moving with constant velocity 1 m/s is




(1) 4 N (2) 6 N

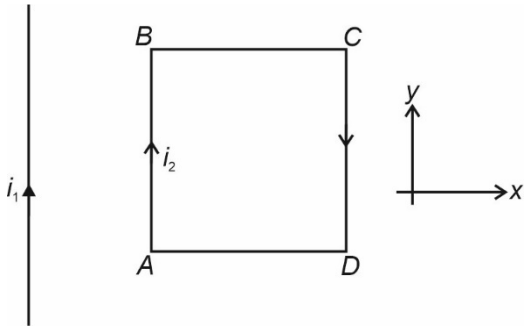
(3) 8 N (4) 2 N

47. The ratio of energy density of magnetic field at centre of a current carrying loop to that at a distance $\frac{R}{\sqrt{2}}$ from centre of loop on its axis is (*R* : radius of loop)

(1) 1 : 9 (2) 27 : 4

(3) 27 : 8 (4) 3 : 1

48. The direction of resultant force on the current loop *ABCD* due to long current carrying conductor wire will be



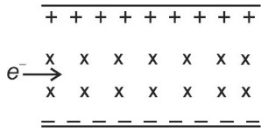

(1) Towards +ve *y*-axis

(2) Towards +ve *x*-axis

(3) Towards –ve *y*-axis

(4) Towards –ve *x*-axis

49. An electron enters the space between the plates of a charged capacitor as shown in the figure. The surface charge density on the plate is $\sigma$. Electric field intensity in the space between the plates is *E*. The uniform magnetic field also exists in that space perpendicular to the direction of *E*. The electron moves perpendicular to both $\vec{E}$ and $\vec{B}$ without any change in direction. The time taken by the electron to travel a distance *l* in the space is



(1) $\frac{\sigma l}{\varepsilon_0 B}$ (2) $\frac{\sigma B}{\varepsilon_0 l}$

(3) $\frac{\varepsilon_0 lB}{\sigma}$ (4) $\frac{\varepsilon_0 l}{\sigma B}$

50. An alternating electric field of frequency $\nu$, is applied across the dees (Radius *R*) of a cyclotron, that is used to accelerate protons (mass = *m*). The operating magnetic field (*B*) used in the cyclotron is

(1) $B = \frac{m\nu}{e}$ (2) $B = \frac{\pi m\nu}{e}$

(3) $B = \frac{2\pi m\nu}{e}$ (4) $B = \frac{m\nu}{2e}$

## CHEMISTRY

### SECTION - A

51. Mond process for refining is used for

(1) Cu (2) Fe

(3) Ni (4) Zn

52. Number of geometrical isomers shown by $[Co(NH_3)_3Cl_3]$ is

(1) Zero (2) 1

(3) 2 (4) 3

53. Shortest 'C–O' bond length is present in

(1) $[Mn(CO)_5]$ (2) $[Co(CO)_5]^+$

(3) $[Co(CO)_4]^-$ (4) $[Co(CO)_4]^{2-}$

54. Hydride of group 15 elements of highest boiling point is

(1) $NH_3$ (2) $PH_3$

(3) $SbH_3$ (4) $BiH_3$

55. Select the reaction in which $NH_3(g)$ can be formed as one of the products?

(1) $(NH_4)_2Cr_2O_7 \xrightarrow{\Delta}$

(2) $NH_4Cl + NaNO_2 \longrightarrow$

(3) $NaN_3 \xrightarrow{\Delta}$

(4) $(NH_4)_2SO_4 + NaOH \longrightarrow$

56. Catalyst used in Haber's process of ammonia formation is

(1) Iron oxide with $K_2O$ and $Al_2O_3$

(2) Lead oxide with $CaCO_3$

(3) Pt/Rh

(4) Pd/$BaSO_4$ with $K_2O$

57. Most acidic oxide of nitrogen among the following is

(1) NO (2) $N_2O$

(3) $N_2O_3$ (4) $N_2O_4$

58. White phosphorus is

(1) A transparent white waxy liquid

(2) Non-poisonous

(3) Insoluble in carbon disulphide

(4) Insoluble in water

59. Incorrect statement about $PCl_5$ is

(1) It has two different types of bond lengths

(2) It is used in the synthesis of $CH_3COCl$

(3) It contains both polar and non-polar bonds

(4) On hydrolysis, it gives $POCl_3$

60. Among the following which oxoacids of phosphorus is strongest reducing agent?

(1) $H_3PO_2$

(2) $H_3PO_3$

(3) $H_3PO_4$

(4) All are equally strong

61. Among the hydrides of group 16 elements, most acidic is

(1) $H_2O$ (2) $H_2S$

(3) $H_2Se$ (4) $H_2Te$

62. Ion which has maximum number of unpaired electron(s) is

(1) $Gd^{3+}$ (2) $Er^{3+}$

(3) $Ce^{3+}$ (4) $Lu^{3+}$

63. $XeOF_4$ is isostructural with

(1) $SF_4$ (2) $PCl_5$

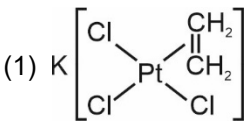
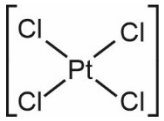
(3) $IF_5$ (4) $PBr_5$

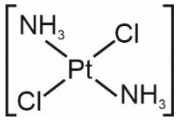
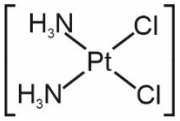
64. Which is the strongest acid in the following?

(1) $HNO_3$ (2) $HNO_2$

(3) $HClO_3$ (4) $HClO_4$

65. Which of the following is considered to be an anticancer species?

(1)  (2) 

(3)  (4) 

66. Write the increasing order of the value of CFSE ($\Delta_0$) for the following species

a. $[Ni(NH_3)_6]^{2+}$

b. $[Pd(NH_3)_6]^{2+}$

c. $[Pt(NH_3)_6]^{2+}$

(1) a < b < c (2) c < b < a

(3) a < c < b (4) c < a < b

67. Hf and Zr have similar atomic and ionic radii because of

(1) Lanthanoid contraction

(2) Diagonal relationship

(3) Belonging to same period

(4) Same chemical properties

68. The reaction of aqueous $MnO_4^-$ with $NO_2^-$ in acidic conditions gives

(1) $Mn^{2+}$ and $NO_2^-$ (2) $Mn^{2+}$ and $NO_3^-$

(3) $Mn^{+3}$ and $NO_2^-$ (4) $Mn^{3+}$ and $NO_3^-$

69. Which one of the following ions can exhibit d – d transition?

(1) $MnO_4^{2-}$ (2) $MnO_4^-$

(3) $Cr_2O_7^{2-}$ (4) $CrO_4^{2-}$

70. Which of the following oxidation states is the most common among the lanthanoids?

(1) 4 (2) 3

(3) 2 (4) 5

71. The correct order of decreasing first ionisation enthalpy of Mn(25), Fe(26) and Cu(29) is

(1) Cu > Fe > Mn (2) Cu > Mn > Fe

(3) Fe > Mn > Cu (4) Fe > Cu > Mn

72. The basic character of the transition metal monoxides follows the order

(1) VO > TiO > CrO (2) VO > CrO > TiO

(3) TiO > VO > CrO (4) TiO > CrO > VO

73. Gun metal contains

(1) Cu, Sn, Zn (2) Cu, Sn, Pb

(3) Sn, Zn, Fe (4) Cu, Cr, C

74. **Statement-I:** The variability of oxidation states of transition elements arises due to incomplete filling of *d*-orbital.

**Statement-II:** In *d*-block, Mn has the maximum oxidation state (+7).

In the light above statement choose the most appropriate answer from the options given below.

(1) Both Statement I and Statement II are correct

(2) Both Statement I and Statement II are incorrect

(3) Statement I is correct but Statement II is incorrect

(4) Statement I is incorrect but Statement II is correct

75. **Statement-I:** Halogens react with metals to form metal halides.

**Statement-II:** In metal halides, ionic character decrease in the order MF > MCl > MBr > MI where M is a monovalent metal.

In the light of above statements choose the most appropriate answer from the option given below.

(1) Both Statement I and Statement II are correct

(2) Both Statement I and Statement II are incorrect

(3) Statement I is correct but Statement II is incorrect

(4) Statement I is incorrect but Statement II is correct

76. Correct formula of copper pyrites ore is

(1) $Cu_2S$ (2) $Cu_2O$

(3) $CuFeS_2$ (4) $Cu(OH)_2$

77. In which pair of ions, both the species contain S–S bond?

(1) $S_2O_3^{2-}$, $S_2O_7^{2-}$ (2) $S_2O_7^{2-}$, $S_4O_6^{2-}$

(3) $S_4O_6^{2-}$, $S_2O_3^{2-}$ (4) $S_2O_7^{2-}$, $S_2O_8^{2-}$

78. Solvent used for leaching of metal oxide from bauxite in Bayer process is

(1) NaOH (2) NaCN

(3) $NaNO_3$ (4) $Na_2SO_4$

79. Titanium is refined by

(1) Mond process (2) Van Arkel method

(3) Distillation (4) Zone refining

80. Select the ligand which is ambidentate.

(1) $H_2O$ (2) $NO_2^-$

(3) $NH_3$ (4) $NH_2^-$

81. Correct IUPAC name of $[Ni(en)_3]Cl_2$ is

(1) Triethylenediaminenickel(II) chloride

(2) Triethylenediaminenickel(II) chlorido

(3) Tris(ethane-1,2-diamine)nickel(II) dichlorido

(4) Tris(ethane-1,2-diamine)nickel(II) chloride

82. Which complex is diamagnetic in nature?

(1) $[Ti(H_2O)_6]Cl_3$ (2) $[Cu(H_2O)_6]Cl_2$

(3) $[Fe(CO)_5]$ (4) $[Mn(H_2O)_6]Cl_2$

83. The maximum temperature that can be achieved in blast furnace is upto

(1) 1500 K

(2) 1000 K

(3) 2200 K

(4) 3200 K

84. CFSE of complex $[Mn(H_2O)_6]Cl_2$ is

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

(3) $-1.6\Delta_0$ (4) $-0.4\Delta_0$

85. Correct electronic configuration of central atom in $[Ni(NH_3)_6]Cl_2$ is

(1) $t_{2g}^6 e_g^2$ (2) $t_{2g}^5 e_g^3$

(3) $t_2^6 e^2$ (4) $t_2^5 e^3$

## SECTION - B

86. German silver does not contain

(1) Au (2) Cu

(3) Zn (4) Ni

87. In which of the following compound nitrogen exhibits highest oxidation state?

(1) $N_3H$ (2) $HNO_3$

(3) $NH_4OH$ (4) $N_2H_4$

88. Consider the given statement and select the **correct** option.

**Statement-I:** In the froth floatation method the froth is formed which carries the minerals particles. The froth is light and is skimmed off. It is then dried for recovery of the ore particles.

