1. When one of the following is not correct about Lorentz Force?

(a) In presence of electric field $\vec{E}(r)$ and magnetic field $\vec{B}(r)$ the force on a moving electric charge is $\vec{F} = q\left[\vec{E}(r) + v \times \vec{B}(r)\right]$

(b) The force, due to magnetic field on a negative charge is opposite to that on a positive charge.

(c) The force due to magnetic field become zero of velocity and magnetic field are parallel or anti-parallel.

(d) For a static charge the magnetic force is maximum.

2. The magnetic force $\vec{F}$ on a current carrying conductor of length l in an external magnetic field $\vec{B}$ is given by

(a) $\dfrac{I \times \vec{B}}{\vec{l}}$　　(b) $\dfrac{\vec{I} \times \vec{B}}{I}$　　(c) $I(\vec{l} \times \vec{B})$　　(d) $I^2 \vec{l} \times \vec{B}$

3. A circular loop of radius R carrying a current I is placed in a uniform magnetic field B perpendicular to the loop. The force on the loop is

(a) $2\pi RIB$　　(b) $2\pi RI^2 B^3$　　(c) $\pi R^2 IB$　　(d) zero

4. Which one of the following is correct statement about magnetic forces?
(a) Magnetic forces always obey Newton's third law

(b) Magnetic forces do not obey Newton's third law

(c) For very high current, magnetic forces obey Newton's third law

(d) Inside low magnetic field, magnetic forces obey Newton's third law

5. Two particles have the ratio of their velocities as 3 : 2 on entering the field. If they move in different circular paths, then the ratio of the radii of their paths is
(a) 2 : 3　　(b) 3 : 2　　(c) 9 : 4　　(d) 4 : 9

6. If a charged particle is moving in a cyclotron, then
(a) It speeds up within a dee

(b) Slows down within a dee and speeds up between dees

(c) Speeds up between the dees because of external magnetic field

(d) Undergoes acceleration all times

7. An element of $0.05\hat{i}$ m is placed at the origin as shown in figure which carries a large current of 10 A. The magnetic field at a distance of 1 m in perpendicular direction is

(a) 4.5 × 10⁻⁸ T

(b) 5.5 × 10⁻⁸ T

(c) 5.0 × 10⁻⁸ T

(d) 7.5 × 10⁻⁸ T
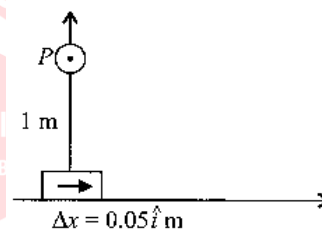
8. Two identical current carrying coaxial loops, carry current I in opposite sense. A simple amperian loop passes through both of them once. Calling the loop as C, then which statement is correct?

(a) $\oint_c \vec{B}\vec{d}l = \pm 2\mu_0 I$

(b) The value of $\oint \vec{B}.\vec{d}l$ is independent of sense of C

(c) There may be a point on C where B and dl are parallel.

(d) None of these

9. A long straight wire carrying current of 30 A rests on a table. Another wire AB of length 1 m, mass 3 g carries the same current but in the opposite direction, the wire AB is free to side up and down. The height upto which AB will rise is
(a) 0.6 cm　　(b) 0.7 cm　　(c) 0.4 cm　　(d) 0.5 cm

10. A circular current loop of magnetic moment M is in an arbitrary orientation in an external magnetic Field $\vec{B}$. The work done to rotate the loop by 30° about an axis perpendicular to its plane is

(a) MB   (b) $\sqrt{3}\dfrac{MB}{2}$ (c) $\dfrac{MB}{2}$ (d) Zero.

11. Find the position of point from wire 'B' where net magnetic field is zero due to following current distribution
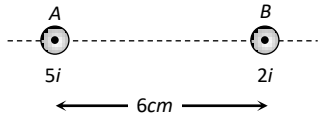
(a) 4 cm   (b) $\dfrac{30}{7}$ cm   (c) $\dfrac{12}{7}$ cm   (d) 2 cm

12. A torpid of mean radius 'c' cross section radius 'r' and total number of turns N. It carries a current 'i'. The torque experienced by the toroid if a uniform magnetic field of strength B is applied -
(a) Is zero
(b) Is $BiN\pi r^2$
(c) Is $BiN\pi a^2$
(d) Depends on the direction of magnetic field

13. The primary origin of magnetism lies in
(a) Atomic current and intrinsic spin of electrons.

(b) Polar and non polar nature of molecules.

(c) Pauli exclusion principle.

(d) Electronegative nature of materials.

14. Which of the following is correct about magnetic monopole?
(a) Magnetic monopole exist.

(b) Magnetic monopole does not exist.

(c) Magnetic monopole have constant value of monopole momentum.

(d) The monopole momentum increase due to increase at its distance from the field.

15. A short bar magnet has a magnetic moment of 0.48 J T^{-1}. The magnitude and direction of magnetic field produced by the magnet at a distance of 10 cm from the centre of the magnet on its axis is
(a) 0.48 × 10^{-4} along N-S direction

(b) 0.28 × 10^{-4} T along S-N direction

(c) 0.28 × 10^{-4} T along N-S direction

(d) 0.96 × 10^{-4} T along S-N direction

16. A wire is placed between the poles of two fixed bar magnets as shown in the figure. A small current in the wire is into the plane of the paper. The direction of the magnetic force on the wire is
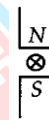
(a) ↑   (b) ↓   (c) →   (d) ←

17. A bar magnet of magnetic moment M and moment of inertia I (about centre perpendicular to length) is cut into two equal pieces perpendicular to length. Let T be the period of oscillations of the original magnet about an axis through the midpoint perpendicular to length in magnetic field B. The similar period T' for each piece would be

(a) $\dfrac{T}{2}$ (b) $\dfrac{3T}{4}$ (c) $\dfrac{5T}{2}$ (d) T

18. A magnetic dipole is under the influence of two magnetic fields. The angle between the field directions is 60° and one of the fields has a magnitude of 1.2 x 10^{-2} T. If the dipole comes to stable equilibrium at an angle of 30° with this field, then the magnitude of the field is
(a) 1.2 x 10^{-4} T   (b) 2.4 x 10^{-2} T

(c) $1.2\times10^{-2}\,T$ (d) $2.4\times10^{-2}\,T$

19. A vector needs three quantities for its specification. Which of the following independent quantities is not used to specify the earth's magnetic field?
(a) Magnetic declination (θ).

(b) Magnetic dip (δ).

(c) Horizontal component of earths field (B_H).

(d) Vertical component of earth's field (B_v).

20. A ring of mean radius 15 cm has 3500 turns of wire wound on a ferromagnetic core of relative permeability 800. The magnetic field in the core for a magnetising current of 1.2 A is
(a) 2.48 T   (b) 3.48 T   (c) 4.48 T   (d) 5.48 T

21. In an experiment it is found that the magnetic susceptibility of given substance is much more greater than one. The possible substance is
(a) Diamagnetic   (b) Paramagnetic

(c) Ferromagnetic   (d) Nonmagnetic

22. Point out the correct set of diamagnetic substances
(a) Aluminium, sodium calcium and oxygen

(b) Bismuth, copper, lead and silicon

(c) Cobalt, nickel, gadolinium and aluminium

(d) Silver, niobium, magnesium and calcium

23. Permanent magnets are the substances having the property of
(a) Ferromagnetism at room temperature for a long period of time.

(b) Paramagnetism at room temperature for a long period of time.

(c) Anti ferromagnetism at room temperature for a long period of time.

(d) Diamagnetism at room temperature for a long period of time.

24. The magnetic field of Earth can be modelled by that of a point dipole placed at the centre of the Earth. The dipole axis makes an angle of 11.3° with the axis of Earth. At Mumbai, declination is nearly zero. Then,
(a) The declination varies between 11.3° W to 11.3°E.

