SECTION - A (PHYSICS)
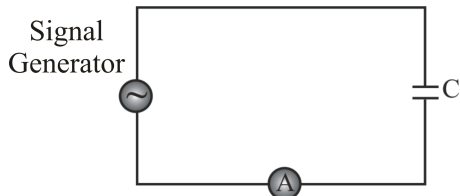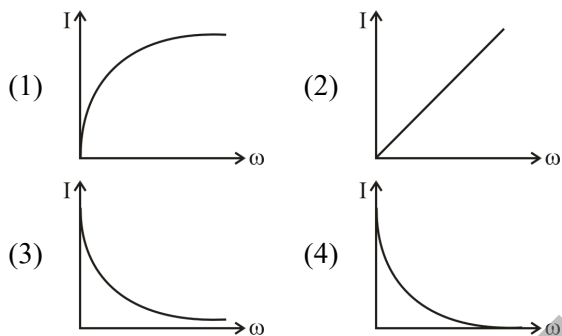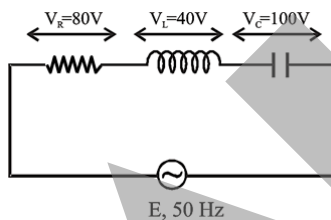
1. A constant voltage at different frequencies is applied across a capacitance C as shown in the figure. Which of the following graphs

Correctly depicts the variation of current with frequency?

(1)   (2)

(3)   (4)

2. The value of alternating emf E in the given circuit will be :

(1) 220 V (2) 140 V (3) 100 V (4) 20 V

3. A series LCR AC circuit has R = 5Ω, L = 40 mH and C = 1 µF, the bandwidth of the circuit is :-

(1) 62.5 rad/sec. (2) 125 rad/sec.

(3) 187.5 rad/sec. (4) 250 rad/sec.

4. In parallel plate capacitor the distance between plates is d = 0.1 mm. The medium between the plates is air. The maximum potential difference which can be applied to the capacitor is : (Dielectric strength of air = 3 MV/m)

(1) 3×10^6 volt (2) 300 volt

(3) 3×10^{10} volt (4) Infinite

5. It is required to measure equivalent resitance of circuit with ideal battery, ideal voltmeter and ideal ammeter. Which circuit diagram shows voltmeter V and ammeter A correctly positioned to measure the total resistance of circuit.

(1)   (2)

(3)   (4)
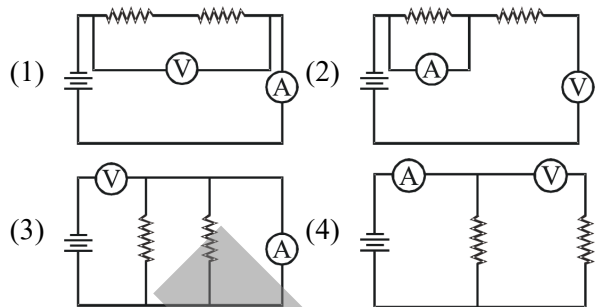
6. In the adjoining circuit diagram the currents flowing in 5Ω and 10Ω resistances will respectively be :- (I_2 and I_3)
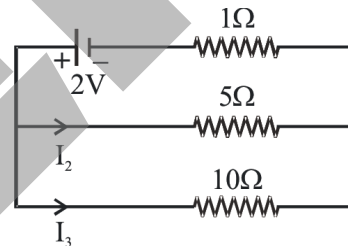

(1) $\frac{2}{13}$ A, $\frac{4}{13}$ A (2) $\frac{13}{2}$ A, $\frac{4}{13}$ A

(3) $\frac{4}{13}$ A, $\frac{2}{13}$ A (4) $\frac{13}{4}$ A, $\frac{13}{2}$ A

7. A power transmission line feeds input power at 2300 V to a step down transformer having 4000 turns in its primary. What should be the number of turns in the secondary to get output power at 230 volt :-

(1) 40 (2) 400 (3) 4 (4) 4000

8. Oscillating magnetic field in a plane EMW is given by $B_y = 8 \times 10^{-6} \sin (5000 \, \pi x - 3 \times 10^{11} \, \pi t)$T. Expression for oscillating electric field will be

(1) $\vec{E} = 240 \sin(5000 \, \pi x - 3 \times 10^{11} \, \pi t)\hat{k}$

(2) $\vec{E} = 480 \sin(5000 \, \pi x - 3 \times 10^{11} \, \pi t)\hat{k}$

(3) $\vec{E} = +2400 \sin(5000 \pi x - 3 \times 10^{11} \, \pi t)\hat{k}$

(4) $\vec{E} = - 480 \sin(5000 \pi x - 3 \times 10^{11} \pi t)\hat{k}$

9. Two charged spherical conductors of radius R_1 and R_2 are connected by a wire. If σ_1 and σ_2 are final surface charge densities of two sphere than which condition is correct when finally charge transfer stop :-

(1) $\sigma_1 R_2 = \sigma_2 R_1$ (2) $\sigma_1 R_1 = \sigma_2 R_2$

(3) $\sigma_1 R_2^2 = \sigma_2 R_1^2$ (4) $\sigma_1 R_1^2 = \sigma_2 R_2^2$

10. A dipole of dipole moment P is placed parallel to electric field E. Find work done to rotate dipole by 30° angle ?

(1) $\dfrac{PE}{2}$ (2) $\dfrac{\sqrt{3}}{2} PE$

(3) $PE\left(1 - \dfrac{\sqrt{3}}{2}\right)$ (4) zero

11. If the radius and acceleration due to gravity both are doubled, escape velocity of earth will become :

(1) 11.2 km/s   (2) 22.4 km/s

(3) 5.6 km/s   (4) 44.8 km/s

12. The range of a projectile, thrown with an initial speed u at the angle of projection 15° from horizontal is R. What will be the range if it is thrown with an initial speed 2u at an angle 30° from horizontal ?

(1) $2\sqrt{3}$ R   (2) $4\sqrt{3}$ R   (3) $\sqrt{3}$ R   (4) $5\sqrt{3}$ R

13. A car is moving horizontally along a straight line with a uniform velocity of 25 ms^{-1}. A projectile is to be fired from this car in such a way that it will return to it after it has moved 100 m. The initial vertical speed of the projection must be :- (g = 10 m/s^2)

(1) 10 ms^{-1} (2) 20 ms^{-1}

(3) 15 ms^{-1} (4) 25 ms^{-1}

14. Velocity of a particle of mass 2 kg varies with time 't' according to the equation $\vec{v} = \left(2t\,\hat{i} - 4\hat{j}\right)$ m/s. Here 't' is in seconds. The impulse imparted to the particle in the time interval $0 \le t \le 2$ s is:-

(1) $\left(4\hat{i}\right)$ kg-m/s   (2) $\left(8\hat{i} - 4\hat{j}\right)$ kg-m/s

(3) $\left(8\hat{i} + 4\hat{j}\right)$ kg-m/s   (4) $\left(8\hat{i}\right)$ kg-m/s

15. In a place where electric field (E) and magnetic field (B) are finite, a charged particle projected along x − axis with speed v passes undeflected and with uniform speed. We may conclude that :-

(1) such a situation is impossible

(2) x − component of E as well as x − component of B must be zero

(3) if E is along x − axis, then B must be along z − axis

(4) if B is along z − axis, then E must be along the y − axis only

16. A charged particle (charge q) is moving in a circle of radius R with uniform speed v. The associated magnetic moment μ is given by :