**Statement-II:** Cresols is a froth stabiliser.

In the light of above statements. Choose the most appropriate answer from the options given below.

(1) Both Statement I and Statement II are correct

(2) Both Statement I and Statement II are incorrect

(3) Statement I is correct but Statement II is incorrect

(4) Statement I is incorrect but Statement II is correct

89. An excess of $AgNO_3$ is added to 100 mL of a 0.02 M solution of dichloridotetraaquachromium (III) chloride. The number of moles of AgCl precipitated would be

(1) 0.004 mol (2) 0.002 mol

(3) 0.0002 mol (4) 0.02 mol

90. n-factor of $KMnO_4$ is neutral medium is

(1) 3 (2) 5

(3) 1 (4) 4

91. Which one of the following exhibit optical isomerism (en-ethylene diamine)?

(1) cis-$[Pt(NH_3)_2Cl_2]$ (2) $[Ni(CO)_4]$

(3) cis-$[Co(en)_2Cl_2]^+$ (4) trans-$[Co(en)_2Cl_2]^+$

92. **Statement-I:** $(Ph_3P)_3RhCl$ is a Wilkinson catalyst.

**Statement-II:** Wilkinson catalyst is used in the treatment of lead poisoning.

In the light of above statements. Choose the most appropriate answer from the options given below.

(1) Both Statement I and Statement II are correct

(2) Both Statement I and Statement II are incorrect

(3) Statement I is correct but Statement II is incorrect

(4) Statement I is incorrect but Statement II is correct

93. Which among the following ion is colourless in its aqueous solution?

(1) $V^{3+}$ (2) $Zn^{2+}$

(3) $Co^{2+}$ (4) $Cr^{3+}$

94. Match the following aspects with the respective metal.

| | Aspects | | Metal |
|---|---|---|---|
| a. | The metal which reveals a maximum numbers of oxidation states | (i) | Scandium |
| b. | The metal although placed in 4d series but it is not considered as a transition element | (ii) | Manganese |
| c. | The transition metal which does not exhibit variable oxidation states | (iii) | Cadmium |
| d. | The d-block element which show only +2 oxidation state | (iv) | Zinc |

Select the correct option.

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

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

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

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

95. When neutral or faintly alkaline $KMnO_4$ is treated with potassium iodide then iodide ion is converted into X. X is

(1) $IO_3^-$ (2) $IO_2^-$

(3) $IO_4^-$ (4) $IO^-$

96. Match **List-I** with **List-II.**

| | List-I | | List-II |
|---|---|---|---|
| a. | Am(Z = 95) | (i) | $[Rn]5f^{14}7s^2$ |
| b. | Cm(Z = 96) | (ii) | $[Rn]5f^{7}7s^2$ |
| c. | No(Z = 102) | (iii) | $[Rn]5f^{7}6d^{1}7s^2$ |
| d. | Lr(Z = 103) | (iv) | $[Rn]5f^{14}6d^{1}7s^2$ |

Select the correct option.

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

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

97. Catalyst used in contact process for the conversion of $SO_2$ to $SO_3$ is

(1) $V_2O_5$ (2) Cu

(3) $Fe_2O_3$ (4) $Al_2O_3$

98. Number of P-H bond(s) present in pyrophosphoric acid ($H_4P_2O_7$) is

(1) Zero (2) One

(3) Two (4) Three

99. Halogen molecule of maximum bond length is

(1) $F_2$ (2) $Cl_2$

(3) $Br_2$ (4) $I_2$

100. $Cl_2$ on reaction with cold and dilute NaOH forms

(1) $ClO_2^-$

(2) $ClO_3^-$

(3) $ClO_4^-$

(4) $ClO^-$

## BOTANY

### SECTION - A

101. About genetic code all of the given are true features, **except**

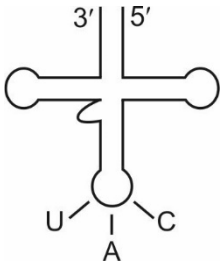
(1) It is nearly universal

(2) It is triplet

(3) It is degenerate

(4) It is read in non-contiguous fashion

102. During translation, which of the following amino acids is carried by the tRNA shown below?




(1) Methionine

(2) Arginine

(3) Glycine

(4) Serine

103. In *lac* operon, if repressor protein is unable to bind with operator then

(1) Lactose will bind to operator

(2) RNA polymerase can bind to promoter

(3) Repressor will bind to promoter

(4) RNA polymerase will bind to operator

104. In *lac* operon, the gene that codes for repressor protein is

(1) Gene *z* (2) Gene *i*

(3) Gene *y* (4) Gene *a*

105. If three genes A, B and C control the skin colour in humans then which one of the following genotypes does not produce the intermediate skin colour?

(1) AaBbCc (2) AaBBCC

(3) AABbcc (4) AaBBcc

106. Out of four children of a couple, one is colour-blind. If this child is daughter then which of the following genotypes should be **true** for the couple?

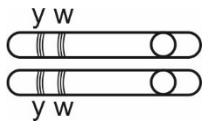
(1) $X^CX^C \times XY$ (2) $X^CX \times X^CY$

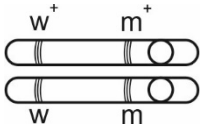
(3) $XX \times X^CY$ (4) $X^CX \times XY$

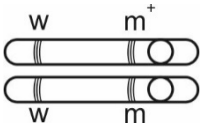
107. A child has blood group AB and his mother has blood group B. What is the possible blood group and the genotype of his father?

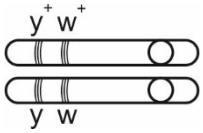
| | Blood group | Genotype |
|---|---|---|
| (1) | O | $I^\circ I^\circ$ |
| (2) | A | $I^\circ I^A$ |
| (3) | B | $I^\circ I^B$ |
| (4) | AB | $I^\circ I^B$ |

108. Which of the following representation related to dihybrid cross in *Drosophila* conducted by Morgan shows recombinant type $F_2$ offspring?

(1) 


(2) 


(3) 


(4) 


109. All of the following follow the Mendel's law of dominance, **except**

(1) Eye colour is *Drosophila*

(2) Seed colour is Pea plant

(3) Flower colour in Snapdragon

(4) Flower colour in Pea plant

110. Select the option in which the combination will result in Turner's Syndrome

(1) Egg (22 + 0) × sperm (22 + 0)

(2) Egg (21 + X) × sperm (22 + Y)

(3) Egg (22 + XX) × sperm (22 + 0)

(4) Egg (22 + X) × sperm (22 + 0)

111. In the Mendelian dihybrid cross, what percent of individuals in $F_2$ generation show wrinkled and green seeds?

(1) 12.5% (2) 25%

(3) 6.25% (4) 50%

112. Match the following columns and select the **correct** option.

| | Column I | | Column II |
|---|---|---|---|
| a. | Template strand of DNA | (i) | Towards 5′ end of coding strand |
| b. | Transcription unit | (ii) | 5′⟶3′ polarity |
| c. | Promoter sequence | (iii) | 3′⟶5′ polarity |
| d. | Sense strand of DNA | (iv) | Has three components |

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

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

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

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

113. Select the **correct** match w.r.t size of starch grain in pea plant and its genotype

(1) Bb – large sized starch grains with wrinkled seeds

(2) bb – intermediate size starch grains with round seeds

(3) BB – large sized starch grains with round seeds

(4) Bb – large sized starch grains with round seeds

114. Regarding the transcription in bacteria, which statement given below is **incorrect**?

(1) There are three types of DNA-dependent RNA polymerase for this purpose

(2) mRNA does not require any processing to become active

(3) It takes place in the same compartment where translation occurs

(4) Many times the translation can begin much before the mRNA is fully transcribed

115. Morgan carried out several dihybrid crosses in *Drosophila* to study genes that were sex linked. Which of the following is **not** true regarding these crosses?

(1) Recombinants for genes y and w were 37.2% in $F_2$ generation

(2) Genes w and m were found to be linked

(3) Recombinants obtained for genes w and m were more than y and w

(4) Distance between genes y and w is less than w and m.