(b) The least declination is 0°.

(c) The plane defined by dipole axis and Earth axis passes through Greenwich.

(d) Declination averaged over Earth must be always negative.

25. Consider the two idealised systems
(i) a parallel plate capacitor with large plates and small separation and

(ii) a long solenoid of length L >>R, radius of cross-section.

In (i) $\vec{E}$ is ideally treated as a constant between plates and zero outside. In (ii) magnetic field is constant inside the solenoid and zero outside. These idealised assumptions, however, contradict fundamental laws as below

(a) Case (i) contradicts Gauss's law for electrostatic fields.

(b) Case (ii) contradicts Gauss's law for magnetic fields.

(c) Case (i) agrees with $\oint \vec{E}.\vec{dl} = 0$.

(d) Case (ii) contradicts $\oint \vec{H}.\vec{dl} = I_{en}$.

26. Two identical magnetic dipoles of magnetic moment 2A m^2 are placed at a separation of 2 m with their axes perpendicular to each other in air. The resultant magnetic field at a midpoint between the dipoles is
(a) $4\sqrt{5}\times10^{-5}\,\text{T}$ (b) $2\sqrt{5}\times10^{-5}\,\text{T}$

(c) $4\sqrt{5}\times10^{-7}\,\text{T}$ (d) $2\sqrt{5}\times10^{-7}\,\text{T}$

27. Assume the dipole model for earths magnetic field *B* which is given by the vertical component of magnetic field, $B_v = \frac{\mu_0}{4\pi}\frac{2m\cos\theta}{r^3}$ and the horizontal component of magnetic field $B_H = \frac{\mu_0}{4\pi}\frac{m\sin\theta}{r^3}$ where $0 = 90°$ - latitude as measured from magnetic equator, then the loci of point for which dip angle is ± 45°.
(a) $\tan^{-1}(3)$ (b) $\tan^{-1}(2)$

(c) $\tan^{-1}(0.5)$ (d) $\tan^{-1}(1)$

28. The magnetic susceptibility of a material of a rod is 499, permeability of vacuum is $4\pi \times 10^{-7} H/m$. Permeability of the material of the rod in *henry/metre* is

(a) $\pi \times 10^{-4}$ (b) $2\pi \times 10^{-4}$

(c) $3\pi \times 10^{-4}$ (d) $4\pi \times 10^{-4}$

29. The coefficient of self inductance of a solenoid is 0.18 mH. If a crode of soft iron of relative permeability 900 is inserted, then the coefficient of self inductance will become nearly

(a) 5.4 Mh (b) 162 Mh

(c) 0.006 mh (d) 0.0002 Mh

30. A current increases uniformly from zero to one ampere in 0.01 second, in a coil of inductance 10 mH it. The induced emf will be

(a) 1 V (b) 2 V (c) 3 V (d) 4 V

31. The average emf induced in a coil in which a current changes from 0 to 2 A in 0.05 s is 8 V. The self inductance of the coil is

(a) 0.1 H (b) 0.2 H (c) 0.4 H (d) 0.8 H

32. If the rotational velocity of a dynamo armature is doubled, then the induced emf will

(a) Become half (b) Become double

(c) Become quadruple (d) Remain unchanged

33. An ideal transformer steps down 220 V to 22 V in order to operate a device with an impedance of 220 Ω. The current in the primary is

(a) 0.01 A (b) 0.1 A (c) 0.5 A (d) 1.0 A

**34.** In the circuit shown below, what will be the readings of the voltmeter and ammeter
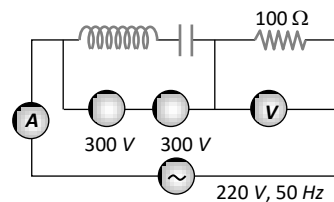
(a) 800 V, 2A (b) 300 V, 2A

(c) 220 V, 2.2 A (d) 100 V, 2A

35. A solenoid has a length L = 1.23m and an inner diameter d = 3.55cm. It has five layers of windings of 850 turns each and carries a current $i_0 = 5.57 A$. What is B at its center?

(a) 5mT (b) 30.8mT (c) 43.2mT (d) 24.2mT

36. In a LR circuit connected to a battery the rate at which energy is stored in the inductor is plotted against time during the growth of current in the circuit. Which of the following best represents the resulting curve?
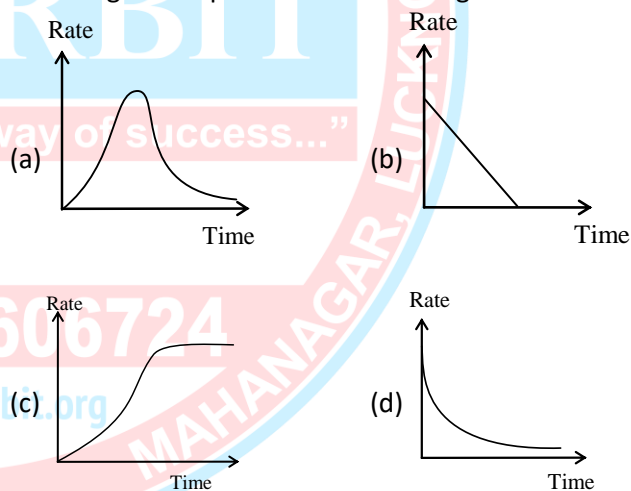
37. A wire bent as a parabola $y = kx^2$ is located in a uniform magnetic field of induction B, the vector B being perpendicular to the plane xy. At t = 0, sliding wire starts sliding from the vertex O with a constant acceleration a linearly as shown in Fig. Find the emf induced in the loop –
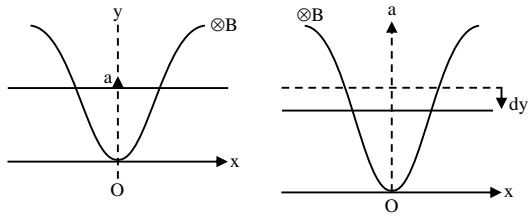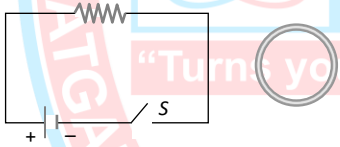

(a) $By\sqrt{\dfrac{2a}{k}}$ (b) $By\sqrt{\dfrac{4a}{k}}$ (c) $By\sqrt{\dfrac{8a}{k}}$ (d) $By\sqrt{\dfrac{a}{k}}$

38. The e.m.f $E = 4 \cos 1000t$ volts is applied to an L–R circuit containing inductance 3mH and resistance $4\,\Omega$. The amplitude of current is -

(a) $4\sqrt{7}$ A   (b) 1.0 A   (c) $\dfrac{4}{7}$ A   (d) 0.8 A

39. A small loop lies outside a circuit. The key of the circuit is closed and opened alternately. The closed loop will show

(a) Clockwise pulse followed by another clockwise pulse Clockwise pulse followed by another clockwise pulse

(b) Anticlockwise pulse followed by another anticlockwise pulse

(c) Anticlockwise pulse followed by a clockwise pulse

(d) Clockwise pulse followed by an anticlockwise pulse

40. What will be the equation of ac of frequency 75 Hz if its r.m.s. value is 20 A

(a) $i = 20 \sin 150\,\pi\,t$ (b) $i = 20\sqrt{2} \sin(150\,\pi\,t)$

(c) $i = \dfrac{20}{\sqrt{2}} \sin(150\,\pi\,t)$ (d) $i = 20\sqrt{2} \sin(75\,\pi\,t)$

41. The r.m.s. current in an ac circuit is 2 A. If the wattless current be $\sqrt{3}\,A$, what is the power factor

(a) $\dfrac{1}{\sqrt{3}}$ (b) $\dfrac{1}{\sqrt{2}}$ (c) $\dfrac{1}{2}$ (d) $\dfrac{1}{3}$