(1) $\dfrac{qvR}{2}$ (2) qvR^2 (3) $\dfrac{qvR^2}{2}$ (4) qvR

17. A ultra violet light bulb, emitting 400 nm and infrared bulb emitting 700 nm wavelength radiation, each are rated at 130 W. Then the ratio of the number of photons emitted per second by the UV & IR sources :-

(1) 0.57   (2) 1.75   (3) 28   (4) 0.04

18. The mass of a $_5B^{10}$ nucleus is 0.042u less than the sum of the masses of all its nucleons. The binding energy per nucleon of $_5B^{10}$ nucleus is nearly:-

(1) 23 MeV   (2) 39 MeV

(3) 5.6 MeV   (4) 3.9 MeV

19. A radioactive nucleus decay as follows :-
$X \xrightarrow{\alpha} X_1 \xrightarrow{\beta} X_2 \xrightarrow{\alpha} X_3 \xrightarrow{\gamma} X_4$, if the atomic number and the mass number of X are 72 and 180 then the mass number and atomic number of X_4 are :-

(1) 172, 70 (2) 171, 69 (3) 172, 69 (4) 172, 68

20. Starting from the origin, a body oscillates simple harmonically with a time period 2 sec. After what time will its kinetic energy will be 75% of the total energy ?

(1) $\dfrac{1}{12}$ sec. (2) $\dfrac{1}{6}$ sec. (3) $\dfrac{1}{4}$ sec. (4) $\dfrac{1}{3}$ sec.

21. A light ray incident at an angle of 45° on one refracting surface of a prism of angle 60° suffers a deviation of 55°. What is the angle of emergence ?

(1) 95° (2) 45° (3) 30° (4) 70°

22. Two lenses are placed in contact with each other and the focal length of combination is 80 cm. If the focal length of one is 20 cm, then the power of the other will be :

(1) 1.66 D (2) 4.00 D (3) −1.00 D (4) −3.75 D

23. Four identical rods each of mass M and length L, form a square as shown in the figure. The moment of inertia of this system about diagonal of the square is :
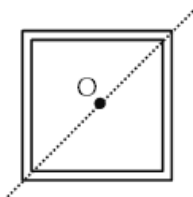

(1) $\dfrac{2}{3}ML^2$ (2) $\dfrac{4}{3}ML^2$

(3) $\dfrac{5}{3}ML^2$ (4) $\dfrac{10}{3}ML^2$

24. The number of electron hole pair in a pure silicon crystal at 300 K is 6×10^{15} m^{-3}. When it is doped by indium the electron concentration becomes 1.2×10^9 m^{-3}. The number of indium atoms mixed per cubic meter is (approx) :-

(1) 1.2×10^9 (2) 6×10^{15}

(3) 3×10^{22} (4) 5×10^6

25. V_0 is the potential barrier across a p-n juction when no battery across p-n junction then in the figure.
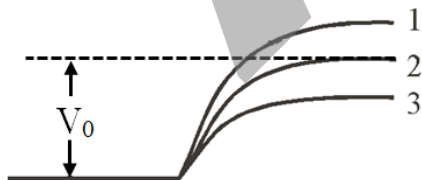

(1) 1 and 3 both correspond to forward bais of junction.

(2) 3 corresponds to forward bias of junction and 1 correspond to reverse bias of junction.

(3) 1 corresponds to forward bias and 3 corresponds to reverse bias of junction

(4) 1 and 3 both corresponds to reverse bias of junction.

26. Two friends A and B are waiting for another friend for tea. A took the tea in a cup and mixed the cold milk and then waits. B took the tea in the cup and then mixed the cold milk when the friend comes. Then the tea will be hotter in the cup of-

(1) A

(2) B

(3) Tea will be equally hot in both cups

(4) Friend's cup

27. Two full turns of Screw gauge cover a distance of 1 mm on main scale. The total number of circular scale divisions are 100. The measured value of thickness of sheet will be:
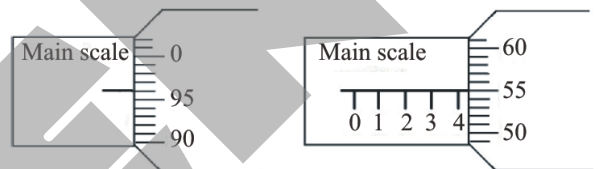
Fig.(1)   SCREW GAUGE   Fig.(2)

(1) 4.555 mm   (2) 4.295 mm

(3) 2.295 mm   (4) 2.245 mm

28. A particle is projected from point A on a smooth vertical track OABCD as shown. What should be the minimum speed at A so that it can reach point C ? (g = 10 m/s^2)
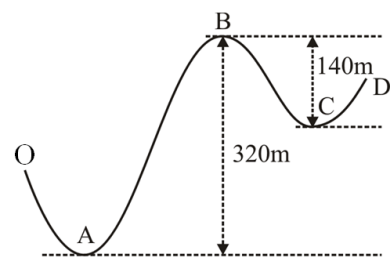
(1) 60 m/s (2) 100 m/s (3) 80 m/s (4) 20 m/s

29. A particle moves with a velocity $\vec{v} = \left(5\hat{i} - 3\hat{j} + 6\hat{k}\right)$ m/s under the influence of a constant force $\vec{F} = \left(10\hat{i} + 10\hat{j} + 20\hat{k}\right)$ N. The instantaneous power applied to the particle is :

(1) 200 J/s   (2) 40 J/s

(3) 140 J/s   (4) 170 J/s

SPACE FOR ROUGH

30. The velocity of water waves v may depend upon their wavelength λ, the density of water ρ and the acceleration due to gravity g . The method of dimensions gives the relation between these quantities as (here λ is measured in terms of length)

(1) $v^2 \propto \lambda g^{-1} \rho^{-1}$ (2) $v^2 \propto g\lambda\rho$

(3) $v^2 \propto g\lambda$ (4) $v^2 \propto g^{-1}\lambda^{-3}$

31. The speed of light (c), universal gravitational constant (G) and Planck's constant (h) are taken as the fundamental units in a system. The dimension of time in this new system should be :-

(1) $G^{1/2}h^{1/2}c^{-5/2}$ (2) $G^{-1/2}h^{1/2}c^{1/2}$

(3) $G^{1/2}h^{1/2}c^{-3/2}$ (4) $G^{1/2}h^{1/2}c^{1/2}$

32. There are 26 tuning forks arranged in the decreasing order of their frequencies. Each tuning fork give 3 beats with the next. The first one is octave of the last. What is the freqency of 18th tuning fork ?