116. The role of SnRNPs is to

(1) Add adenylate residues at 3′ end of mRNA

(2) Remove introns from hnRNA

(3) Add methyl guanosine triphosphate at 5′ end

(4) Catalyze the elongation of mRNA

117. Females are heterogametic in

(1) Birds

(2) *Drosophila*

(3) Humans

(4) Grasshopper

118. Which of the following disorders can be seen only in females?

(1) Colour blindness (2) Turner's syndrome

(3) Down's syndrome (4) Sickle cell anemia

119. Mark the **odd** one w.r.t. symbols used in the human pedigree analysis.

(1) □ – Male

(2) ○ – Female

(3) □=○ – Mating between relatives

(4) ◇5 – Five affected males

120. Read the following statements and choose the option which is **true** for them.

**Statement-1:** VNTRs and STRs code for many essential proteins.

**Statement-2:** The degree of polymorphism in DNA sequence is specific to an individual and is not inheritable.

(1) Both the statements are correct

(2) Both the statements are incorrect

(3) Only statement-1 is correct

(4) Only statement-2 is correct

121. The nitrogenous base that is **not** seen in the genetic material of *E. coli* is

(1) Adenine (2) Uracil

(3) Guanine (4) Thymine

122. Some features related to the plant *Pisum sativum* are given below

| |
|---|
| Flower position, Dwarf stem, Wrinkled seed, Green seed, Flower colour, Inflated pod, Pod colour |

How many of them are traits and characters respectively?

(1) 5 and 2 (2) 4 and 3

(3) 2 and 5 (4) 3 and 4

123. The feature which is **not** true for double helix model of DNA is

(1) The two chains have anti-parallel polarity

(2) A purine comes opposite to pyrimidine

(3) Each nucleotide has free 3′ and 2′ OH

(4) The pitch of the DNA is 3.4 nm

124. A tall pea plant bearing axial flowers is self crossed. In $F_1$ generation, the tall plants bearing terminal flowers were equal in number with dwarf plants bearing axial flowers.

Which of the following would be **true** for the above experiment?

I. Segregation of alleles

II. Independent assortment of genes

III. Complete linkage of genes

IV. Dominancy of factors

(1) I, III and IV (2) I, II and IV

(3) II and III (4) IV only

125. A glycosidic linkage joins
(1) Sugar to nitrogenous base
(2) Phosphate to nitrogenous base
(3) Sugar to phosphate
(4) A nucleotide to another nucleotide

126. According to human genome project, total number of genes in human genome was estimated to be
(1) 80,000
(2) 30,000
(3) 3,000
(4) 1,40,000

127. During DNA replication, the Okazaki fragments formed on lagging strand are joined together by
(1) DNA ligase
(2) RNA primase
(3) Helicase
(4) DNA polymerase

128. A red flowered snapdragon plant is crossed with white flowered snapdragon plant. If 180 seeds were produced by this cross, then how many seeds would produce red flowered plant?
(1) Zero (2) 90
(3) 45 (4) 135

129. The enzyme that catalyses the peptide bond formation in prokaryotes is structural part of
(1) Smaller subunit of ribosome
(2) Nucleoid or genome
(3) Messenger RNA
(4) Larger subunit of ribosome

130. In incomplete dominance
(1) Heterozygous condition cannot be obtained
(2) Phenotype is expressed only in homozygous conditions
(3) $F_1$ phenotype is intermediate between dominant and recessive phenotype
(4) Both the alleles express themselves as dominant

131. Consider the following statements and select the **correct** option.
I. The process of splicing represents the dominance of RNA world.
II. The split gene arrangement represents an ancient feature of the genome.
(1) Only statement A is correct
(2) Only statement B is correct
(3) Both statements A and B are correct
(4) Both statements A and B are incorrect

132. Select the **incorrect** statement from the following.
(1) In diploid organisms, the factors occur in pairs
(2) In dissimilar pair of factors only dominant one is able to express itself
(3) Two factors in an individual do not get mixed up
(4) All the dominant factors get separated together in one gamete during gametogenesis

133. State true **(T)** or false **(F)** for the given statements and select the **correct** option.
(A) Exons do not appear in mature mRNA.
(B) All the reference point while defining a transcription unit is made with coding strand.

| | **A** | **B** |
|---|---|---|
| (1) | T | F |
| (2) | F | T |
| (3) | T | T |
| (4) | F | F |

134. An allele in mutated condition
(i) Can form less efficient enzyme
(ii) May form normal enzyme
(iii) Can form non-functional enzyme
(iv) Cannot form enzyme
The **correct** one(s) is/are
(1) All (i), (ii), (iii) and (iv)
(2) (i), (iii) and (iv) only
(3) (iii) only
(4) (iv) only

135. Match the following columns and select the **correct** option.

| | **Column A** | | **Column B** |
|---|---|---|---|
| (a) | AUG | (i) | Codes for methionine |
| (b) | UAA | (ii) | Codes for phenylalanine |
| (c) | UUU | (iii) | This codon does not have its specific tRNA |
| (d) | GAG | (iv) | Codes for glutamic acid |

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

**SECTION - B**

136. Identify the following statements as true **(T)** or false **(F)** and choose the option accordingly.

**A** : Two genes present on different chromosomes segregate independently during gamete formation.

**B** : For a Mendelian trihybrid cross, maximum possible phenotypes in the generation will be four.

**C** : For the alleles of a gene showing co-dominance, the ratios of different genotypes and phenotypes will never be the same.

| | **A** | **B** | **C** |
|---|---|---|---|
| (1) | T | T | F |
| (2) | F | T | F |
| (3) | T | F | F |
| (4) | F | F | T |

137. The most abundant type of RNA found in animal cell is

(1) tRNA

(2) rRNA

(3) mRNA

(4) ScRNA

138. Different heights in human beings is an example of

(1) Polygenic inheritance

(2) Multiple allelism

(3) Codominance

(4) Incomplete dominance

139. Ribozyme is a

(1) Protein that codes for an enzyme

(2) Protein that itself behaves like an enzyme

(3) RNA molecule that acts as an enzyme

(4) DNA fragment that codes for an enzyme

140. In a diploid organism, a particular character is controlled by 3 pairs of alleles. How many genotypes regarding these alleles are possible in the population?

(1) 27 (2) 9

(3) 8 (4) 5

141. Select the **incorrect** match.

| | | | |
|---|---|---|---|
| (1) | Satellite DNA | – | Repetitive DNA |
| (2) | VNTR (variable number of tandem repeats) | – | Used for DNA fingerprinting |
| (3) | Transforming principle | – | Proposed by Griffith |
| (4) | β-galactosidase | – | Breakdown lactose into fructose and glucose |

142. Darkly stained regions in chromatin

(1) Are densely packed

(2) Are transcriptionally active

(3) Do not have histone proteins

(4) Do not contain nucleosomes

143. Removal of RNA polymerase II from a cell will affect the synthesis of

(1) tRNA

(2) mRNA

(3) rRNA

(4) SnRNA

144. The unequivocal proof that DNA is the genetic material came from the experiments of Hershey and Chase. In their experiments, the phage DNA was labelled with

(1) $^{15}N$ (2) $^{35}S$

(3) $^{18}O$ (4) $^{32}P$

145. Removal of introns and joining of exons in a defined order during transcription is called

(1) Tailing (2) Splicing

(3) Capping (4) Charging of RNA

146. Select the **correct** statements from the following.

(i) In most of the eukaryotes, structural gene in a transcription unit is polycistronic.

(ii) Monocistronic structural genes can have interrupted coding sequences.

(iii) The DNA sequence can code for mRNA, rRNA or tRNA.

(1) (i) only (2) (i) and (iii)

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

147. Number of autosomes in the somatic cell of an individual suffering from Klinefelter's syndrome is

(1) 47 (2) 44

(3) 45 (4) 43

148. Select the **wrong** statement regarding mutations.

(1) Frame-shift mutation may be due to deletion or insertion of one or more bases in a nucleotide chain

(2) When a purine base is substituted by another purine base then it is transition mutation

(3) Transfer of gene segment during crossing over between homologous chromosome always results in chromosomal aberration

(4) Many chemical and physical factors can be mutagens

149. How many traits regarding the character pod shape in pea plant were studied by Mendel?

(1) 1 (2) 2

(3) 7 (4) 14

150. In human beings, which of the following disorders occurs due to the dominant allele?

(1) Sickle cell anaemia (2) Cystic fibrosis

(3) Myotonic dystrophy (4) Haemophilia

## ZOOLOGY

### SECTION - A

151. Multiload-375 is responsible for

(1) Stimulation of ovulation

(2) Stimulation of gametogenesis

(3) Suppressing the sperm motility

(4) Increasing the fertilising capacity of sperms

152. The population in India was approximately 350 million at the time of our independence crossed 1.2 billion in May 2011.

The decline in which of the following cannot be the probable reason for this?

(1) Number of people in reproducible age

(2) Maternal mortality rate

(3) Infant mortality rate

(4) Death rate

153. Family planning programmes were initiated in India in

(1) 1971 (2) 1951

(3) 1919 (4) 2011

154. Choose the **odd** one w.r.t. barrier methods of birth control.

(1) Vault (2) Cervical cap

(3) Progestasert (4) Condom

155. Condoms provide all of the given benefits to the user, **except**

(1) Inserted by doctors or expert nurses

(2) Protect from STIs

(3) Prevent conception

(4) Give privacy to the user

156. Emergency contraceptives are very effective if used within

(1) 72 hours of ovulation

(2) First five days of menstrual cycle

(3) 72 hours of coitus

(4) First 12 weeks of pregnancy

157. Medical termination of pregnancy (MTP) is considered relatively safe up to which trimester of pregnancy?

(1) Third (2) Fourth

(3) First (4) Second

158. Choose the **incorrect** statement w.r.t hormonal oral pills.
(1) Pills have to be taken daily for a period of 21 days starting preferably within first five days of menstrual cycle.
(2) They cause changes in cervical mucus impairing transport of sperms.
(3) They cause alteration in uterine myometrium to make it unsuitable for implantation.
(4) These pills inhibit ovulation.