42. When 100 volt dc is applied across a solenoid, a current of 1.0 amp flows in it. When 100 volt ac is applied across the same coil, the current drops to 0.5 amp. If the frequency of ac source is 50 Hz the impedance and inductance of the solenoid are
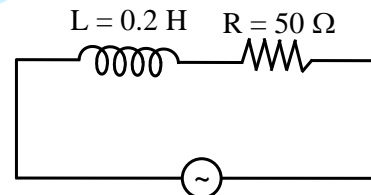
(a) 200 ohms and 0.5 henry   (b) 100 ohms and 0.86 henry

(c) 200 ohms and 1.0 henry   (d) 100 ohms and 0.93 henry

43. A 50 Hz ac source of 20 volts is connected across R and C as shown in figure. The voltage across R is 12 volt. The voltage across C is –
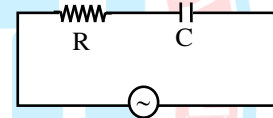
(a) 8 V

(b) 16 V

(c) 10 V

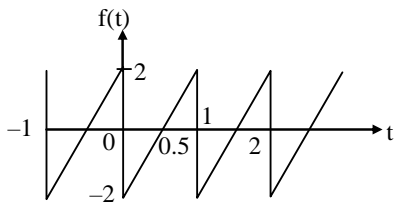(d) Not possible to determine unless values of R and C are given

44. In the given circuit the average power developed is–

$V = 200 \sin(250\ t)$ volt

(a) $50\sqrt{2}$ watt   (b) 200 watt

(c) $150\sqrt{2}$ watt   (d) $200\sqrt{2}$ watt

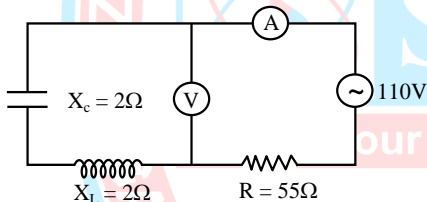**45.** Find the rms value of the saw tooth wave form shown in figure -

(a) 5   (b) 1.15   (c) 4   (d) None of these

46. In an a.c. circuit V and I are given by

V = 100 sin (100 t) volts

I = 100 sin (100 t + π/3) mA

the power dissipated in the circuit is-

(a) 10^4 watt   (b) 10 watt   (c) 2.5 watt   (d) 5.0 watt

**47.** The reading of the ammeter and voltmeters are (Both the instruments are ac meters and measures rms value) -

(a) 2A, 110 V   (b) 2A, 0V   (c) 2A, 55V   (d) 1A, 0 V

48. In a circuit an alternating current and a direct current are supplied together. The expression of the instantaneous current is given as $i = 3 + 6\sin\omega t$. Then the r.m.s. value of the current is

(a) 3A   (b) 6A   (c) $3\sqrt{2}$ A   (d) $3\sqrt{3}$ A

49. By passing 0.1 Faraday of electricity through fused sodium chloride, the amount of chlorine liberated is

(a) 35.45 g   (b) 70.9 g   (c) 3.55 g   (d) 17.77 g

50. When electricity is passed through the solution of $AlCl_3$, 13.5 gmof Al are deposited. The number of Faraday must be

(a) 0.50   (b) 1.00   (c) 1.50   (d) 2.00

51. The cell constant of a given cell is $0.47\,cm^{-1}$. The resistance of a solution placed in this cell is measured to be 31.6 Ohm. The conductivity of the solution (in $S\,cm^{-1}$ where S has usual meaning) is

(a) 0.15   (b) 1.5   (c) 0.015   (d) 150

52. The standard electrode potentials of the two half calls are given below

$Ni^{2+} + 2e^- \rightleftharpoons Ni\,;E^0 = -0.25\ volt$;

$Zn^{2+} + 2e^- \rightleftharpoons Zn\,;E^0 = -0.77\ volt$
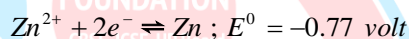
The voltage of cell formed by combining the two half - cells would be

(a) – 1.02 V   (b) + 0.52 V   (c) + 1.02 V   (d) – 0.52 V

53. E^0 for the cell $Zn/Zn^{2+}{}_{(aq)}//Cu^{2+}{}_{(aq)}/Cu$ is 1.10Vat 25^oC. The equilibrium constant for the reaction $Zn + Cu^{2+}{}_{(aq)} \rightleftharpoons Cu + Zn^{2+}{}_{(aq)}$ is of the order of

(a) 10^{-28} (b) 10^{-37} (c) 10^{+18} (d) 10^{37}

54. The logarithm of the equilibrium constant, $\log K_{eq}$, of the net cell reaction of the cell,

$X(s)|X^{2+}||Y^+|Y(s)(given\ E^0_{cell} = 1.20V)$, is

(a) 47.2   (b) 40.5   (c) 21.4   (d) 12.5

55. Electrolysis of dil H_2SO_4 liberates gases at anode and cathode

(a) O_2 & SO_2 respectively   (b) SO_2 & O_2 respectively

(c) O_2 & H_2 respectively   (d) H_2 & O_2 respectively

56. At 298 K , the conductivity of a saturated solution of AgCl in water is 2.6×10^{-6} ohm^{-1}cm^{-1}. Given , λ_m^∞ (Ag$^+$) = 63 ohm^{-1} cm^{2}mol^{-1} & λ_m^∞ (Cl$^-$) = 67 ohm^{-1} cm^{2}mol^{-1}

Therefore solubility product of AgCl is

(a) 2×10^{-5} (b) 4×10^{-10}

(c) 4×10^{-16} (d) 2×10^{-8}

57. The thermodynamic efficiency of cell is given by –

(a) $\Delta H/\Delta G$ (b) nFE/ΔG (c) nFE/ΔH (d) Nfe^0

58. Given : $E^0_{Fe^{3+}/Fe=-0.036}$ V, $E^0_{Fe^{2+}/Fe} = -0.439$ V The value of standard electrode potential for the change, $+e^- \longrightarrow$ will be :

(a) 0.385V (b) 0.770V (c) – 0.270V (d) – 0.072V

59. For the reaction $N_2 + 3H_2 \rightleftharpoons 2NH_3$, if $\dfrac{\Delta[NH_3]}{\Delta t} = 2 \times 10^{-4} mol\ l^{-1}s^{-1}$, the value of $\dfrac{-\Delta[H_2]}{\Delta t}$ would be

(a) $1 \times 10^{-4} moll^{-1}s^{-1}$ (b) $3 \times 10^{-4} mol\ l^{-1}s^{-1}$

(c) $4 \times 10^{-4} moll^{-1}s^{-1}$ (d) $6 \times 10^{-4} mol\ l^{-1}s^{-1}$

60. The first order rate constant for the decomposition of N_2O_5 is $6.2 \times 10^{-4} \sec^{-1}$. The half-life period for this decomposition in seconds is

(a) 1117.7 (b) 111.7 (c) 223.4 (d) 160.9

61. Which of the following curve represent zero order reaction of A →products?
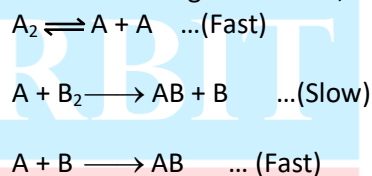

(a)   (b)

(c)   (d)
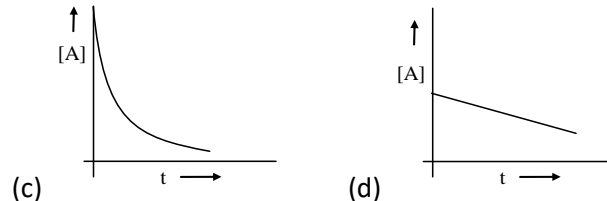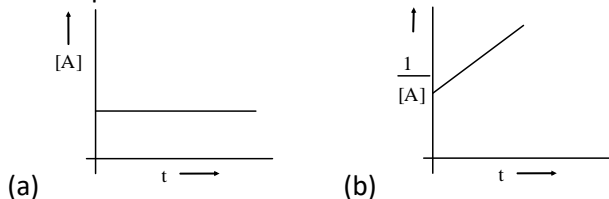
62. A substance undergoes first order decomposition involving two parallel first order reactions as :
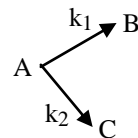
$k_1 = 1.25 \times 10^{-4}$ s^{-1}
$k_2 = 3.80 \times 10^{-5}$ s^{-1}