(1) 100 Hz   (2) 99 Hz

(3) 96 Hz   (4) 103 Hz

33. Two slits seperated by a distance of 1 mm are illuminated with red light of wavelength 6.5×10^{-7} m. Interference fringes are observed on screen placed 1 m from the slits. The distance between the third dark fringe and fifth bright fringe is equal to :-

(1) 0.65 mm   (2) 1.63 mm

(3) 3.25 mm   (4) 4.88 mm

34. At what angle should an unpolarised beam be incident on a crystal of $\mu = \sqrt{3}$, so that reflected beam is polarised :-

(1) 45°   (2) 60°   (3) 90°   (4) 0°

35. A liquid of specific heat 0.8 cal/g°C at temperature 60°C is mixed with other liquid of same mass having temperature 45°C. If temperature of mixture is 53°C, then specific heat (in cal/g°C) of the liquid is :-

(1) 0.5   (2) 0.6   (3) 0.7   (4) 0.8

SECTION - B (PHYSICS)

36. The effective capacitance between A & B is:-
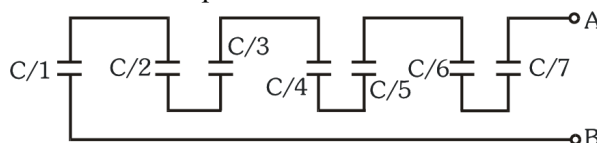
(1) $\dfrac{C}{21}$ (2) $\dfrac{C}{28}$

(3) C   (4) None of these

37. A conductor of resistance 3Ω is stretched uniformly till its length is doubled. The wire is now bent in the form of an equilateral triangle. The effective resistance between the ends of any side of the triangle (in ohm) are :-

(1) $\dfrac{9}{2}$ (2) $\dfrac{8}{3}$ (3) 2   (4) 1

38. Two coils A and B having turns 300 and 600 respectively are placed near each other. On passing a current of 3.0 ampere in A, the flux linked with A is 1.2×10^{-4} Wb and with B it is 9.0×10^{-5} Wb. The mutual inductance of the system is :

(1) 4×10^{-5} H   (2) 3×10^{-5} H

(3) 2×10^{-5} H   (4) 1.8×10^{-2} H

39. A uniformly charged non-conducting sphere of radius R has a potential V_0 at a distance 2R from the surface of sphere, then find the potential at a distance $\dfrac{R}{2}$ from center :-

(1) $\dfrac{11}{4}V_0$ (2) $\dfrac{33}{8}V_0$ (3) $\dfrac{33}{2}V_0$ (4) $\dfrac{11}{2}V_0$

40. In elliptical orbit of a planet, as the planet moves from apogee position to perigee position :-

	List - I		List - II
(P)	Speed of planet	(1)	Remains same
(Q)	Distance of planet from centre of Sun	(2)	Decreases
(R)	Potential energy of planet	(3)	Increases
(S)	Angular momentum about centre of Sun	(4)	Can not say

(1) P-3; Q-2; R-2; S-1   (2) P-1; Q-2; R-2; S-3

(3) P-3; Q-1; R-2; S-2   (4) P-3; Q-2; R-1; S-2

41. A driver applies the brakes on seeing traffic signal 400 m ahead. At the time of applying the brakes vehicle was moving with 15 ms^{-1} and retarding with 0.3 ms^{-2}. The distance of vehicle after 1 minute from the traffic light is :-

(1) 25 m   (2) 375 m (3) 360 m (4) 40 m

42. A hollow cylindrical wire carries current I, having inner & outer radius R & 2R respectively magnetic field at a point which is $\frac{5R}{4}$ distance away from the axis of wire :-

(1) $\frac{5\mu_0 I}{18\pi R}$ (2) $\frac{\mu_0 I}{36\pi R}$ (3) $\frac{5\mu_0 I}{36\pi R}$ (4) $\frac{3}{40}\frac{\mu_0 I}{\pi R}$

43. A particle of charge q and mass m starts moving from the origin under the action of an electric field $\vec{E} = E_0 \hat{i}$ and magnetic field $\vec{B} = B_0 \hat{k}$. Its velocity at (x, −3, 0) is $\left(6\hat{i} + 8\hat{j}\right)$. The value of x is :-

(1) $\frac{36 E_0 B_0}{qm}$ 　　　　(2) $\frac{25m}{2q E_0}$

(3) $\frac{50m}{q E_0}$ 　　　　(4) $\frac{25 E_0 B_0}{m}$

44. According to de-Broglie, the de-Broglie wavelength for electron in an orbit of (radius 5.3 × 10^{-11} m) hydrogen atom is 1.1 × 10^{-10} m. The principle quantum number of this electron is :-

(1) 1 　　(2) 2 　　(3) 3 　　(4) 4

45.
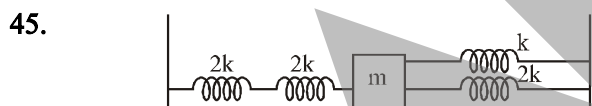
The frequency of oscillation of the system shown in figure is :-

(1) $\frac{1}{2\pi}\sqrt{\frac{k}{4m}}$ 　　(2) $\frac{1}{2\pi}\sqrt{\frac{4k}{m}}$

(3) $\frac{1}{2\pi}\sqrt{\frac{k}{7m}}$ 　　(4) $\frac{1}{2\pi}\sqrt{\frac{7k}{m}}$

46. A spherical ball of radius 3 × 10^{-4} m and density 10^4 kg/m^3 falls freely under gravity through a distance h before entering a tank of water. If after entering the water the velocity of the ball does not change, then value of h is:-
(Viscocity of water is 10^{-5} N-s/m^2) (g = 10 m/s^2)

(1) 1.6 × 10^5 m 　　　(2) 1.6 × 10^7 m

(3) 1.6 × 10^3 m 　　　(4) 1.6 × 10^4 m

47. An astronomical telescope has an angular magnification of magnitude 5 for distant objects. The separation between the objective and eye-piece is 36 cm and the final image is formed at infinity. Determine the focal length of objective and eye-piece–

(1) $f_0 = 30$ cm, $f_e = 6$ cm 　(2) $f_0 = 25$ cm, $f_e = 10$ cm

(3) $f_0 = 30$ cm, $f_e = 10$ cm 　(4) $f_0 = 15$ cm, $f_e = 5$ cm

48. Find tension T_1 and T_2 in the strings in the given diagram. Mass of the rod is M and length L while mass of the block is also M.
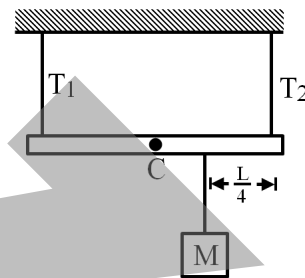
(1) $T_1 = \frac{3Mg}{4}$, $T_2 = \frac{5Mg}{4}$ 　(2) $T_1 = \frac{5Mg}{4}$, $T_2 = \frac{3Mg}{4}$

(3) $T_1 = Mg$, $T_2 = Mg$ 　(4) $T_1 = \frac{3Mg}{2}$, $T_2 = \frac{Mg}{2}$

49. Match column-I with column-II

	Column-I		Column-II
(A)	Wein's displacement law explains	(P)	Why days are hot and nights are cold in deserts
(B)	Planck's radiation law explains	(Q)	Why a blackened platinum wire when gradually heated, appears first dull red and then blue
(C)	Kirchoff's law explains	(R)	The distribution of energy in black body spectrum at shorter as well as longer wavelength

(1) (A) → P, (B) → R (C) → Q

(2) (A) → Q (B) → P (C) →R

(3) (A) → P (B) → Q (C) → R

(4) (A) → Q (B) → R (C) → P

50. A long resonance tube contains air at a pressure of 1 atm and a temperature of 59°C. A tuning fork near its open end is vibrating with a frequency of 500 Hz. Resonance is produced when the length of air column is 16 cm, 49.2 cm and 82.4 cm from open end. Molar mass of air is 28.8 g/mol. The speed of sound in air is :-

(1) 332 m/s (2) 342 m/s (3) 352 m/s (4) 362 m/s

SECTION-A (CHEMISTRY)

51.