159. The contraceptive method with high effectiveness and very poor reversibility, among the following, is
(1) Condoms (2) IUDs
(3) Vasectomy (4) Vaults

160. Non-medicated IUD is
(1) Lippes loop (2) Progestasert
(3) CuT (4) Multiload-375

161. Select the odd one w.r.t. STIs, which are non-curable.
(1) Hepatitis-B (2) Genital warts
(3) Genital herpes (4) HIV infections

162. 'Saheli' was developed by scientists at _____ in _____.
Select the **correct** option to fill the blanks respectively.
(1) GEAC, Lucknow (2) EFB, Spain
(3) Eli Lilly, America (4) CDRI, Lucknow

163. Select the most appropriate method of ART to a couple where the male partner is unable to inseminate the female or has very low sperm count and female partner is reproductively healthy.
(1) GIFT (2) AI
(3) IUT (4) ZIFT

164. Choose the incorrect match.

| | | | |
|---|---|---|---|
| (1) | Tubectomy | – | Prevents oogenesis |
| (2) | IUDs | – | Suppress sperm motility and fertilizing capacity of sperms |
| (3) | Condoms | – | Prevents physical meeting of ovum and sperms |
| (4) | Coitus interruptus | – | Male partner withdraws penis from vagina just before ejaculation |

165. The theory of panspermia proposes the
(1) Spontaneous generation of life
(2) Extra-terrestrial origin of life
(3) Chemical evolution of life
(4) Special creation of life

166. The type of natural selection in which more individuals acquire mean character value, is called
(1) Directional selection (2) Disruptive selection
(3) Stabilising selection (4) Cyclic selection

167. A Russian scientist who proposed that the first form of life could have come from pre-existing non-living organic molecules, was
(1) Haldane (2) Urey
(3) Miller (4) Oparin

168. After the industrialisation in the year A , the proportion of moths was B .
Choose the option that fills the blanks **correctly**.

| | A | B |
|---|---|---|
| (1) | 1955 | Unchanged |
| (2) | 1985 | Unchanged |
| (3) | 1920 | Reversed |
| (4) | 1620 | Reversed |

169. The organism that arose in the ice age between 75,000 - 10,000 years ago was
(1) *Homo erectus* (2) *Dryopithecus*
(3) *Ramapithecus* (4) *Homo sapiens*

170. Which of the following can be used as industrial pollution indicators?
(1) Predators (2) Lichens
(3) Dark-winged moths (4) Industrial smoke

171. The thorn of *Bougainvillea* and tendril of *Cucurbita* exhibit
(1) Homology
(2) Convergent evolution
(3) Adaptive convergence
(4) Analogy

172. The action of artificial selection can be observed in all of the following, **except**
(1) Breeding of dogs and horses
(2) Horticulture and agriculture
(3) Breeding of pigeons
(4) Wing of bat and wing of insects to show analogy

173. The biggest carnivore with bipedal locomotion was
(1) *Brachiosaurus* (2) *Stegosaurus*
(3) *Triceratops* (4) *Tyrannosaurus*

174. If gene migration occurs multiple times, it is best described as
(1) Genetic drift (2) Artificial selection
(3) Saltation (4) Gene flow

175. The occurrence of all of the following events will cause a change in gene frequency, **except**
(1) Genetic drift (2) Selective mating
(3) Gene migration (4) Random mating

176. The first human-like being hominid was called
(1) *Homo erectus*
(2) *Homo sapiens*
(3) *Homo neanderthalensis*
(4) *Homo habilis*

177. Agriculture and human settlements arose about
(1) 18,000 years ago
(2) 10,000 years ago
(3) 75,000 years ago
(4) 1,00,000 – 40,000 years ago

178. Select the **incorrect** match among the following w.r.t. scientist and the theory/idea put forth by him.

| | | | |
|---|---|---|---|
| (1) | Hugo de Vries | – | Mutation theory |
| (2) | Lamarck | – | Theory of inheritance of acquired characters |
| (3) | Ernst Haeckel | – | Embryological support for evolution |
| (4) | Karl Ernst von Baer | – | Natural selection |

179. A pre-requisite for genetic drift to operate is that the population should be
(1) Large
(2) Non-reproducing
(3) Randomly and slowly reproducing
(4) Small

180. All of the following are the descendants of sauropsids, **except**
(1) Pelycosaurs
(2) Thecodonts
(3) Dinosaurs
(4) Turtles

181. According to the theory of special creation, Earth is 'X' years old.
Select the **correct** option for 'X'.
(1) 4000 (2) 20 billion
(3) 2 billion (4) 6000

182. **Assertion (A):** Primitive atmosphere was of reducing type.
**Reason (R):** Water vapour, methane, oxygen and ammonia covered the Earth surface.
In the light of above statements, select the **correct** option.
(1) Both (A) and (R) are true and (R) is the correct explanation of (A)
(2) Both (A) and (R) are true but (R) is not the correct explanation of (A)
(3) (A) is true, (R) is false
(4) Both (A) and (R) are false

183. According to the Hardy-Weinberg equilibrium, the frequency of heterozygous individuals can be represented as
(1) $p^2$ (2) $q^2$
(3) 2pq (4) p + q

184. The fossils which were discovered in Java in 1891 belonged to
(1) *Homo habilis*
(2) *Homo erectus*
(3) *Australopithecines*
(4) *Homo neanderthalensis*

185. In a population that is in Hardy-Weinberg equilibrium, the frequency of homozygous recessive genotype of eye colour is 0.09. Calculate the percentage of individuals homozygous for dominant allele.
(1) 91%
(2) 49%
(3) 64%
(4) 24%

## SECTION - B

186. Embryo with more than 8 blastomeres could be transferred into the uterus to complete its further development in which of the following ART?

(1) Zygote intra-fallopian transfer

(2) Intra uterine insemination

(3) Artificial insemination

(4) Intra-uterine transfer

187. Combination of which of the following sets of hormones can be used by females as implants under the skin for birth control?

(1) Oxytocin and progestogen

(2) Relaxin and estrogen

(3) Estrogen and oxytocin

(4) Progestogens and estrogen

188. How many features from the following given box are **correct** w.r.t. an ideal contraceptive?

| |
|---|
| Effective, Irreversible, User-friendly, to be inserted by experts only, Easily available, Least side-effects |

(1) 3 (2) 4

(3) 5 (4) 6

189. Select the **incorrect** statement.

(1) The most important component of the oral contraceptive pills is luteinizing hormone.

(2) Inability to conceive or produce children even after 2 years of unprotected sexual cohabitation is called infertility.

(3) Lactational amenorrhea is based on the fact that ovulation and menstruation do not occur during period of intense lactation following parturition.

(4) Malaria is not a sexually transmitted infection.

190. Select the **correct** option to complete the analogy.

Vasectomy : Vas deferens :: Tubectomy : _____

(1) Ovary

(2) Fallopian tube

(3) Uterus

(4) Cervix

191. Consider the given statements.

**Statement A:** Lactational amenorrhea is effective only upto a maximum period of 6 months following implantation.

**Statement B:** IUDs are ideal contraceptives for the females who want to delay pregnancy and/or space children.

Choose the **correct** option.

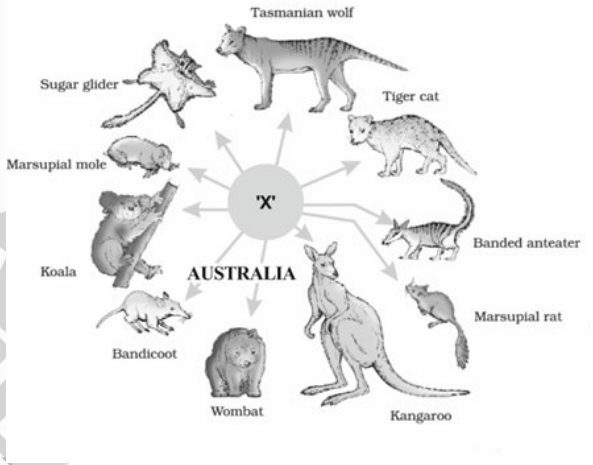
(1) Both statements A and B are correct

(2) Both statements A and B are incorrect

(3) Only statement A is incorrect

(4) Only statement A is correct

192. Identify the phenomenon marked 'X' which led to the development of various marsupials of Australia.




Select the **correct** option for 'X'.

(1) Adaptive convergence

(2) Adaptive radiation

(3) Convergent evolution

(4) Analogy

193. Read the following statements.

**Statement A :** During the course of evolution the pouched mammals of Australia survived.

**Statement B :** Placental mammals failed to be a competition to marsupials as they were separated due to continental drift.

Choose the **correct** option.