The mole percentage of B in the products is :

(a) 23.17 (b) 77 (c) 30.16 (d) 69.84

**63.** A hypothertical reaction, $A_2 + B_2 \longrightarrow$ 2AB follows the mechanism as given below ;

$A_2 \rightleftharpoons A + A$ ...(Fast)

$A + B_2 \longrightarrow AB + B$ ...(Slow)

$A + B \longrightarrow AB$ ... (Fast)

The order of the overall reaction is -

(a) 2 (b) 1 (c) $1\dfrac{1}{2}$ (d) Zero

64. Consider a reaction A→ B + C. If the initial concentration of A was reduced from 2M to 1 M in 1 hour and from 1 M to 0.25 M in 2 hours, the order of the reaction is :

(a) 1 (b) 0 (c) 2 (d) 3

65. For the reaction $2NO_2 + F_2 \longrightarrow 2NO_2F$, following mechanism has been provided:

$NO_2 + F_2 \xrightarrow{\text{slow}} NO_2F + F$

$NO_2 + F \xrightarrow{\text{fast}} NO_2F$
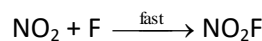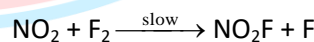
Thus rate expression of the above reaction can be written as -

(a) r = K $[NO_2]^2$ $[F_2]$ (b) r = K $[NO_2]$

(c) r = K $[NO_2]$ $[F_2]$ (d) r = K $[F_2]$

66. The rate constant of a first order reaction is 6.9×10^{-3} s^{-1}. How much time will it take to reduce the initial concentration to its $1/8^{th}$ value?
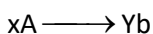
(a) 100 s (b) 200 s (c) 300 s (d) 400 s

67. For a reaction $\dfrac{dx}{dt} = K[H^+]^n$. If pH of reaction medium changes from two to one the rate becomes 100 times of value at pH = 2, The order of reaction is -

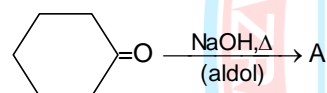(a) 1 (b) 2 (c) 0 (d) 3

68. In the following reaction :

xA $\longrightarrow$ Yb

$$\log\left[-\frac{d\,[A]}{dt}\right] = \log\left[-\frac{d\,[B]}{dt}\right] + 0.3 \text{ where } -\text{ve sign}$$

indicates rate of disappearance of the reactant. Thus, x : y is :

(a) 1 : 2 (b) 2 : 1 (c) 3 : 1 (d) 3 : 10

69.

(a)   (b)

(c)   (d)

70.
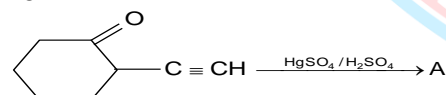
A is

(a)   (b)
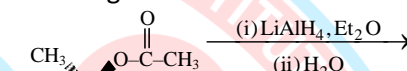
(c)   (d)

71. Aldol condensation is not given by

(a) CH_3CHO (b) CH_3COCH_3

(c) CH_3CH_2CHO (d) HCHO

72. The most appropriate reagent for the conversion of 2-pentanone to butanoic acid is

(a) Sodium hypoiodite (b) O_2

(c) Acidified $KMnO_4$ (d) Alkaline $KMNO_4K$

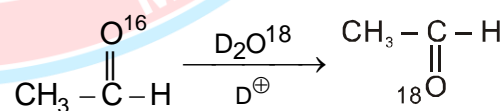**73.** Which compound below is the product expected from the following reaction?

(a)   (b)

(c)   (d)

74. On heating calcium propionate, the product formed is

(a) 3-Pentanone (b) 2-Pentanone
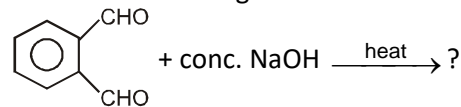
(c) 3-Methyl-2-butanone (d) Propanone
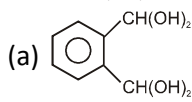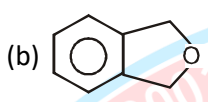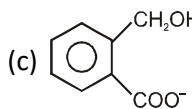
75.

The intermediate is

(a) $CH_3 - \overset{\overset{18}{O}D}{\underset{\underset{16}{O}D}{C}} - D$

(b) $CH_3 - \overset{\overset{18}{O}D}{\underset{\underset{16}{O}D}{C}} - H$

(c) $CH_3 - \overset{\overset{16}{O}D}{\underset{\underset{16}{O}D}{C}} - H$

(d) $CH_3 - \overset{\overset{18}{O}D}{\underset{\underset{18}{O}D}{C}} - H$
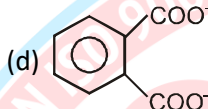
76. In which of the following compounds the methylene hydrogen's are the most acidic

(a) $CH_3COCH_2CH_3$

(b) $CH_3CH_2COOC_2H_5$

(c) $CH_3CH_2CH(COOC_2H_5)_2$

(d) CH_3COCH_2CN.

77. Product of following reaction is

 + conc. NaOH $\xrightarrow{\text{heat}}$?

(a)

(b)

(c)

(d)
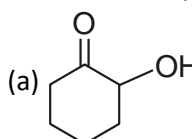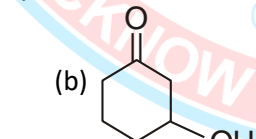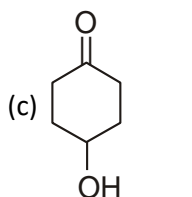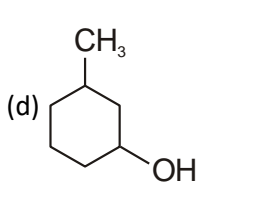
78.
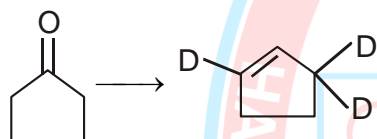
The above conversion is carried out

(a) KOD /D_2O, $H^{\oplus}$/Δ, LiAlH$_4$

(b) $H^{\oplus}$/Δ / KOD, D_2O, LiAlH$_4$

(c) KOD/ D_2O, LiAlH$_4$, $H^{\oplus}$/Δ

(d) LiAlH$_4$, $H^{\oplus}$ Δ ,KOD/H_2O
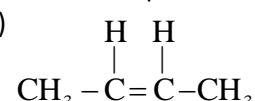
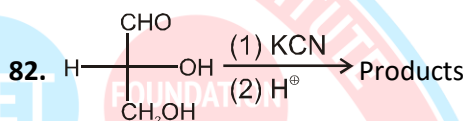**79.** Maximum dehydration takes place in

(a)

(b)

(c)

(d)

80. Acetyl bromide reacts with excess of CH_3MgI followed by treatment with a saturated solution of NH_4Cl gives

(a) Acetone

(b) Acetamide

(c) 2-Methyl-2-propanol

(d) Acetyl iodide

81. The treatment of CH3MgX with CH3C⁰C–H produces
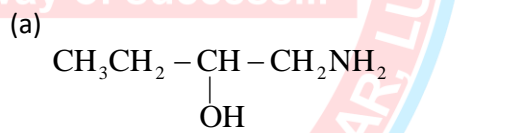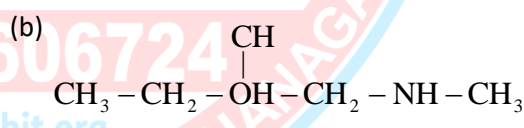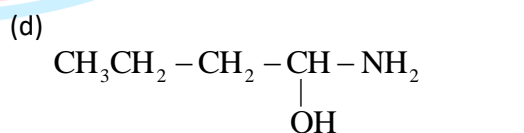
(a) $CH_3C \equiv C\text{-}CH_3$

(b)

(c) CH_4

(d) $CH_3\text{-}CH = CH_2$

82. $\xrightarrow[\text{(2) } H^{\oplus}]{\text{(1) KCN}}$ Products

Products obtained in the reaction is-

(a) Diastereomer

(b) Racemic mixture

(c) Meso compound

(d) Optically pure enantiomer

83.