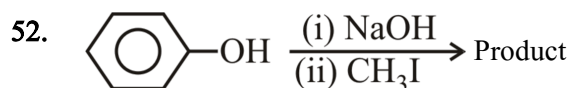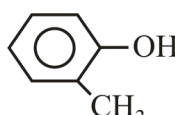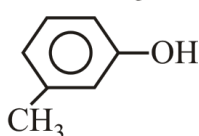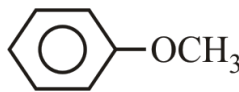$\overset{\oplus\ \ominus}{N_2Cl}$ benzene ring $\xrightarrow[\text{Boil}]{H_2O}$ A $\xrightarrow{Br_2/H_2O}$ B , B is :-
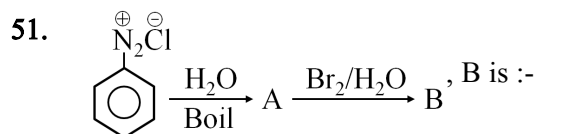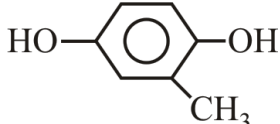
(1) Yellow ppt (2) White ppt

(3) Red ppt (4) Violet ppt

52.

benzene ring—OH $\xrightarrow[\text{(ii) } CH_3I]{\text{(i) NaOH}}$ Product

Product is :

(1) benzene ring with OH and CH₃ (ortho)

(2) benzene ring with OH and CH₃ (meta)

(3) benzene ring—OCH₃

(4) HO—benzene ring—OH with CH₃

53. $C_6H_5NH_2 + CHCl_3 + 3KOH(alc.) \longrightarrow$

$C_6H_5NC + 3KCl + 3H_2O$
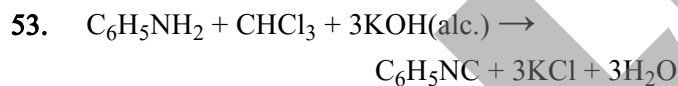
Reaction is known as :
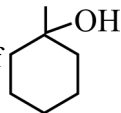
(1) Hoffman isocyanide test

(2) Hoffman bromamide reaction

(3) Carbyl amine reaction

(4) (1) and (3) both
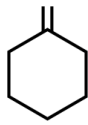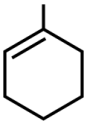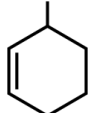
54. Which of the following compound not prepared by sandmeyer reaction ?

(1) Chlorobenzene (2) Bromobenzene

(3) Benzonitrile (4) Phenol

55. Which of the following is not a suitable reagent to convert Butane-2-one to butan-2-ol.

(1) $LiAlH_4$ (2) Zn-Hg/HCl

(3) $NaBH_4$ (4) $H_2/Ni, \Delta$

56. Which of the following is major product of dehydration of (cyclohexanol with methyl and OH) ?

(1) methylenecyclohexane

(2) 1-methylcyclohexene

(3) 3-methylcyclohexene

(4) cyclohexene

57. Compound P & Q in the following sequence are :-

CH_3CH_2I $\xrightarrow{AgCN}$ P

$\xrightarrow{NaCN}$ Q
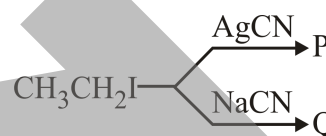
(1) Same compound

(2) Position isomers

(3) Metamers

(4) Functional group isomers

58. Which of the following is incorrect ?

(1) phenol (OH) $\xrightarrow[H_2SO_4]{Na_2Cr_2O_7}$ benzoquinone (O=...=O)

(2) $CH_3-CH=CH-CH_2-OH \xrightarrow{PCC}$

$CH_3-CH=CH-COOH$

(3) benzene—NO_2 $\xrightarrow{Sn+HCl}$ benzene—NH_2

(4)

benzene—$\underset{O}{\overset{O}{S}}$—Cl + H—N—$C_2H_5$ with C_2H_5 →

benzene—$\underset{O}{\overset{O}{S}}$—N with C_2H_5 and C_2H_5

59. Identify product?

$$Ph-CH_2-O-CH_2CH_3 \xrightarrow[\text{One equi}]{HI} ?$$
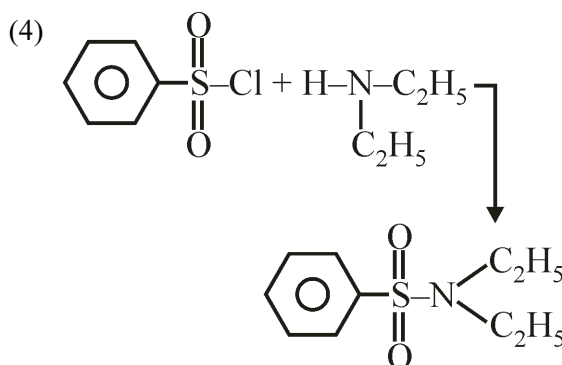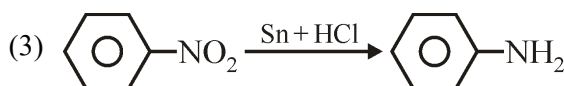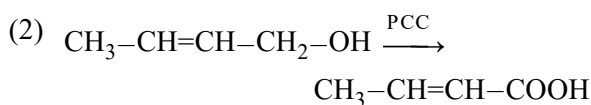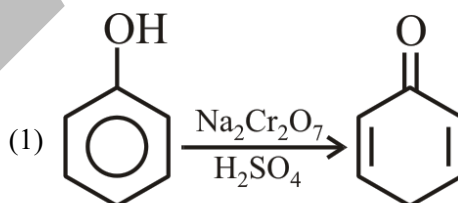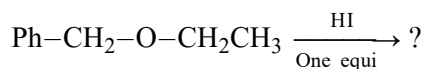
(1) $Ph-CH_2I + CH_3CH_2OH$

(2) $Ph-CH_2I + CH_3CH_2I$

(3) $Ph-CH_2OH + CH_3CH_2I$

(4) $Ph-CH_2OH + CH_3CH_2OH$

60. Victor mayer test is used to differentiate :-

(1) $1°$, $2°$ and $3°$ Amines

(2) Aldehyde & Ketones

(3) $1°$, $2°$ and $3°$ Alcohols

(4) Phenol and ketone

61. Which of the following compound on reaction with Hinsberg reagent gives a product that is insoluble in sodium hydroxide ?

(1) Ethylamine   (2) Dimethylamine

(3) Aniline   (4) Trimethyl amine

62.

$$CH_3-\overset{\overset{O}{\|}}{C}-NH_2 \quad \underset{\triangle}{\overset{NaOBr}{\longrightarrow}} A$$
$$\xrightarrow{LiAlH_4} B$$
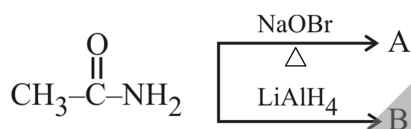
In the above reaction product A and B are :-

(1) Position isomers   (2) Identical

(3) Functional isomers (4) Homologues

63. A solution contains I_2 in benzene. The mole fraction of I_2 is 0.2. Calculate molarity of solution if density of solution is d g/mL. (Molecular weight of I_2 = 254 g/mol).

(1) 1.77 d (2) 17.7 d (3) 1.17 d (4) 2.77 d

64. Find out maximum number of moles of CO_2 obtained by decomposition of 200 g sample of $CaCO_3$ (M_w = 100 g/mol) whose purity is 80%.