(1) Only statement A is correct

(2) Both statements A and B are correct

(3) Both statements A and B are incorrect

(4) Only statement B is correct

194. Scientist 'A' proposed embryological support for evolution based upon features observed during embryonic stages of all vertebrates which was disapproved by scientist 'B'.
Which of the following observations was true according to scientist 'B'?
(1) Embryos pass through adult stages of invertebrates
(2) Embryos never pass through adult stages of other animals
(3) All features observed during embryonic stage are common to all vertebrates upto stages in adult
(4) Embryos of different vertebrates become more and more similar on passing throughout gestation period

195. One of the greatest weaknesses of Darwin's theory of natural selection was that he was unable to explain the cause of
(1) High rate of reproduction
(2) Discontinuous variation
(3) Struggle for existence
(4) Survival of fittest

196. In the course of human evolution, 'A' was possibly the ancestor of 'B' and 'B' was possibly the ancestor of 'C'. Identify 'A', 'B' and 'C' and select the **correct** option.

| | A | B | C |
|---|---|---|---|
| (1) | *Australopithecus* | *Homo erectus* | *Homo habilis* |
| (2) | *Homo habilis* | *Homo erectus* | *Australopithecus* |
| (3) | *Australopithecus* | *Homo erectus* | *Ramapithecus* |
| (4) | *Australopithecus* | *Homo habilis* | *Homo erectus* |

197. The control apparatus of the Urey-Miller experiment was devoid of
(1) Methane and ammonia
(2) Energy source
(3) Water vapour
(4) Being a closed system

198. Select the correct set of examples of convergent evolution
(1) Wings of butterfly and of birds, thorn of *Bougainvillea* and tendril of *Cucurbita*
(2) Forelimbs of man and whale, eye of *Octopus* and of mammals
(3) Sweet potato and potato, flippers of penguins and dolphins
(4) Vertebrate hearts, thorn of *Bougainvillea* and tendril of *Cucurbita*

199. Match column I with column II.

| | **Column I** | | **Column II** |
|---|---|---|---|
| a | Origin of Universe | (i) | 3 bya |
| b | Origin of Earth | (ii) | 20 bya |
| c | Origin of non-cellular form of life | (iii) | 4.5 bya |
| d | Origin of life | (iv) | 4 bya |

Choose the **correct** option.
(1) a-(ii), b-(iii), c-(iv), d-(i)
(2) a-(iii), b-(i), c-(iv), d-(ii)
(3) a-(iii), b-(iv), c-(ii), d-(i)
(4) a-(ii), b-(iii), c-(i), d-(iv)

200. Consider the given statements.
(a) Oparin and Haldane proposed that the first form of life could have come from pre-existing living organic molecules.
(b) S.L. Miller observed the formation of amino acids in his experiment.
(c) According to Darwin, fitness refers ultimately and only to reproductive fitness.
How many of the above statements are correct?
(1) Zero (2) One
(3) Two (4) Three

❑ ❑ ❑

07/04/2023

Phase-1
CODE-B

*Corporate Office*: Aakash Tower, 8, Pusa Road, New Delhi-110005, Ph.011-47623456

# FINAL TEST SERIES for NEET-2023

**MM : 720** **Test-6** **Time : 3 Hrs. 20 Mins.**

## Answers

| | | | | |
|---|---|---|---|---|
| 1. (4) | 41. (4) | 81. (4) | 121. (2) | 161. (2) |
| 2. (2) | 42. (1) | 82. (3) | 122. (2) | 162. (4) |
| 3. (1) | 43. (3) | 83. (3) | 123. (3) | 163. (2) |
| 4. (4) | 44. (4) | 84. (1) | 124. (2) | 164. (1) |
| 5. (2) | 45. (1) | 85. (1) | 125. (1) | 165. (2) |
| 6. (2) | 46. (4) | 86. (1) | 126. (2) | 166. (3) |
| 7. (4) | 47. (3) | 87. (2) | 127. (1) | 167. (4) |
| 8. (3) | 48. (4) | 88. (1) | 128. (1) | 168. (3) |
| 9. (2) | 49. (3) | 89. (2) | 129. (4) | 169. (4) |
| 10. (4) | 50. (3) | 90. (1) | 130. (3) | 170. (2) |
| 11. (3) | 51. (3) | 91. (3) | 131. (3) | 171. (1) |
| 12. (3) | 52. (3) | 92. (3) | 132. (4) | 172. (4) |
| 13. (4) | 53. (2) | 93. (2) | 133. (2) | 173. (4) |
| 14. (2) | 54. (4) | 94. (3) | 134. (1) | 174. (4) |
| 15. (2) | 55. (4) | 95. (1) | 135. (2) | 175. (4) |
| 16. (4) | 56. (1) | 96. (3) | 136. (3) | 176. (4) |
| 17. (4) | 57. (4) | 97. (1) | 137. (2) | 177. (2) |
| 18. (2) | 58. (4) | 98. (1) | 138. (1) | 178. (4) |
| 19. (4) | 59. (3) | 99. (4) | 139. (3) | 179. (4) |
| 20. (1) | 60. (1) | 100. (4) | 140. (1) | 180. (1) |
| 21. (2) | 61. (4) | 101. (4) | 141. (4) | 181. (1) |
| 22. (2) | 62. (1) | 102. (1) | 142. (1) | 182. (3) |
| 23. (3) | 63. (3) | 103. (2) | 143. (2) | 183. (3) |
| 24. (2) | 64. (4) | 104. (2) | 144. (4) | 184. (2) |
| 25. (1) | 65. (4) | 105. (2) | 145. (2) | 185. (2) |
| 26. (1) | 66. (1) | 106. (2) | 146. (4) | 186. (4) |
| 27. (4) | 67. (1) | 107. (2) | 147. (2) | 187. (4) |
| 28. (2) | 68. (2) | 108. (3) | 148. (3) | 188. (2) |
| 29. (2) | 69. (1) | 109. (3) | 149. (2) | 189. (1) |
| 30. (4) | 70. (2) | 110. (4) | 150. (3) | 190. (2) |
| 31. (2) | 71. (4) | 111. (3) | 151. (3) | 191. (3) |
| 32. (4) | 72. (3) | 112. (4) | 152. (1) | 192. (2) |
| 33. (3) | 73. (1) | 113. (3) | 153. (2) | 193. (2) |
| 34. (2) | 74. (3) | 114. (1) | 154. (3) | 194. (2) |
| 35. (4) | 75. (1) | 115. (1) | 155. (1) | 195. (2) |
| 36. (1) | 76. (3) | 116. (2) | 156. (3) | 196. (4) |
| 37. (3) | 77. (3) | 117. (1) | 157. (3) | 197. (2) |
| 38. (1) | 78. (1) | 118. (2) | 158. (3) | 198. (3) |
| 39. (4) | 79. (2) | 119. (4) | 159. (3) | 199. (4) |
| 40. (1) | 80. (2) | 120. (2) | 160. (1) | 200. (3) |

07/04/2023

Phase-1
CODE-B

*Corporate Office*: Aakash Tower, 8, Pusa Road, New Delhi-110005, Ph.011-47623456

# FINAL TEST SERIES for NEET-2023

MM : 720 **Test-6** Time : 3 Hrs. 20 Mins.

## Answers and Solutions

## PHYSICS

### SECTION - A

1. Answer (4)

This is a balanced wheatstone bridge.

$\therefore \ V_A = V_B$

2. Answer (2)

$$P = \frac{V^2}{R} \Rightarrow R \propto \frac{1}{P}$$

3. Answer (1)

$\vec{J} = ne\vec{v}$

$\because \rho = ne$

$\therefore \vec{J} = \rho\vec{v}$

4. Answer (4)

Let resistance be $R$

$$\left(\frac{2}{R+8}\right) = \frac{4\times10^{-1}}{8} \Rightarrow R = 32\ \Omega$$

5. Answer (2)

Maximum power will be delivered when external resistor = $0.6\Omega$

$$\text{Power} = \left(\frac{4}{1.2}\right)^2 \times 0.6 = 6.67\ \text{W}$$

6. Answer (2)

$$\mu = \frac{v}{E}$$

as $v \propto E$

$\mu \propto E^o$

7. Answer (4)

$i = 2t$

$$H = \int_0^2 i^2 R dt = \int_0^2 4t^2(2)dt = 8\frac{t^3}{3}\Big|_0^2 = 8\times\frac{8}{3} = \frac{64}{3}\text{J}$$

8. Answer (3)

KCL : Current is same

as $J = \sigma E \Rightarrow i = \sigma EA$ for larger area, $E$ is less.

9. Answer (2)

$$i = \frac{d\phi}{dt\times R}$$

$\phi = R\int idt$

$\phi = 5\times6\times0.2\times\frac{1}{2} = 3$

10. Answer (4)

$$\varepsilon = \frac{B\omega l^2}{2}$$

$$60 = \frac{B\times100\times4}{2}$$

$$B = \frac{30}{100}$$

$B = 0.3$ T

11. Answer (3)

$$\varepsilon = -\frac{LdI}{dt}$$

12. Answer (3)

$\phi = Li$

$\varepsilon = \frac{d\phi}{dt} = L\frac{di}{dt}$

Since, $\frac{di}{dt}$ is constant, therefore ε is constant.

13. Answer (4)

Effective Length = $\frac{\lambda}{2}$

Force = $i\ l_{eff}\ B = i \times \frac{\lambda}{2} B$

14. Answer (2)

Statements (a) is correct only for bodies in which mass and charge distribution is similar.

15. Answer (2)

$B = \mu_0 ni = \mu_0 \lambda$

16. Answer (4)

On increasing current sensitivity, voltage sensitivity may not increase. To convert a moving coil galvanometer a large resistance is connected in series.

17. Answer (4)

$B = \frac{\mu_0 i}{2\pi(R)} = \frac{\mu_0 \times 40}{2\pi \times 2} = 40 \times 10^{-7}\ T$

18. Answer (2)

Work done by magnetic field is zero and thus kinetic energy remains constant.

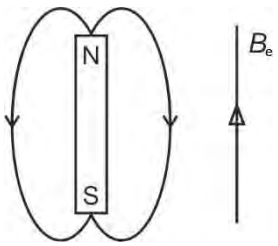
19. Answer (4)

Magnetic moment = $IA = q\frac{v}{2\pi R}(\pi R^2) = \frac{qvR}{2}$

20. Answer (1)

When the pole pieces of a magnet are placed around a limb of a U-tube containing a paramagnetic substance, the paramagnetic substance gets attracted to the magnet and rises up.