 $\xrightarrow[\text{(ii) LiAlH}_4]{\text{(i) KCN/H}_2\text{SO}_4}$ Product is

(a)
$$CH_3CH_2 - \underset{\underset{OH}{|}}{CH} - CH_2NH_2$$

(b)
$$CH_3 - CH_2 - \underset{\underset{CH_2}{|}}{OH} - CH_2 - NH - CH_3$$

(c)
$$CH_3CH_2 - \underset{\underset{OH}{|}}{CH} - CN$$

(d)
$$CH_3CH_2 - CH_2 - \underset{\underset{OH}{|}}{CH} - NH_2$$
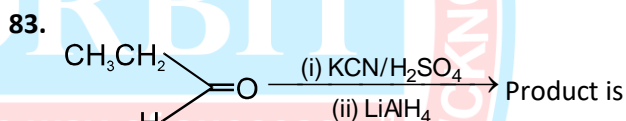
84. In the given reaction sequence B is

$$\xrightarrow{\text{(1) } O_3} \text{(a)} \xrightarrow{\overset{\ominus}{OH}/\Delta} \text{(b)}$$

(a) structure with OH and CHO

(b) structure with CHO

(c) structure with CHO

(d) structure with CHO and OH
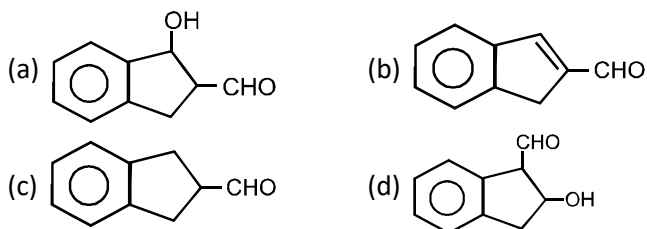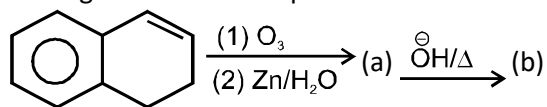
85. Which of the following can be the product/s of following reaction.

 Conc. NaOH
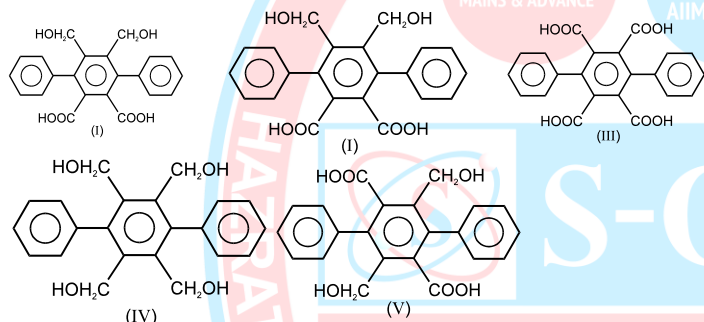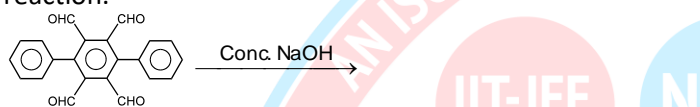
(a) I, II, IV   (b) III, IV   (c) II, V   (d) I, V

86.
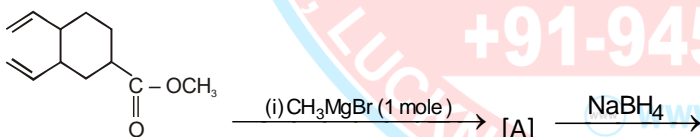
[B]

Identify the structure of [B] in following sequence of reactions.

(a) structure   (b) structure

(c) structure   (d) structure
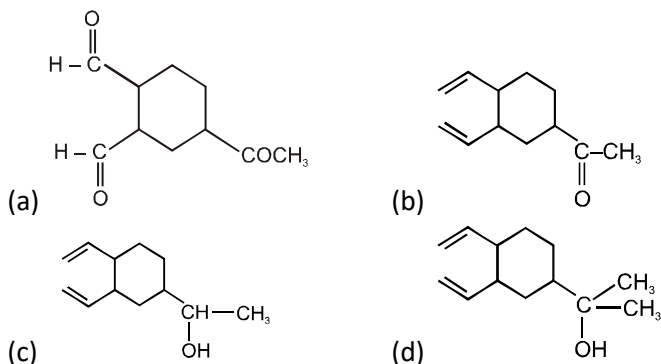
87. When acetic acid reacts with ketene, product formed
(a) Ethyl acetate   (b) Aceto - acetic ester
(c) Acetic anhydride   (d) No reaction

88. The ease of alkaline hydrolysis is more for

(A) structure with COOCH₃ and NO₂

(B) structure with COOCH₃ and Cl

(C) structure with COOCH₃

(D) structure with COOCH₃ and OCH₃
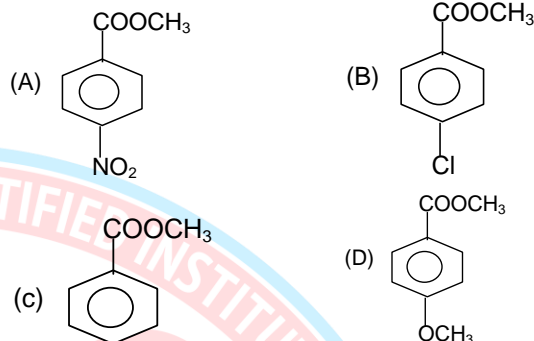
89. An ester (a) with mol. formula $C_9H_{10}O_2$ was treated with excess of CH_3–Mg Br and the complex. So formed was treated with H_2SO_4 to give on olefin (b). Ozonolysis of (b) gave a ketone with molecular formula C_8H_8O which shows the iodoform test the structure of (a) is -
(a) $C_6H_5 COOC_2H_5$ (b) $CH_3COCH_2COC_6H_5$
(c) P CH_3O–C_6H_4–$COCH_3$ (d) $C_6H_5COOC_6H_5$

90. What is compound Z ?

$$CH_3\text{–}CH_2\text{–}CH_2\text{–}Br \xrightarrow{NaCN} X \xrightarrow[\Delta]{\overset{\oplus}{H_3O}} Y$$

$$Y \xrightarrow[H^\oplus]{CH_3\text{–}CH_2\text{–}OH} Z$$
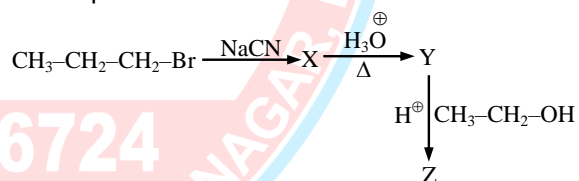
(a) $CH_3\text{–}CH=CHCOH$ (with =O)

(b) $CH_3\text{–}CH_2\text{–}CH_2CH=NOCH_2CH_3$

(c) $CH_3\text{–}CH_2\text{–}CH_2CH(OCH_2CH_3)_2$

(d) $CH_3\text{–}CH_2\text{–}CH_2\text{–}\overset{O}{\underset{\|}{C}}\text{–}OCH_2CH_3$

91. Which of the following does not give benzoic acid salt on oxidation with hot alkaline $KMnO_4$.
(a) Ph–CH_3 (b) Ph–CH=CH–CH_3
(c) Ph–C≡C–CH_3 (d) Ph–C(CH_3)₃

92. CH₃–CH₂–CH₂–COOH $\xrightarrow{\text{Re d P+Br}_2}$

$$CH_3 - CH_2 - \underset{\underset{Br}{|}}{CH} - COOH$$ This reaction is called
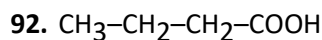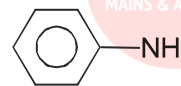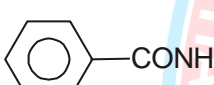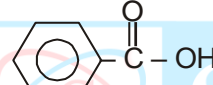
(a) Cannizzaro reaction

(b) Schmit reaction

(c) Hell Volhard Zelinsky reaction

(d) Reimer tiemann reaction

93.