(1) 1 mol (2) 1.6 mol (3) 0.8 mol (4) 1.2 mol

65. Number of de-Broglie waves in 4th orbit of hydrogen atom is :-

(1) 4   (2) 8   (3) 3   (4) 1

66. **Assertion :-** Oxidation of iron is given by $4Fe_{(s)} + 3O_2(g) \longrightarrow 2Fe_2O_{3(s)}$ entropy change is -549.4 kJ/mol-K at 298 K. Hence, it is a non-spontaneous process.
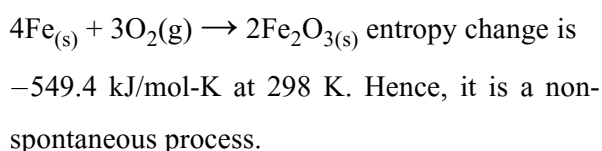
Reason :- For a process to be spontaneous, ΔS_{total} & ΔG of a system should be positive & negative respectively.

(1) Both Assertion & Reason are True & the Reason is a correct explanation of the Assertion.

(2) Both Assertion & Reason are True but Reason is not a correct explanation of the Assertion.

(3) Assertion is True but the Reason is False.

(4) Assertion is false and Reason is true.

67. Match the column :-

|	Column-I		Column-II
(i)	$NaCl_{(s)} \longrightarrow Na^+_{(aq)} + Cl^-_{(aq)}$	(p)	Enthalpy of atomisation
(ii)	$NaCl_{(s)} \longrightarrow Na^+_{(g)} + Cl^-_{(g)}$	(q)	$\Delta_{sol}H^0$
(iii)	$Na_{(s)} \longrightarrow Na_{(g)}$	(r)	Enthalpy of formation
(iv)	$H_{2(g)} + \frac{1}{2} O_{2(g)} \longrightarrow H_2O_{(\ell)}$	(s)	Lattice enthalpy

(1) (i)-q ; (ii)-r ; (iii)-p, (iv)-q

(2) (i)-q ; (ii)-s ; (iii)-r, (iv)-p

(3) (i)-r ; (ii)-s ; (iii)-p, (iv)-q

(4) (i)-q ; (ii)-s ; (iii)-p, (iv)-r

68. Calculate the molar solubility of $Ni(OH)_2$ in 0.10 M NaOH. The solubility product of $Ni(OH)_2$ is 2×10^{-15}.

(1) 2×10^{-13} M

(2) 3.2×10^{-8} M

(3) 5×10^{-5} M

(4) 3×10^{-17} M

SPACE FOR ROUGH

69. 2 moles of AB_3 was introduced in an evacuated vessel of 1L capacity. At high temperature, the gas undergoes partial dissociation according to the equation

$2AB_3(g) \rightleftharpoons A_2(g) + 3B_2(g)$

At equilibrium, the concentration of AB_3 was found to be 1 M. What is the value of K_C ?

(1) $1.7 \text{ mol}^2 \text{L}^{-2}$ (2) $6.75 \text{ mol}^2 \text{L}^{-2}$

(3) $0.42 \text{ mol}^2 \text{L}^{-2}$ (4) $27 \text{ mol}^2 \text{L}^{-2}$

70. For a Bimolecular elementary reaction

$A + B \longrightarrow$ Products, Rate $= PZ_{AB} e^{-Ea/RT}$

(1) P is called probability factor.

(2) Z_{AB} represents collision frequency of reactants A & B.

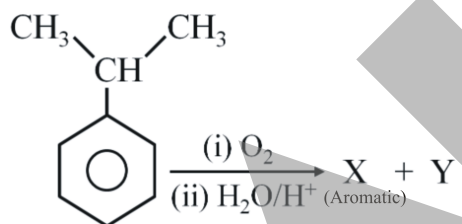(3) $e^{-E_a/RT}$ corresponds to the fraction of molecules that have energies equal to or greater than E_a.

(4) All are correct

71. A reaction $A \longrightarrow$ Product, which is of first order with respect to A has a rate constant of 6 min^{-1}. If we start with $[A] = 0.5$ M, when will $[A]$ reach the value of 0.05 M ?

(1) 0.384 min   (2) 0.15 min

(3) 3 min   (4) 3.84 min

72. What weight of the non volatile solute urea needs to be dissolved in 100 g of water in order to decrease the vapour pressure of water by 25% ?

(1) 100 g   (2) 111.1 g

(3) 150 g   (4) 201.5 g

73. The emf of the cell $Zn|Zn^{+2}||Ag^+|Ag$ is independent of :-

(1) The quantity of solution of Zn^{+2} & Ag^+ ions

(2) The molarity of Zn^{+2} ions in the solution

(3) Moles of Ag^+ ions in unit volume

(4) Temperature

74. Ca and Ba ions are precipitated in fifth group as their :

(1) O^{-2} (2) SO_4^{-2} (3) CO_3^{-2} (4) S^{-2}

75. On heating a small lump of borax, a glassy bead is obtained which contain :-

(1) $Na_2B_4O_7$ (2) $NaBO_2$ & B_2O_3

(3) Na_2O (4) Na_2B

76. The energy required to completely separate one mole of a solid ionic compound into its gaseous constituent ions is called ?

(1) Hydration enthalpy

(2) Ionisation enthalpy

(3) Electron gain enthalpy

(4) Lattice energy

77. IUPAC symbols for the element which is having following configuration :

$[Rn]7s^2\ 6d^0\ 5f^{13}$

(1) Unq   (2) Unu   (3) Unt   (4) Unb

78. Which of the following order is correct ?

(1) $N^{-3} > O^{-2} > Mg^{+2} > F^-$ (Ionic radius)

(2) $Li < B < Be > C$ (2nd I.P.)

(3) $S > Se > Te > O$ (Electron gain enthalpy)

(4) All

79. Which of the following is square planar ?

(1) SF_4 (2) CH_4 (3) XeF_4 (4) ClF_3

80. Which is the correct order of bond order ?

(1) $N_2 > N_2^+ > N_2^{-2}$ (2) $ClO_4^- > SO_4^{-2} > PO_4^{-3}$

(3) $N_2 > O_2 > F_2$ (4) All

81. Which is the correct order of solubility in water ?

(1) $Na_2S > Cu_2S > ZnS$

(2) $LiOH < NaOH < RbOH < KOH$

(3) $BeO < MgO < CaO < SrO$

(4) $CsF < CsCl < CsBr < CsI$
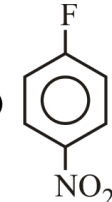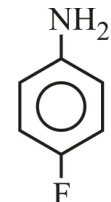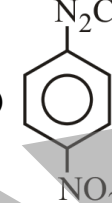
82. **Statement-I :** I_3^- ion is linear.

Statement-II : In I_3^- ion, iodine is in 'sp' hybridised state.

(1) Both **Statement I** and **Statement II** are correct.

(2) Both **Statement I** and **Statement II** are incorrect.

(3) **Statement I** is correct and **Statement II** is incorrect

(4) **Statement I** is incorrect and **Statement II** is correct

83. Which of the following exhibit maximum ionic conductivity ?

(1) $[Co(NH_3)_6]Cl_3$ (2) $[Cu(NH_3)_4]Cl_2$

(3) $[Ni(CO)_4]$ (4) $K_4[Fe(CN)_6]$

84. Which one is most paramagnetic ?

(1) $[Cr(H_2O)_6]^{+3}$ (2) $[Fe(H_2O)_6]^{+2}$

(3) $[Cu(H_2O)_6]^{2+}$ (4) $[Zn(H_2O)_6]^{+2}$

85. What is the correct order of spin only magnetic moment of Mn^{+2}, Cr^{+2} & Ti^{+2} ?

(1) $Mn^{+2} > Ti^{+2} > Cr^{+2}$ (2) $Ti^{+2} > Cr^{+2} > Mn^{+2}$

(3) $Mn^{+2} > Cr^{+2} > Ti^{+2}$ (4) $Cr^{+2} > Ti^{+2} > Mn^{+2}$

SECTION-B (CHEMISTRY)

86.