21. Answer (2)




$B_e = B_H$

$\frac{\mu_0 M}{4\pi r^3} = B_H$

22. Answer (2)

$A = nI$

$= 2000 \times 4 = 8 \times 10^3$ A/m

The magnetic field $B = \mu_r \mu_0 A$

$= 400 \times 4\pi \times 10^{-7} \times 8 \times 10^3$

$\approx 4$ T

23. Answer (3)

$I(\text{magnetisation}) \propto \frac{B(\text{magnetic fields induction})}{T(\text{temperature in kelvin})}$

$\frac{I_2}{I_1} = \frac{B_2 \times T_1}{B_1 \times T_2}$

$\frac{I_2}{I_1} = \frac{0.1 \times 4}{0.3 \times 12}$

$\frac{I_2}{I_1} = \frac{1}{9}$

$I_2 = \left(\frac{4}{9}\right)$ A m$^{-1}$

24. Answer (2)

Here for solenoid $H = nI$

$H = 500 \times 2$

$= 1000$ A m$^{-1}$

Thus, $H$ is a constant, so it is nearly unchanged

But $B = \mu_0\ \mu_r\ nI$

$B = \mu_0\ nI \times \mu_r$

$B$ = (constant) × $\mu_r$

Thus, from the above equation, we find that $B$ varies with the variation of $\mu_r$

25. Answer (1)

$U = -MB\cos\theta$

For unstable equilibrium $\theta = 180°$

26. Answer (1)

Area of hysteresis loop represents energy loss per unit volume per cycle.

27. Answer (4)

Time period of revolution

$T = \frac{2\pi m}{qB}$

Clearly, time period of revolution is independent of the velocity of the particle.

28. Answer (2)

Two parallel wires carrying current in opposite direction repel each other due to magnetic force.

29. Answer (2)

Angle of dip is 90° at poles and 0° at equator.

30. Answer (4)

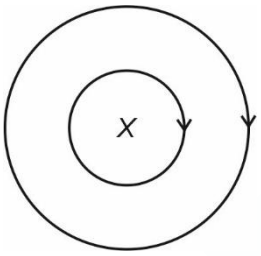
Given, $\phi = 4t^2 + 3$

$$\varepsilon = \left|\frac{d\phi}{dt}\right| = 8t$$

$$\varepsilon = 8 \times 3 = 24\,\text{V}$$

31. Answer (2)

Clockwise current in the outer loop will create magnetic field into the paper and it will decrease with decrease in current, this change will be opposed by the induced emf in the inner coil, therefore current will be induced clockwise to create magnetic field into the paper.




32. Answer (4)

Emf is induced when linked flux change i.e. it may either increase or decrease.

33. Answer (3)

Potential difference in this condition will be

$$\varepsilon = Blv = 2 \times \frac{10}{100} \times 3$$

$\varepsilon$ = 0.6 V

34. Answer (2)

Mutual inductance of two coils can be increased by either increasing the number of turns in the coils or winding the coils on steel core or both.

35. Answer (4)

For parallel combination

$$\frac{1}{L'} = \frac{1}{2} + \frac{1}{2} + \frac{1}{2} \Rightarrow L' = \frac{2}{3}\text{H}$$

For series combination

$$L_{eq} = 2\,\text{H} + \frac{2}{3}\,\text{H} = \frac{8}{3}\,\text{H}$$

## SECTION - B

36. Answer (1)

$$E = \frac{\Sigma E_i / r_i}{\Sigma 1/r_i} = \frac{10/2 + 15/3}{1/2 + 1/3} = \frac{10}{5/6} = 12\,\text{V}$$

$$r_{eq} = \frac{2 \times 3}{2+3} = \frac{6}{5}\Omega$$

$$i = \frac{12}{\frac{6}{5} + 4} = \frac{12}{26/5} = \frac{12 \times 5}{26} = \frac{30}{13}\,\text{A}$$

37. Answer (3)

$$B_{\text{axial}} = \frac{\mu_0 2M}{4\pi r^3}$$

$$B_{\text{equatorial}} = \frac{\mu_0 M}{4\pi r^3}$$

$\chi_{(\text{diamagnetic})} < 0$

$\chi_{(\text{paramagnetic})} > 0$

38. Answer (1)

$$\frac{6}{R} = \frac{I_1}{100 - I_1}$$

$$\frac{6}{(R/2)} = \frac{1.4 I_1}{100 - 1.4 I_1}$$

Dividing both the equations $\Rightarrow \frac{(1.4)(100 - I_1)}{(100 - 1.4 I_1)} = 2$

$200 - 2.8\, I_1 = 140 - 1.4\, I_1$

$60 = 1.4 I_1$

$$I_1 = \frac{60}{1.4} = \frac{300}{7}$$

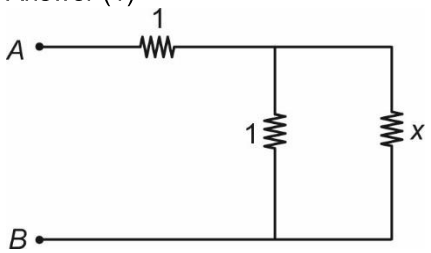
$$\Rightarrow R = 8\,\Omega$$

39. Answer (4)

$$i = \frac{E}{(n+1)r}$$

$$V = E - ir = E - \frac{E}{n+1} = \frac{nE}{n+1}$$

40. Answer (1)




$$\frac{x(1)}{x+1} + 1 = x$$

$$\Rightarrow x + x + 1 = x^2 + x$$

$$x^2 - x - 1 = 0$$

$$x = \frac{1 \pm \sqrt{1+4}}{2} = \frac{1+\sqrt{5}}{2}$$

41. Answer (4)

$$2R_0(1+\alpha T) = R_0(1+\alpha_1 T) + R_0(1+\alpha_2 T)$$

$$\alpha = \frac{\alpha_1 + \alpha_2}{2}$$

42. Answer (1)

Horizontal component of earth's magnetic field is non-zero and vertical component is zero at magnetic equator.

43. Answer (3)

$$\frac{V^2}{R}5 = H$$

$$\left[\frac{V^2}{R} + \frac{V^2}{R}\right]t = H \Rightarrow t = 2.5 \text{ min}$$

44. Answer (4)

$$\varepsilon_s = -M_{12}\frac{dI_p}{dt}$$

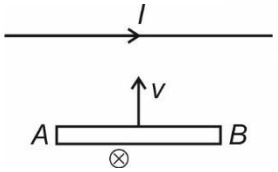
$$\varepsilon_p = -M_{21}\frac{dI_s}{dt}$$

$$\frac{\varepsilon_s}{\varepsilon_p} = \frac{r}{2r} \quad (M_{21} = M_{12})$$

$$\varepsilon_p = 6 \times 2$$

= 12 mV

45. Answer (1)




Magnetic field will be downward therefore force on positive charge will be towards *A* Therefore end *A* will be at higher potential w.r.t. *B*.

46. Answer (4)

$$\varepsilon = (\vec{v} \times \vec{B}).\vec{\ell}$$

= 1 × 2 × 1 = 2 V

$$R_{eff} = \frac{3 \times 6}{9} = 2\ \Omega$$

$$I = \frac{\varepsilon}{R_{eff}} = \frac{2}{2} = 1 \text{ A}$$

$$F = B\,I\,\ell$$

= 2 × 1 × 1 = 2 N

47. Answer (3)

$$B_{centre} = \frac{\mu_0 i}{2R}$$

$$B_{axis} = \frac{\mu_0 i}{2}\frac{R^2}{\left(R^2 + \frac{R^2}{2}\right)^{3/2}} = \frac{\mu_0 i R^2}{2\left(\frac{3R^2}{2}\right)^{3/2}}$$

$$= \frac{\mu_0 i}{\left(\frac{\sqrt{27}}{\sqrt{2}}\right)R}$$

Energy density $\propto B^2$

$$\therefore \text{Ratio} = \frac{1}{2^2}\left(\frac{27}{2}\right) = \frac{27}{8}$$

48. Answer (4)

Magnetic field due to long wire ($B$) = $\frac{\mu_0 i}{2\pi(r)}$

$$B \propto \frac{1}{r}$$

$$F_{AB} > F_{CD}$$

49. Answer (3)

$$qvB = qE \Rightarrow v = \frac{E}{B} = \frac{\sigma}{\varepsilon_0 B}$$

$$\text{time } (t) = \frac{l}{v} = \frac{l}{(\sigma/\varepsilon_0 B)} = \frac{\varepsilon_0 B l}{\sigma}$$

50. Answer (3)

$$T = \frac{1}{\nu} = \frac{2\pi m}{eB} \Rightarrow B = \frac{2\pi m \nu}{e}$$

## CHEMISTRY

### SECTION - A

51. Answer (3)

Mond process is used for refining of Ni.

52. Answer (3)

$[Co(NH_3)_3Cl_3]$ shows two G.I., which are facial and meridional form.

53. Answer (2)

Metal having highest positive charge will have less back bonding and CO present in this case will have shortest 'C–O' bond length.

54. Answer (4)

Order of B.P.: $BiH_3 > SbH_3 > NH_3 > AsH_3 > PH_3$

55. Answer (4)

$(NH_4)_2SO_4 + 2NaOH \rightarrow 2NH_3 + 2H_2O + Na_2SO_4$

56. Answer (1)

Catalyst of Haber's process: Iron oxide with little amounts of $K_2O$ and $Al_2O_3$.

57. Answer (4)

With increase in oxidation state, acidic nature of oxide increases.

58. Answer (4)

White phosphorus is a translucent white waxy solid. It is poisonous, soluble in carbon disulphide and insoluble in water.

59. Answer (3)

In $PCl_5$ all bonds are polar in nature.

60. Answer (1)

Due to presence of maximum 'P-H' bonds in $H_3PO_2$, it is a good reducing agent.

61. Answer (4)

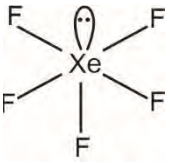
Order of acid strength:

$H_2O < H_2S < H_2Se < H_2Te$

62. Answer (1)

$Gd^{3+}$ : $4f^7$ has 7 unpaired electrons.

63. Answer (3)



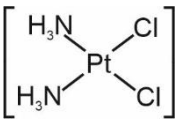
Square pyramidal

$IF_5$ is also square pyramidal in shape.