$\xrightarrow{\text{NaN}_3}$ X $\xrightarrow[\text{(2) OH}^-]{\text{(1)}\Delta}$ Product.
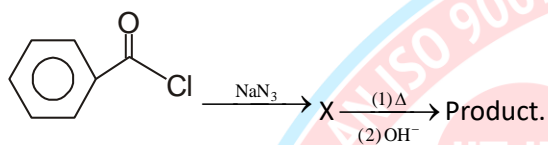
Product is/are

(a) only

(b) , HCOO⁻

(c)

(d)

94. CH₃CH₂CH₂CONH₂ is boiled with aqueous NaOH, then the reaction mixture is acidified with HCl. The products obtained are

(a) CH₃CH₂CH₂COO⁻ + NH₃

(b) CH₃CH₂CH₂COONa + NH₃

(c) CH₃CH₂CH₂COOH + NH₄Cl

(d) CH₃CH₂CH₂COO⁻ + NH₄Cl.

95. Which of the following acids remains unaffected on heating
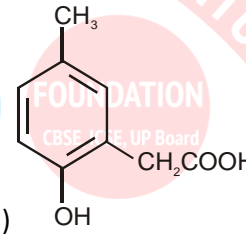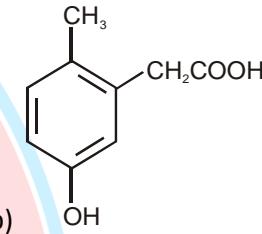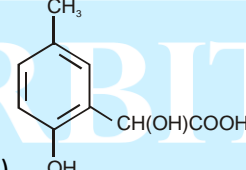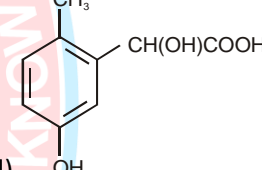
(a) Malonic acid   (b) Malic acid

(c) Fumaric acid   (d) Succinic acid

96. In the esterification of propanoic acid with methanol in the presence of a mineral acid, which is not the expected intermediate species?

(a) $C_2H_5 - \overset{\overset{\oplus}{O}H}{\underset{}{\underset{}{C}}} - OH$

(b) $C_2H_5 - \overset{\oplus}{\underset{\underset{OH}{|}}{C}} - OH$

(c) $C_2H_5 - \underset{\underset{OCH_3}{|}}{\overset{\overset{OH}{|}}{C}} - \overset{\oplus}{O}H_2$

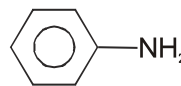(d) $C_2H_5 - \overset{\oplus}{\underset{\underset{O}{||}}{C}}$
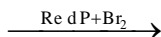
97. p-cresol reacts with chloroform in alkaline medium to give the compound A which adds hydrogen cyanide to form, the compound B. The latter on acidic hydrolysis gives chiral carboxylic acid. The structure of the carboxylic acid is :

(a)

(b)

(c)

(d)

98. A liquid was mixed with ethanol and a drop of concentrated H_2SO_4 was added A compound with a fruity smell was formed The liquid was:

(a) HCHO   (b) CH₃COCH₃

(c) CH₃COOH   (d) CH₃OH

99. Circular and double stranded DNA occurs in -

(a) Golgibody

(b) Mitochondria

(c) Nucleus

(d) Cytoplasm

100. Double helix model of DNA is proposed by-

(a). Watson and Crick

(b) Schleiden schwann

(c) Singer and Nicholson

(d) Kornberg and Khurana

101. DNA was first discovered by-
(a) Meischer
(b) Robert Brown
(c) Flemming
(d) Watson & Crick

102. Prokaryotic genetic system contains -
(a) DNA & histones
(b) RNA & histones
(c) Either DNA or histones
(d) DNA but no histones

103. The purine & pyrimidine pairs of complementry strands of DNA are held together by –
(a) H - bonds
(b) O - bonds
(c) C - bonds
(d) N - bonds

104. What is the nature of the 2 strands of a DNA duplex :-
(a) Identical & Complimentary
(b) Antiparallel & complimentary
(c) Dissimilar & non complimentary
(d) Antiparallel & non complimentary

105. A nucleoside differs from a nucleotide is not having -
(a) Phosphate
(b) Sugar
(c) Phosphate & sugar
(d) Nitrogen base

106. Length of one loop of B- DNA-
(a) 3.4 nm.
(b) 0.34 nm.
(c) 20 nm.
(d) 10 nm.

107. Short DNA segment has 80 thymine and 90 guanine bases. The total number of nucleotides are
(a) 160
(b) 40
(c) 80
(d) 340

108. In a nucleotide $H_3 PO_4$ binds to which carbon atom of pentose sugar :-
(a) Only Ist carbon
(b) Only 3rd carbon
(c) Only 5th carbon
(d) Both 3rd and 5th carbon

109. Which of the following is a false statements ?
(a) DNA is chemically less reactive, as compared to RNA
(b) RNA mutate at a faster rate, as compared to DNA
(c) Guanyl transferase enzyme helps in capping process during splicing of hn-RNA
(d) r RNA is less aboundant RNA in an animal cell

110. In process of replication deoxyribonucleoside triphosphate
(a) acting as substrate
(b) providing energy for polymerisation reaction
(c) acting as an enzyme
(d) both (a)&(b)

111. Method of DNA replication in which two strands of DNA separates and synthesize new strands:-
(a) Dispersive
(b) Conservative
(c) Semiconservative
(d) Non conservative

112. Which of the following enzyme is used in DNA multiplication :-
(a) RNA polymerase
(b) DNA endonuclease
(c) Exonuclease
(d) DNA Polymerase

113. The strand of DNA, which does not code for anything is referred to as :-
(a) Template strand
(b) Antisense strand
(c) Coding strand
(d) Noncoding strand

114. Which may be attached with Adenine base in RNA -
(a) Guanine
(b) Cytosine
(c) Uracil
(d) Thymine

115. During transcription, if the nucleotide sequence of the DNA strand that is being coded is ATACG, then the nucleotide sequence in the mRNA would be
(a) TATGC
(b) TCTGG
(c) UAUGC
(d) UATGC

116. The genes are responsible for growth and differentiation in an organism through regulation of :-
(a) Translocation
(b) Transformation
(c) Transduction and translation
(d) Translation and transcription

117. Inverse transcription was discovered by :-
(a) Watson and Crick
(b) Khorana
(c) Temin an Baltimore
(d) Meischer

118. Genetic code was discovered by-
(a) Nirenberg &Mathei
(b) Kornberg & Crick
(c) Khorana & Kornberg
(d) Gamow

119. A sequence of how many nucleotides in messenger RNA makes a codon for an amino acid ?
(a) Three
(b) Four
(c) One
(d) Two

120. Translation is the process in which :-
(a) D.N.A. is formed on D.N.A template
(b) R.N.A. is formed on D.N.A. template
(c) D.N.A. is formed on R.N.A. template
(d) Protein is formed from R.N.A. message

121. Which of the following RNA play structural and catalytic role during translation.
(a) m-RNA
(b) t-RNA
(c) r-RNA
(d) All