Find the correct statement

(1) Y gives orange ppt with 2, 4 D.N.P.

(2) Y give silver mirror test.

(3) Y can not react with $NaHSO_3$

(4) Y give red-brown ppt of Cu_2O with benedict solution

87. $CH_3-CH_2-CH_2-OH \xrightarrow{Jone's\ reagent} (P) \xrightarrow{PCl_5} (Q)$

$\xrightarrow{H_2+Pd+BaSO_4} (R)$

Product P, Q and R respectively.

(1) CH_3CH_2COOH, CH_3CH_2COCl, $CH_3CH_2CH_2Cl$

(2) CH_3CH_2COOH, CH_3CH_2CHO, CH_3CH_2COCl

(3) CH_3CH_2COOH, CH_3CH_2COCl, CH_3CH_2CHO

(4) CH_3COOH, CH_3COCl, CH_3CHO

88.
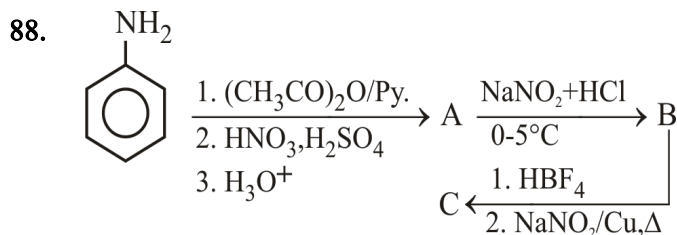
Compound C is :-

89. Which reaction is not used for preparation of benzaldehyde ?
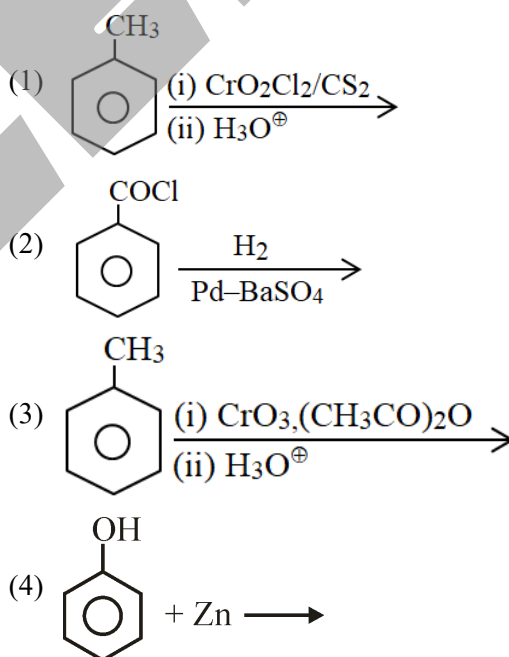
90. $C_6H_5N_2Cl \xrightarrow[KCN]{CuCN} A \xrightarrow[\Delta]{H_2O/H^{\oplus}} B \xrightarrow[\Delta]{NH_3} C$

product C is :-

(1) C_6H_5COOH

(2) $C_6H_5CONH_2$

(3) $C_6H_5NH_2$

(4) C_6H_5CN

91. $CH_3-CH=CH_2 \xrightarrow[CCl_4]{Br_2}$ Product

Which of the following is incorrect ?

(1) it involves cyclic bromonium ion formation

(2) reaction proceeds with anti addition

(3) this reaction acts as test of unsaturation

(4) no color changes of Bromine takes place.

92. Calculate the enthalpy change when 1 mol of water at 100°C & 1 bar pressure is converted to ice at 0°C. Given the enthalpy of fusion of ice is 5.44 kJ/mol and heat capacity of water is 4.2 J/g°C .

(1) −2.12 kJ/mol   (2) −5.86 kJ/mol

(3) −5.02 kJ/mol   (4) −13 kJ/mol

93. How many statements given below are true ?

(a) The energy of an electron in a multi electron atom depends on its principle quantum number & azimuthal quantum number.

(b) Energies of the orbitals in the same subshell decreases with increase in the atomic number.
$E_{2s}(H) > E_{2s}(Li) > E_{2s}(Na) > E_{2s}(K)$

(c) Sodium has 10 core electrons

(d) The size, shape & energy of all 3 p orbitals are identical.

(e) If probability density $|\psi|^2$ is constant on a given surface, $|\psi|$ is also constant over the surface. The boundary surface for $|\psi|^2$ & $|\psi|$ are identical.

(f) There are two d-orbitals which do not have electron density along the axis.

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

94. Which of the following is not a disproportionation reaction.

(1) $P_{4(s)} + 3OH^-_{(aq)} + 3H_2O(\ell) \longrightarrow PH_{3(g)} + 3H_2PO^-_{2(aq)}$

(2) $S_{8(s)} + 12OH^-_{(aq)} \longrightarrow 4S^{2-}_{(aq)} + 2S_2O^{2-}_{3(aq)} + 6H_2O(\ell)$

(3) $Cl_{2(g)} + 2OH^-_{(aq)} \longrightarrow ClO^-_{(aq)} + Cl^-_{(g)} + H_2O_{(\ell)}$

(4) $NaH_{(s)} + H_2O_{(\ell)} \longrightarrow NaOH_{(aq)} + H_{2(g)}$

95. An electric current of 193 A is passed through molten sodium chloride for 5 hours. Calculate the moles of chlorine gas liberated at the electrode ?

(1) 18 mol   (2) 9 mol

(3) 27 mol   (4) 36 mol

96. Sodium nitropruside $Na_2[Fe(CN)_5NO]$ is used as reagent for detection of and the compound formed is :-

(1) S, $Na_4[Fe(CN)_5(NOS)]$

(2) N, $Na_4[Fe(CN)_6]$

(3) S, $Na_2[Fe(CN)_4(NOS)]$

(4) S, $Na_2[Fe(CN)_5(NOS)]$

97. Which of the following pair has same bond order and same bond type ?

(1) C_2, O_2 (2) B_2, F_2 (3) N_2, CO (4) O_2, C_2

98. Which compound is formed when excess of KCN is added to aqueous solution of copper sulphate ?

(1) $Cu(CN)_2$ (2) $K_2[Cu(CN)_4]$

(3) $K[Cu(CN)_4]$ (4) $K_3[Cu(CN)_4]$

99. Which of the following complex exhibits cis-trans isomerism ?

(1) $[Co(NH_3)_4(H_2O)_2]Cl_3$

(2) $[Co(NH_3)_3Cl_3]$

(3) $[Co(NH_3)_4Cl_2]^+$

(4) All

100. **Assertion :** Cu^{+2} is more stable than Cu^+

Reason : E° is more important in determining stable O.S. than electronic configuration.

(1) Both **Assertion** and **Reason** are true but **Reason** is NOT the correct explanation of **Assertion**.

(2) Both **Assertion** and **Reason** are false.

(3) Both **Assertion** and **Reason** are true and **Reason** is the correct explanation of **Assertion**.

(4) **Assertion** is true but **Reason** is false.

SECTION - A (BOTANY)

101. In taxonomic hierarchy, given below organisms are representative of how many families ?
Wheat, Potato, Brinjal, Mango

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

102. ICBN stands for

(1) International classification of biological nomenclature.

(2) International class of biological nomenclature.

(3) International code of botanical nomenclature.

(4) International classification of biological naming.