64. Answer (4)

The oxidation state of the Cl in perchloric acid ($HOClO_3$) is +7 whereas that chloric acid, Nitric acid and nitrous acid contain +5, +5 and +3. Greater the oxidation state of the central atom more readily is the cleavage of the O – H bond hence stronger the acid.

65. Answer (4)

 use for cancer treatment.

66. Answer (1)

As we move up to down in periodic table so the splitting energy ($\Delta_0$) is increase (Ni to Pt) that way CFSE value increase (Ni to Pt).

67. Answer (1)

Hf and Zr having similar atomic and ionic radii because of lanthanoid contraction.

68. Answer (2)

$5NO_2^- + 2MnO_4^- + 6H^+ \rightarrow 2Mn^{2+} + 5NO_3^- + 3H_2O$

$\because$ Nitrite is oxidised to nitrate.

69. Answer (1)

The green magnate $\left(MnO_4^{2-}\right)$ has one unpaired electron that can show d – d transition.

70. Answer (2)

The common oxidation state is +3 among the lanthanoids.

71. Answer (4)

$IE_1$ of Cu is 745 kJ/mol

$IE_1$ of Mn is 717 kJ/mol

$IE_1$ of Fe is 762 kJ/mol

72. Answer (3)

When we move left to right in a periodic table so the size of the metal is decrease due to this basic character of oxides is decrease.

[$\because$ Basic character $\alpha$ size and $\alpha \frac{1}{\text{Oxidation}}$ state of a metal]

73. Answer (1)

Gun metal contains Cu, Sn and Zn.

74. Answer (3)

Osmium and Ruthenium has maximum oxidation state of +8 in d-block.

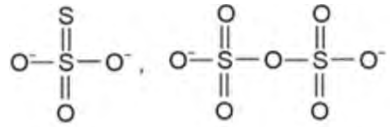
75. Answer (1)

Both the statement I and statement II are correct.

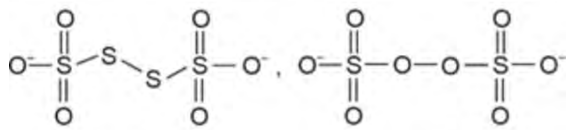
76. Answer (3)

$CuFeS_2$ is a principal ore of copper.

77. Answer (3)



$S_2O_3^{2-}$ $S_2O_7^{2-}$



$S_4O_6^{2-}$ $S_2O_8^{2-}$

78. Answer (1)

NaOH is used as solvent in Bayer process.

79. Answer (2)

Van Arkel method us for refining zirconium and titanium metal.

80. Answer (2)

$NO_2^-$ can act ambidentate ligand, which can show donation either from nitrogen or from oxygen atom.

81. Answer (4)

$[Ni(en)_3]Cl_2 \rightarrow$ Tris(ethane-1,2-diamine)nickel (II) chloride

82. Answer (3)

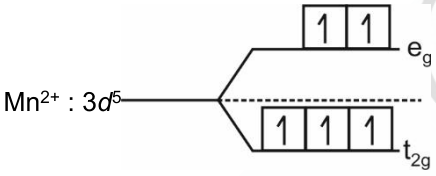
$Fe(CO)_5$ has strong field ligand CO, which allows pairing of unpaired electrons.

83. Answer (3)

The maximum temperature is 2200 K in blast furnace.

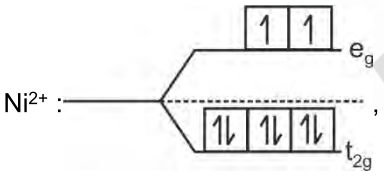
84. Answer (1)

In $[Mn(H_2O)_6]Cl_2$, Mn is present as of $Mn^{2+}$




CFSE = [3(–0.4) + 2(0.6)] $\Delta_0 = 0$

85. Answer (1)




So configuration is $t_{2g}^6\, e_g^2$

## SECTION - B

86. Answer (1)

German silver contains Cu 25 – 30%, Zn 25 – 30% and Ni 40 – 50%.

87. Answer (2)

Highest oxidation state contains by $\overset{+5}{H}N O_3$ is +5.

88. Answer (1)

Both the statement I and statement II are correct.

89. Answer (2)

$[Cr(NH_3)_4(Cl)_2Cl + AgNO_3 \longrightarrow [Cr(NH_3)_4(Cl)_2]NO_3 + AgCl$

| | | | | |
|---|---|---|---|---|
| t = 0 | 0.02 M | excess | – | – |
| t = t | 0.0 | | 0.02 M | 0.02 M |

So 1 L give 0.02 M AgCl than 0.1 L give 0.002 M.

90. Answer (1)

n-factor of $KMnO_4$ in neutral medium is 3.

91. Answer (3)

Square planar and tetrahedral molecule does not show optical isomerism.

cis-$[Pt(NH_3)_2Cl_2$ is square planar and $Ni(CO)_4$ is tetrahedral molecule.

Only Cis form exhibit optical isomerism in octahedral geometry.

92. Answer (3)

- EDTA is used in the treatment of lead poisoning.
- Wilkinson catalyst is used for the hydrogenation of alkenes.

93. Answer (2)

Generally, *d*-block elements with $d^1$ to $d^9$ electronic configuration are coloured in their aqueous solution.

94. Answer (3)

Zn, Cd and Hg are not considerd as transition element.

Sc exist only in +3 oxidation state

Mn Cd exist in +1 to +7 variable oxidation state.

Zn show only +2 oxidation state.

95. Answer (1)

$2MnO_4^- + H_2O + I^- \rightarrow 2MnO_2 + 2OH^- + IO_3^-$

A notable reaction is the oxidation of iodine to iodate.

96. Answer (3)

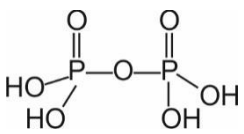
| List-I | List-II |
|---|---|
| Am(Z = 95) | $[Rn]5f^7 7s^2$ |
| Cm(Z = 96) | $[Rn]5f^7 6d^1 7s^2$ |
| No(Z = 102) | $[Rn]5f^{14} 7s^2$ |
| Lr(Z = 103) | $[Rn]5f^{14} 6d^1 7s^2$ |

97. Answer (1)

For the conversion of $SO_2$ to $SO_3$ we use $V_2O_5$ catalyst.

98. Answer (1)

$H_4P_2O_7$:



99. Answer (4)

Order of bond length:

$I_2 > Br_2 > Cl_2 > F_2$

100. Answer (4)

$$Cl_2 + \underset{\text{cold \& dilute}}{2NaOH} \rightarrow NaCl + NaOCl + H_2O$$

## BOTANY

### SECTION - A

101. Answer (4)

Codon is read in contiguous fashion.

102. Answer (1)

Methionine is coded by the code 5′ AUG 3′

103. Answer (2)

When repressor does not bind to operator then RNA polymerase can bind to promoter.

104. Answer (2)

Gene *i* is responsible for the synthesis of repressor protein.

105. Answer (2)

Genotypes with 3 dominant alleles will produce the intermediate skin colour and with more than 3 dominant alleles will produce darker skin colour than intermediate.

106. Answer (2)

$X^CX \times X^CY$

$\downarrow$

$X^CX^C, X^CY, X^CX, XY$

Color blind daughter

107. Answer (2)

| | Father | | Mother |
|---|---|---|---|
| Parent | A | × | B |
| | ↓ | | |
| Son | AB blood group | | |

108. Answer (3)

$wwmm^+$ is genotype of recombinant $F_2$ offspring.

109. Answer (3)

Flower colour in snapdragon shows incomplete dominance.

110. Answer (4)

Individuals suffering from Turner's syndrome have 44 + XO genetic constitution.

111. Answer (3)

$\frac{1}{16}$ individuals have only recessive alleles.

112. Answer (4)

Template strand of DNA has 3′⟶5′ polarity and a transcription unit has three components, i.e., promoter, structural gene and terminator.

113. Answer (3)

BB seeds will have large sized starch grains with round shape.

114. Answer (1)

In prokaryotes, DNA-dependent RNA polymerase is only of one type and transcribes all of RNAs.

115. Answer (1)

Recombinants for y and w were 1.3%.

116. Answer (2)

Introns are removed by small nuclear RNA and protein complex called SnRNPs.

117. Answer (1)

Human, *Drosophila* and Grasshopper males are heterogametic. Birds and Butterflies males are homogametic whereas females are heterogametic.

118. Answer (2)

Turner's syndrome leads to sterility in female due to 44 + XO chromosome complement.

119. Answer (4)

 – five unaffected individuals with unspecified sex.

120. Answer (2)

VNTRs and STRs normally do not code for proteins. Polymorphisms in DNA sequence are inheritable.

121. Answer (2)

Uracil is seen in RNA and *E. coli* has DNA as genetic material.

122. Answer (2)

Traits – Dwarf stem, Wrinkled seed, Green seed, Inflated pod.

Characters – Flower position, Flower colour, Pod colour.

123. Answer (3)

Each nucleotide has free 3′OH only. 2′OH is seen in RNA.

124. Answer (2)

If the genes are linked, the probability to segregate is less than that if they are present on separate chromosomes.

125. Answer (1)

Glycosidic linkage joins sugar to base.

126. Answer (2)

Total number of genes in human genome was estimated to be 30,000 according to HGP.

127. Answer (1)

DNA ligase joins the Okazaki fragments.

128. Answer (1)

Flower colour in snapdragon is an example of incomplete dominance.

RR × rr
Red White
↓
Rr
(All pink)

129. Answer (4)

23S rRNA acts as ribozyme which is a part of larger subunit of ribosome.

130. Answer (3)

In incomplete dominance, $F_1$ does not resemble either of the two parents.

131. Answer (3)

Split gene arrangement is seen in Archaebacteria and eukaryotes.