122. Which is true for tryptophan operon :-
(a) It is the example of inducible operon
(b) It is example of repressible operon
(c) $on \xrightarrow{repressor} off$
(d) (b) and (c) both are correct

123. Regulation of lac operon by repressor is referred to as–
(a) Positive regulation
(b) Nagative regulation
(c) Both(a) and (b)
(d) None

124. Mutations are generally :-
(a) Dominant
(b) Recessive
(c) Codominant
(d) Incompeletely dominant

125. The most striking example of frame shift mutation was found in a disease called :-
(a) Sickle cell anaemia
(b) Colour blindness
(c) Laesh-Nyhn Syndrome
(d) Thallesemia

126. Gene mutation is :
(a) mutation in the genes of DNA
(b) mutation in the phosphodiester linkage
(c) mutation in the chromosomes
(d) change in the sequence of nitrogenous bases

127. Which of the following techniques are used in analyzing restriction fragment length polymorphism (RFLP) :- (a) Electrophoresis (b) Electroporation (c) Methylation (d) Restriction digestion
(a) 'a' and 'c'
(b) 'c' and 'd'
(c) 'a' and 'd'
(d) 'b' and 'd'

128. In which animal nerve cell is present but brain is absent?
(a) Hydra   (b) Sponge   (c) Earthworm   (d) Cockroach

129. The function of our visceral organs is controlled by
(a) Sympathetic and somatic neural system
(b) Central and somatic neural system
(c) None of above
(d) Sympathetic and parasympathetic neural system

130. Parts A, B, C and D of the human eye are shown in the diagram. Select the option which gives correct identification along with its functions/characteristics
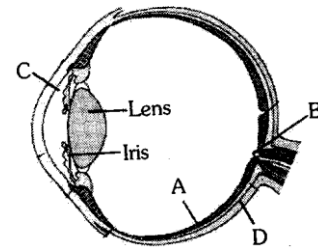
(a) A – Retina – contains photo receptors – rods and cones

(b) D – Choroid – its anterior part forms ciliary body

(c) B – Blind spot – has only a few rods and cones

(d) C – Aqueous chamber reflects the light which does not pass through the lens

131. The organ of corti is a structure present in
(a) External ear   (b) Cochlea.
(c) Middle ear   (d) Semicircular canal

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

Column –I	Column-II
A. Cerebrum	(i) Controls the pituitary
B. Cerebellum	(ii) Controls vision and hearing
C. Hypothalamus	(iii) Controls the rate of heart beat
D. Midbrain	(iv) Seat of intelligence
	(v) Maintains body posture

(a) A – (v), B – (iv), C – (ii), D – (i)
(b) A – (iv), B – (v), C – (ii), D – (i)
(c) A – (v), B – (iv), C – (i), D – (ii)
(d) A – (iv), B – (v), C – (i), D – (ii)

133. Body coordination is maintained by-
(a) Nervous system

(b) Excretory system

(c) Endocrine system

(d) Neuroendocrine system

134. Neurons-
(a) Can detect different kinds of stimuli

(b) Can receive different kinds of stimuli

(c) Can transmit different kinds of stimuli

(d) All

135. Multipolar neuron means-
(a) Has two dendrons   (b) Has one dendron and one axon

(c) Is interneuron   (d) Has no Dendron

136. Which of the following diagrams correctly represent the flow of information through the nervous system?

(a)   (b)

(c)   (d)
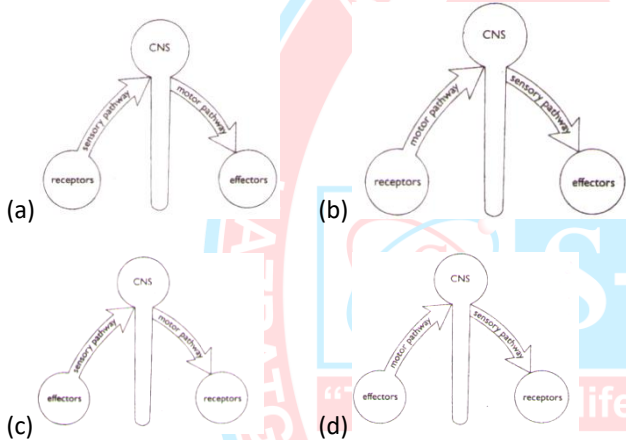
137. Which of the following statements is correct?
(a) The electrical potential difference across the polarized plasma membrane is called as the resting potential

(b) The impulse is action potential

(c) Na^+ ions are responsible for generating an action potential

(d) All

138. Nerve impulse is generated when the nerve cell undergoes -
(a) Hyperpolarization   (b) Depolarization

(c) Repolarization   (d) Pseudopolarization

139. Association areas in cerebral cortex are -
(a) Sensory areas

(b) Motor areas

(c) Responsible for intersensory associations, memory and communication

(d) Non of the above is correct

140. Cavity of aqueous humour (watery fluid) is-
(a) Behind the lens

(b) Between choroid and retina

(c) Between cornea and lens

(d) Between lens and retina

141. Eustachian tube connects -
(a) Middle ear with pharynx

(b) Middle ear with inner ear

(c) Middle ear with external ear

(d) Left auricle with left ventricle

142. Afferent nerve fiber conducts impulse from : -
(a) C.N.S. to effector

(b) Receptor to C.N.S.

(c) Receptor to effector

(d) Effector to receptor

143. Nerve cells possess
(a) Dendrites (b) Axon

(c) Sarcolemma (d) Neurilemma

(a) a, b

(b) a, b, c

(c) a, b, d

(d) a, b, c, d

144. Retina of the vertebrates eye consists of :-

(a) Neurons and neuroglia

(b) Rods, cones, neurons and neuroglia

(c) Rods, cones and neuroglia

(d) Rods and cones

145. All bones provide support and protection to body parts which bone is different in it's function:-

(a) Ribs

(b) Atlas vertebra

(c) Malleus

(d) Radius

146. Colour blindness in human being is due to :-

(a) Vitamin A deficiency

(b) Sex linked inheritance

(c) Over activity of adrenal gland

(d) Excessive drinking of alcohol

147. In eyes the image which is formed on the retina is–

(a) Erect and real

(b) Erect and virtual

(c) Inverted and real

(d) Inverted and virtual

148. Space between cornea & lens is :-

(a) Aqueous chamber

(b) Vitreous chamber

(c) Fovea centralis

(d) Canal of schlemm

149. What is the cause of sterioscopic vision in human?

(a) Refraction power of eye is high

(b) Well developed retina

(c) Highly developed cerebral cortex

(d) Presence of biconvex lens

150. Which structure of eye is related to focussing of eye?

(a) Lens

(b) Cornea

(c) Retina

(d) Aqueous and vitreous humor

151. Only rods are present in the eyes of one of the following animals :–

(a) Pigeon

(b) Squirrel

(c) Fowl

(d) Owl EAR

152. Which structure helps a person to maintain equilibrium ?

(a) Cochlea

(b) Eustachian tube

(c) Semicircular canals

(d) Hammer like bone

153. Cochlea contains :-

(a) Scala vestibuli

(b) Scala tympani

(c) Scala media

(d) All the above

154. Otolith (otoconia) are CaCO3 particles found in :-

(a) Perilymph

(b) Endolymph

(c) Bones

(d) Vitreous humor

155. The middle ear and internal ear of mammals are enclosed in which of the following bones ?

(a) Mastoid

(b) Ethmoid

(c) Tympanic bulla

(d) Tympanic bulla and periotic bone (temporal bone)

156. In the tympanic cavity there is an aperture in which the stapes is fitted it is :-

(a) Foramen rotundus

(b) Foramen triosseum

(c) Fenestra ovalis

(d) Fenestra rotandus

157. The organ of corti is a modification of :-

(a) Tectorial membrane

(b) Reissner's membrane

(c) Basilar membrane

(d) Meissner's membrane

158. The vitamin whose content increases following the conversion of milk into curd by lactic acid bacteria is

(a) Vitamin B_{12} (b) Vitamin C

(c) Vitamin D   (d) Vitamin E

159. Methanogenic bacteria are not found in
(a) Rumen of cattle
(b) Activated sludge
(c) Gobar gas plant
(d) Bottom of water logged paddy fields