103. The deuteromycetes reproduce by asexual spores known as _____.

(1) Conidia   (2) Zoospores

(3) Aplanospores   (4) Ascospores

104. Hydrocolloids are obtained from :-

(1) *Porphyra*   (2) *Gelidium*

(3) *Spirogyra*   (4) *Ectocarpus*

105. Which of the following statement is incorrect ?

(1) After fertilization the ovule wall get transformed into pericarp

(2) Strawberry fruits are false fruits.

(3) Mango is drupe fruit.

(4) Mango fruit develop from monocarpellary superior ovary.

106. Which of the following set of plants shows perigynous flower ?

(1) Mustard, China rose, Brinjal

(2) Rose, Plum, Peach

(3) Grapes, Apple, Sunflower

(4) Cucumber, Maize, Apple

107. Match the column I with column II and choose correct option :-

	Column-I		Column-II
(A)	Underground stem	(1)	*Ashwagandha*
(B)	Medicinal plant	(2)	Potato
(C)	Trilocular ovary with many ovules	(3)	Pea
(D)	Diadelphous stamens	(4)	*Gloriosa*

(1) A-2, B-1, C-4, D-3   (2) A-1, B-2, C-3, D-4

(3) A-4, B-3, C-2, D-1   (4) A-3, B-4, C-1, D-2

108. Given below two statements:
Statement - (I) : In dicots, direct elongation of the radicle leads to the formation of primary root.
Statement - (II) : Fibrous roots arise from the base of the stem.

(1) Both **Statement I** and **Statement II** are correct.

(2) **Statement I** is correct but **Statement II** is incorrect.

(3) Both **Statement I** and **Statement II** are incorrect.

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

109. The functions of sieve tubes are controlled by :-

(1) Nucleus of companion cells

(2) Nucleus of phloem parenchyma

(3) Nucleus of epidermal cells

(4) Nucleus of cells of secondary cortex

110. Which statement/s is/are correct about internal structure of dicot stem :-

(1) Hypodermis is collenchymatous

(2) Pericycle is found in patches located just above phloem bundles.

(3) The cells of endodermis are rich in starch grains

(4) All the above

111. Parenchyma cells are isodiametric and :-

    (1) Thin walled

    (2) Thick walled

    (3) With lignified wall

    (4) With suberized wall

112. Which statement is correct about T.S. of monocot root :-

    (1) Sclerenchymatous pericycle is found in patches located just above the phloem bundles

    (2) It has more than six xylem bundles

    (3) It shows secondary growth

    (4) Endodermis is rich in starch grains so, it is also termed as starch sheath

113. If a monochromatic light of blue colour is incident on different photosynthetic pigments, it will be absorbed maximum by the pigment :-

    (1) Chlorophyll a   (2) Chlorophyll b

    (3) Carotenoids   (4) Phycobilins

114. **Assertion :-** Protons or hydrogen ions that are produced by splitting of water accumulated within the lumen of thylakoids.

    Reason :- Splitting of the water molecules takes place on the inner side of the membrane.

    (1) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.

    (2) Assertion is true but Reason is false.

    (3) Assertion is false but Reason is true.

    (4) Both Assertion and Reason are true but Reason is NOT the correct explanation of Assertion.

115. Which of the metabolities is common to respiration mediated breakdown of fats, carbohydrates and proteins?

    (1) Acetyl CoA   (2) Pyruvic acid

    (3) DHAP   (4) 3 - PGAL

116. Substrate level phosphorylation (SLP) occurs during?

    (1) Link reaction and Kreb's cycle

    (2) Glycolysis only

    (3) Link reaction and ETS

    (4) Krebs cycle and glycolysis

117. The volatile substance is released from ripened oranges that __A__ the ripening of stored un-ripened banana. It was identified as __B__.

    (1) A-Reduced , B-Ascisic acid

    (2) A-Hastened, B-Ethylene

    (3) A-Stop, B-Auxin

    (4) A-Hastened, B-Cytokinins

118. Growth of pollen tube is measured in terms of increase in its _____.

    (1) Length   (2) Surface area

    (3) Volume   (4) Cell's size

119. The number of ovule/ovules in an ovary of wheat is :

    (1) One   (2) Two   (3) Three   (4) Four

120. A typical angiosperm anther is

    (1) Bilobed, dithecous, tetrasporangiate

    (2) Bilobed, trithecous, tetrasporangiate

    (3) tetralobed, dithecous, tetrasporangiate

    (4) Bilobed, dithecous, bisporangiate

121. Which of the following is resistant to enzyme action ?

    (1) Pollen exine   (2) Leaf cuticle

    (3) Cork   (4) Wood fiber

122. _a_ is a good example of incomplete dominance and _b_ is a example of co-dominance.

    (1) a – shape of seed ; b – ABO blood groups

    (2) a – size of starch gain in pea ; b – AB blood group

    (3) a – Human skin colour ; b – Sickle cell anaemia

    (4) a – Coat colour in cattles ; b – Flower colour in *Mirabilis jalapa*

123. The F_2 generation offspring in a plant showing incomplete dominance exhibit

   (1) Variable genotypic & phenotypic ratio.

   (2) A genotypic ratio of 1 :1

   (3) A phenotypic ratio of 3 :1

   (4) Similar phenotypic & genotypic ratio of 1 : 2 : 1

124. A family has 6 girls, probability of son at 7th birth is-

   (1) 50%   (2) 75%

   (3) 25%   (4) 100%

125. Okazaki fragments are synthesized on

   (1) Leading strand, towards fork

   (2) Lagging strand, towards fork

   (3) Leading strand, away from fork

   (4) Lagging strand, away from fork

126. Which of the following are excellent candidates for species-specific, narrow spectrum insecticidal applications.

   (1) Bacteria   (2) Baculoviruses

   (3) Fungus   (4) None of these

127. $Nt = N_0e^{rt}$ this equation is a integral form of the exponential growth in this equation what is "r"?

   (1) Population density after time t

   (2) Population density at time zero

   (3) Reproduction period

   (4) Intrinsic rate of natural increase

128. Choose the incorrect statement :-

   (1) Population ecology is an important area of ecology because it links ecology to population genetics and evolution.

   (2) A population has certain attributes whereas, an individual organism does not.

   (3) Individual has birth rate and death rate.

   (4) Sex ratio is characteristic of a population.

129. Choose the incorrect statement ?

   (1) Interaction of biotic and abiotic components result in a physical structure that is characteristic for each type of ecosystem.

   (2) In an ecosystem unidirectional movement of energy towards the higher trophic levels and its dissipation and loss as heat to the environment takes place.

   (3) A constant input of solar energy is the basic requirement for any ecosystem to function and sustain.

   (4) Primary productivity is defined as the rate of formation of new organic matter by consumer.

130. _____ Showed that in his experiments, increased diversity contributed to higher productivity.