The process of splicing is done with the help of ribozyme thus represents the dominance of RNA world.

132. Answer (4)

Separation of factors during gametogenesis is random.

133. Answer (2)

Introns do not appear in mature RNA.

134. Answer (1)

Mutated allele may be equivalent to the unmodified allele.

135. Answer (2)

UUU codes for phenylalanine.

AUG codes for methionine.

GAG codes for glutamic acid.

UAA is a stop codon.

## SECTION - B

136. Answer (3)

Maximum number of possible phenotypes in trihybrid cross will be $2^3 = 8$.

For co-dominance, ratios for genotypes and phenotypes will be same.

137. Answer (2)

Most abundant RNA is rRNA.

138. Answer (1)

Heights in humans is controlled by more than one gene.

139. Answer (3)

Ribozyme is a RNA enzyme.

140. Answer (1)

Number of genotypes of polygenes = $3^n$
$= 3^3 = 27$

141. Answer (4)

Lactose is broken down into glucose and galactose.

142. Answer (1)

Darkly stained regions in chromatin are called heterochromatin.

143. Answer (2)

RNA pol II synthesizes mRNA.

144. Answer (4)

Phage DNA was labelled with $^{32}P$ by growing bacteria infected with phages in culture medium containing $^{32}PO_4$.

145. Answer (2)

With the help of splicing introns are removed.

146. Answer (4)

In most of the eukaryotes, structural genes in transcription units are monocistronic.

147. Answer (2)

Persons suffering from Klinefelter's syndrome have 44 + XXY genetic constitution.

148. Answer (3)

Loss or gain of segment of DNA results in alteration in chromosomes. This results in chromosomal aberration.

149. Answer (2)

Each character has 2 traits in pea plant which were considered by Mendel.

150. Answer (3)

Myotonic dystrophy is autosomal dominant trait.

# ZOOLOGY

## SECTION - A

151. Answer (3)

The function of copper ions in copper releasing IUDs is to suppress sperm motility and fertilising capacity of sperms.

152. Answer (1)

An increase in number of people in reproducible age is probable reason of population explosion.

153. Answer (2)

The programmes called 'family planning' were initiated in 1951.

154. Answer (3)

Progestasert is a hormone releasing IUD.

155. Answer (1)

Both male and female condoms are disposable, can be self-inserted and there by gives privacy to the user.

156. Answer (3)

Administration of progestogens or progestogen-estrogen combinations or IUDs within 72 hours of coitus have been found to be very effective as emergency contraceptives as they could be used to avoid possible pregnancy due to rape or casual unprotected intercourse.

157. Answer (3)

MTP is relatively safe, if it is performed upto 12 weeks (first trimester) of pregnancy.

158. Answer (3)

Hormonal oral pills alter the uterine endometrium to make it unsuitable for implantation.

159. Answer (3)

Sterilisation methods are highly effective but their reversibility is very poor.

160. Answer (1)

Copper releasing and hormone releasing IUDs are considered as medicated IUDs.

161. Answer (2)

Except for hepatitis-B, genital herpes and HIV infections, other diseases are completely curable if detected early and treated properly.

162. Answer (4)

'Saheli'–a new oral contraceptive for the females–was developed by scientists at Central Drug Research Institute (CDRI) in Lucknow, India.

163. Answer (2)

Infertility cases either due to inability of the male partner to inseminate the female or due to very low sperm counts in the ejaculates, could be corrected by artificial insemination (AI) technique.

164. Answer (1)

Oogenesis occurs in ovary and is not hampered in case of tubectomy.

165. Answer (2)

According to theory of panspermia, units of life called spores were transferred to different planets including Earth.

Panspermia states that life is present throughout the Universe.

166. Answer (3)

The peak shifts to one direction in directional selection.

167. Answer (4)

Oparin of Russia and Haldane of England proposed that the first form of life could have come from pre-existing non-living organic molecules (e.g. RNA, protein, *etc*.) and that formation of life was preceded by chemical evolution, i.e., formation of diverse organic molecules from inorganic constituents.

168. Answer (3)

After the industrialisation in 1920, there were more dark winged moths in the same area *i.e.* the proportion was reversed.

169. Answer (4)

*Homo sapiens* arose in the ice age.

170. Answer (2)

Lichens cannot grow in polluted atmosphere so, they are considered as pollution indicator.

171. Answer (1)

Homology is based on divergent evolution whereas analogy is based on convergent evolution.

172. Answer (4)

Wings of bat and wings of pigeon are analogous structures.

173. Answer (4)

The land reptiles were, of course, the dinosaurs. The biggest of them, *i.e.*, *Tyrannosaurus* rex was about 20 feet in height and had huge fearsome dagger like teeth.

174. Answer (4)

Gene flow occurs if gene migration happens multiple times.

175. Answer (4)

Random mating helps in maintaining the Hardy Weinberg equilibrium whereas genetic drift, gene migration and selective mating disrupt it.

176. Answer (4)

Two mya, *Australopithecines* probably lived in East African grasslands. Evidence shows they hunted with stone weapons but essentially ate fruit. This creature was called the first human-like being the hominid and was called *Homo habilis*.

177. Answer (2)

Pre-historic cave art developed 18,000 years ago.

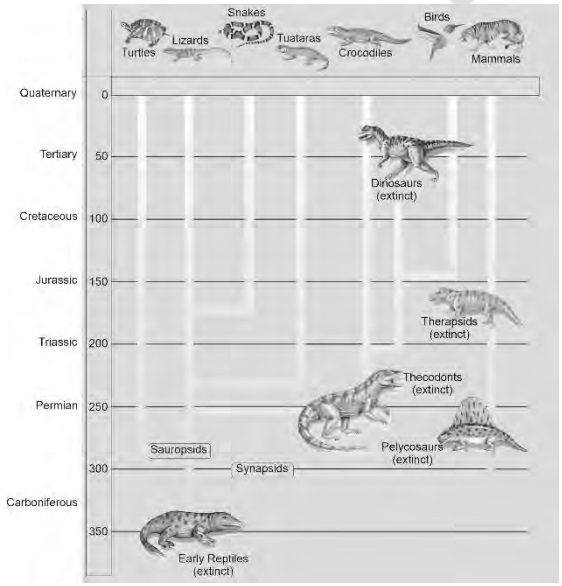
178. Answer (4)

Charles Darwin gave the concept of natural selection.

179. Answer (4)

Genetic drift causes the change in gene frequency by chance in a small population.

180. Answer (1)




181. Answer (1)

About 2000 million years ago, the first cellular forms of life appeared on Earth.

182. Answer (3)

Water vapour, methane, carbon dioxide and ammonia released from molten mass covered the Earth surface.

183. Answer (3)

Sum total of the allelic frequencies (p + q) = 1

$p^2$ = frequency of homozygous dominant individuals

$q^2$ = frequency of homozygous recessive individuals.

184. Answer (2)

Fossils discovered in Java in 1891 revealed the next stage, *i.e.*, *Homo erectus* about 1.5 mya.

185. Answer (2)

Frequencies of homozygous recessive genotype ($q^2$) = 0.09

$q = \sqrt{0.09} = 0.3$

According to Hardy-Weinberg equilibrium, p + q = 1

$p = 1 - q \Rightarrow 1 - 0.3 \Rightarrow 0.7$

Frequency of homozygous dominant genotype = $p^2$

$= (0.7)^2 = 0.49$

Percentage of individuals homozygous for dominant allele = 49%

## SECTION - B

186. Answer (4)

In AI, the semen collected either from the husband or a healthy donor is artificially introduced either into the vagina or into the uterus (IUI – intra uterine insemination) of the female.

187. Answer (4)

Progestogens alone or in combination with estrogen can be used by females as injections or implants under the skin.

188. Answer (2)

An ideal contraceptive should be user-friendly, easily available, effective and reversible with no or least side-effects.

189. Answer (1)

The most important component of the oral contraceptive pills is progesterone.

190. Answer (2)

In tubectomy, a small part of the fallopian tube is removed or tied up through a small incision in the abdomen or through vagina.

191. Answer (3)

Lactational amenorrhea has been reported to be effective only upto a maximum period of 6 months following parturition.

192. Answer (2)

Darwin's finches and Australian Marsupials are best examples of adaptive radiation.

193. Answer (2)

Continental drift created a biogeographical barrier for placental mammals.

194. Answer (2)

Embryological support for evolution was also proposed by Ernst Heckel based upon the observation of certain features during embryonic stage common to all vertebrates that are absent in adult. For example, the embryos of all vertebrates including human develop a row of vestigial gill slit just behind the head but it is a functional organ only in fish and not found in any other adult vertebrates. However, this proposal was disapproved on careful study performed by Karl Ernst von Baer. He noted that embryos never pass through the adult stages of other animals.

195. Answer (2)

Darwin was unable to explain the cause of discontinuous variations observed by himself in nature and the mode of transmission of variants.

196. Answer (4)

The chronological order of human evolution from early to recent is

*Australopithecus* → *Homo habilis* → *Homo erectus*

197. Answer (2)

In the experiment, Miller took molecules similar to early Earth's atmosphere and put them into a closed system. The control apparatus comprised similar arrangement except that it was devoid of an energy source.

198. Answer (3)

Divergent evolution or homology – Vertebrate hearts or brains, forelimbs of man and whale, thorn of *Bougainvillea* and tendril of *Cucurbita*.

199. Answer (4)

Origin of Universe – 20 bya

Origin of Earth – 4.5 bya

Origin of non-cellular form of life – 3 bya

Origin of life – 4 bya

200. Answer (3)

Oparin of Russia and Haldane of England proposed that the first form of life could have come from pre-existing non-living organic molecules (e.g. RNA, protein, *etc.*) and that formation of life was preceded by chemical evolution, i.e., formation of diverse organic molecules from inorganic constituents.

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