160. The primary treatment of waste water involves the removal of
(a) Stable particles   (b) Dissolved impurities
(c) Toxic substances   (d) Harmful bacteria

161. Which one of the following alcoholic drinks is produced without distillation?
(a) Whisky   (b) Rum   (c) Brandy   (d) Wine

162. Which one of the following is not a nitrogen fixing organism?
(a) Anabaena   (b) Pseudomonas
(c) Nostoc   (d) Azotobacter

163. The microbe Pseudomonas denitrificans produces Vitamin.
(a) K   (b) D   (c) B_{12} (d) B_2

164. Microbes are diverse which include
A. Bacteria   B. Mosses   C. Protozoans   D. Fungi

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

165. The distillation of the fermented broth is required in the formation of
A. rum   B. beer   C. brandy   D. whisky

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

166. Methanogens are found in

A. ehtanol   B. organic acids

C. anaerobic sludge   D. rumen of cattle

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

167. Microbes are found –

(a) In soil   (b) In air   (c) In water   (d) Everywhere

168. The large vessels for growing microbes on an industrial scale are called

(a) Petri dish   (b) Digestors

(c) Biogas vessel   (d) Fermentors

169. Acetic acid is produced by a

(a) Fungus   (b) Bacterium   (c) Yeast   (d) Virus

170. The amount of oxygen required by the microbes in the decomposition of organic matter is called –

(a) Chemical oxygen demand

(b) Biochemical oxygen demand

(c) Total oxygen demand

(d) Dissolve oxygen

171. Biogas contains –

(a) CO_2 (b) H_2S (c) CH_4 (d) All of these

172. During which stage of sewage treatment microbes are used?

(a) Primary treatment   (b) Secondary treatment

(c) Tertiary treatment   (d) All of these

173. Following is the sewage treatment. In which of the following options, correct word for all the four numbers (1, 2, 3 and 4) are indicated –
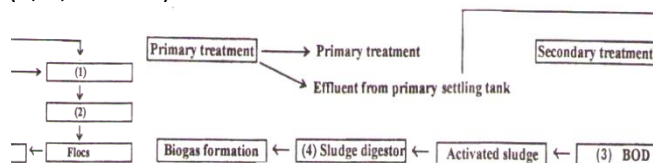
(a) 1 – Large aeration tanks; 2 – Chemically agitation;

3 – High; 4 – Anaerobic

(b) 1 – Large aeration tanks; 2 – Mechanically agitation;

3 – Low; 4 – Anaerobic

(c) 1 – Large aeration tanks; 2 – Mechanically agitation;

3 – Low; 4 – Aerobic

(d) 1 – Large aeration tanks; 2 – Mechanically agitation;

3 – High; 4 – Anaerobic

174. In chesse manufacure, the micro-organisms are used for –

(a) The souring of milk only

(b) The ripening only

(c) Development of resistance to spoilage

(d) Both a and b

175. Which of the following is common to Azospirllum, Azotobacter, Anabaena, Nostoc and Oscilatoria –

(a) Prokaryotes   (b) N_2-fixes   (c) Both   (d) Eukaryotes

176. Beer is obtained from :

(a) Molasses

(b) Grapes

(c) Barley

(d) Rye

177. Which of the following is the pair of biofertlizers :
(a) Azolla and BGA

(b) Nostoc and legume

(c) Rhizobium and grasses

(d) Salmonella& E. Coli

178. The puffed - up appearance of dough is due to
(a) Growth of LAB

(b) Production of O_2 & ethanol

(c) Production of CO_2

(d) Growth of yeast Monascus

179. Microbial insecticide is:
(a)*Bacilluspolymixa*

(b)*Bacillusbrevis*

(c) Bacillus subtilio

(d) Bacillus thuringenesis

180. Read the following statement having two blanks (A and B) : "A drug used for −(A)− patients is obtained from a species of the organism −(B)− " The one correct option for the two blanks is :
Blank - A Blank - B

(a) AIDS *Pseudomonas*

(b) Heart *Penicillium*

(c) Organ - transplant *Trichoderma*

(d) Swine flu *Monascus*

181. Choose the correct statement: -
(a) *Aspergillusnigeris* bacterium which is used for obtaining acetic acid & citric acid

(b) Streptokinase is used as a dot buster

(c)*Monascuspurpureus* is responsible for production of large holes in Swiss cheese

(d) Toddy is manufactured by *Lactobacillus*

182. Match Column - I with Column - II and select the correct option using the codes given below

Column-I	Column-II
(a) Citric acid	(i) Trichoderma
(b) Cyclosporin A	(ii) Clostridium
(c) Statins	(iii) Aspergillus
(d) Butyric acid	(iv) Monascus

Codes :

a b c d

(a) i iv ii iii

(b) iii iv i ii

(c) iii i ii iv

(d) iii i iv ii

183. Biological control agent obtained from : -
(a)*Bacillusthuringiensis*

(b)*E. coli*

(c)*Agrobacteriumtumifaciens*

(d)*Meloidogyneincogniti*a

184. Interfascicular cambium develops from the cells of.
(a) Medullary rays

(b) Pericycle

(c) Xylem parenchyma

(d) Endodermis

185. How many shoot apical meritsems are likely to be present in a twig of a plant possessing, 4 branches and 26 leaves?
(a) 5   (b) 26   (c) 1   (d) 30   (e) 4

186. In conifers fibres are likely to be absent in.
(a) Secondary phloem   (b) Primary phloem

(c) Leaves   (d) Secondary Xylem

187. Meristems are present in
(a) Root apex and shoot apex   (b) Bases of leaves

(c) Axillary buds   (d) All

188. Secondary tissue are produced by all except-
(a) Fascicular cambium   (b) Interfascicular cambium

(c) Apical meristem   (d) Phellogen

189. Xylem
(a) Functions as conducing tissue for water and minerals from root to the stem and leaves

(b) Provides mechanical strength to plant parts

(c) Both

(d) Is absent in pteridophytes

190. The _____ is the centermost tissue in a dicot stem.
(a) Pith   (b) Xylem   (c) Phloem   (d) Pericycle

191. Which of the following is the living element of xylem?
(a) Fibre   (b) Parenchyma   (c) Tracheid   (d)   Vessel

192. Stomata develop from -
(a) Dermal tissue   (b) Ground tissue

(c) Accessory tissue   (d) Vascular tissue

193. One of the primary function of the ground tissue in a plant is -
(a) Photosynthesis   (b) To protect the plant

(c) To anchor the plant   (d)   Water   and   sugar conduction

194. Autumn wood or late wood is formed
(a) In winter   (b) In spring

(c) Throughout the year   (d) In rainy season

195. Cork is impervious to water due to
(a) Silica in cell wall   (b) $CaCO_3$ in cell wall

(c) Suberin in cell wall   (d) Cuticle in cell wall

196. Compared to sclerenchyma, collenchymas cells
(a) Have more secondary cell wall materials

(b) Are used to support the plant

(c) Less flexible

(d) Are more flexible

197. How many histogens are present in monocot root apex :
(a) 1
(b) 2
(c) 3
(d) 4

198. Phloem parenchyma is absent in -
(1) Dicot stem
(2) Dicot leaf
(3) Monocot stem
(4) Dicot root

199. Water cavity & V or Y-shaped xylem occurs in -
(a) Dicot stem
(b) Monocot root
(c) Monocot stem
(d) Dicot root

200. Vascular bundles are found scattered in ground tissue in-
(a) Maize stem
(b) Sunflower stem
(c) Gram root
(d) Isobilateral leaf