   (1) Paul Ehrlich   (2) Robert May

   (3) David Tilman   (4) Reiter

131. Which of the following was objective of world summit held in 2002 in South Africa ?

   (1) Protection of Stratospheric ozone

   (2) Climate change

   (3) Biodiversity conservation

   (4) Sustainable development

132. Study the four statements (a-d) given below and select the two correct ones out of them :
(a) A lion eating a deer and a sparrow feeding on grain are ecologically similar in being predators..
(b) Predator star fish *Pisaster* helps in maintaining species diversity of some invertebrates.
(c) Predators ultimately lead to the extinction of prey species.
(d) Production of chemicals such as nicotine, strychnine by the plants are metabolic disorders.
The two correct statements are :

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

133. If in a pond there are 50 fish last year and through reproduction 20 new fish are added, taking the current population to 70, calculate the birth rate (in terms of offsprings per fishes per year)

   (1) 0.4   (2) 0.1   (3) 0.2   (4) 0.5

SPACE FOR ROUGH

134. Which one of the following is not step of decomposition ?

    (1) Fragmentation   (2) Humification

    (3) Stratification   (4) Mineralisation

135. Combined diversity at all levels of biological organization was described by -

    (1) Paul Ehrlich

    (2) Edward Wilson

    (3) Alexander von Humboldt

    (4) Ernst Haeckel

SECTION - B (BOTANY)

136. Which of the following statement is true for both Dinoflagellates and slime moulds ?

    (1) Saprophytic protists

    (2) Formation of red tides by rapid multiplication

    (3) Formation of plasmodium

    (4) Presence of membrane-bound organelles

137. Read the following example :-

    Chara, Ectocarpus, Spirogyra, Volvox, Polysiphonia, Porphyra

    How many examples have chlorophyll 'a' and 'b'?

    (1) Three (2) Four (3) Five (4) Six

138. Which of the following family members have leaves with parallel venation ?

    (1) Liliaceae   (2) Malvaceae

    (3) Solanaceae   (4) Fabaceae

139. Match the column-I with column-II and select correct option.

	Column-I		Column-II
(A)	Trimerous flower	(i)	Brinjal
(B)	Persistent calyx	(ii)	Sweet pea
(C)	Ornamental plant	(iii)	Onion
(D)	Stem tendril	(iv)	Grapevines

    (1) A-iii, B-ii, C-iv, D-i (2) A-iii, B-i, C-ii, D-iv

    (3) A-ii, B-iv, C-i, D-iii (4) A-iv, B-iii, C-i, D-ii

140. Choose the incorrect statement ?

    (1) The cells of permanent tissue generally do not divide further

    (2) A simple tissue is made up of one type of cells

    (3) The wall of parenchymatous cells are generally thick and made up of cellulose and lignin.

    (4) Parenchymatous cells may either be closely packed or have small inter cellular space

141. **Statement-I :** The root hairs are unicellular elongations of the epidermis cells and help absorb water and minerals from the soil.

    Statement-II : The trichomes in the root system are usually multicellular and they may be branched or unbranched and soft or stiff.

    (1) Both Statement I and Statement II are incorrect.

    (2) Statement I is true but Statement II is false

    (3) Statement I is false but Statement II is true

    (4) Both Statement I and Statement II are correct.

142. Which of the following statements regarding effect of temperature on photosynthesis is incorrect ?

    (1) Tropical plants have a higher temperature optimum than the plants adapted to temperate climates.

    (2) The dark reaction being enzymatic are temperature controlled.

    (3) The temperature optimum for photosynthesis of different plants also depends on the habitat that they are adapted to.

    (4) The C_3 plants respond to higher temperature and show high rate of photosynthesis.

143. Choose the correct answer to fill in the blank from the options given -

   In ETS electrons from NADH produced in the mitochondrial matrix during citric acid cycle are oxidised by _____.

   (1) Complex - III

   (2) Complex - I

   (3) Complex - IV

   (4) Complex - II

144. Match the column−A with column−B :

	Column-A		Column-B
(a)	Pyruvic acid → Lactic acid	(i)	Alcohol dehydrogenase
(b)	Pyruvic acid → Acetaldehyde	(ii)	Lactate dehydrogenase
(c)	Acetaldehyde → Ethanol	(iii)	Pyruvic acid Decarboxylase

   (1) (a) − (ii), (b) − (iii), (c) − (i)

   (2) (a) − (iii), (b) − (i), (c) − (ii)

   (3) (a) − (i), (b) − (ii), (c) − (iii)

   (4) (a) − (ii), (b) − (i), (c) − (iii)

145. Zeatin was extracted for the first time from -

   (1) Maize

   (2) Coconut

   (3) Fungus

   (4) Autoclaved herring sperm

146. Select incorrect statement?

   (1) Cleistogamous flowers are invariably autogamous

   (2) Self−incompatibility is an out breeding device

   (3) Black pepper is an example of perispermic seed

   (4) Pea & groundnut are example of albuminous seeds

147. **Assertion :** Mendel obtained phenotypic ratio 9 : 3 : 3 : 1 in the dihybrid cross.

   Reason : When two pairs of traits are combined in a hybrid, segregation of one pairs of character is independent of the other pair of character.

   (1) Both assertion and reason are true and reason is the correct explanation of assertion.

   (2) Assertion is true but reason is false

   (3) Assertion is false but reason is true

   (4) Both assertion and reason are true but reason is not the correct explanation of assertion.

148. (A) A gene is defined as the functional unit of inheritance.
   (B) The DNA sequence coding for tRNA or r-RNA molecule define a gene.
   (C) The exons are said to be those sequences that appear in mature or processed RNA
   (D) Inheritance of a character is not affected by promoter and regulatory sequence of structural gene.
   Select the set of correct statements in given option :

   (1) A, B and C   (2) B, C and D

   (3) A, C and D   (4) A, B and D

149. It was George Gamow, a ____, who argued that since there are only 4 bases and if they have to code for ____ amino acids, the code should constitute a combination of 3 bases.
   Fill in the blanks, respectively :

   (1) Physicist ; 20   (2) Biochemist ; 20

   (3) physicist ; 18   (4) geneticist ; 20

150. True for competition -

   (1) Organisms having same niche live together for indefinite time period.

   (2) Competitive release demonstrates occurence of competition in nature.

   (3) During competition *Chathamalus* removes *Balanus* from intertidal region of Scotland.

   (4) Gause's competitive exclusion principle is valid also when plenty of resources are present and organisms having different food habits.

SECTION - A (ZOOLOGY)

151. In which of the following segmentation in the body is first observed ?

(1) Aschelminthes   (2) Annelida

(3) Arthropoda   (4) Mollusca

152. Which are incorrect among the following :
(A) Poison sting in "Torpedo"
(B) Electric organ is found in "Trygon"
(C) Claspers present in "Scoliodon"
(D) Air bladder present in "Pristis"

(1) A & B   (2) B & C

(3) A, B & C   (4) A, B & D

153. Mark the incorrect option about amphibians :-

(1) Skin is moist and glandular

(2) Cloaca is present

(3) Fertilisation is mainly external and development is indirect

(4) Eyes are without eyelids

154. The mast cells secrete the following substances :

(1) Heparin   (2) Histamine

(3) Serotonin   (4) All of the above

155. Which of the following statements is/are false about columnar epithelium ?
(A) It is made up of tall and slender cells
(B) Free surface may have microvilli
(C) They are found in stomach and intestine and help in secretion and absorption
(D) Ciliated epithelium is mainly present in hollow structures like bronchioles and fallopian tubes
(E) They have apical nuclei

(1) (A) only   (2) (E) only

(3) (B) and (D)   (4) (B) and (C)

156. How many of the following statements are correct :-
(A) Systemic circulation takes place between left ventricle and right atrium of heart
(B) Adrenal medullary hormones can decrease the cardiac output
(C) Heart failure is not the same as cardiac arrest or heart attack
(D) The opening between the right atrium and the right ventricle is guarded by a valve formed of two muscular flaps

(1) Two   (2) One   (3) Four   (4) Three

157. Trachea is a straight tube which divides into right and left bronchi at the level of :-

(1) 5th cervical vertebra   (2) 5th thoracic vertebra

(3) 5th lumbar vertebra   (4) 1st thoracic vertebra

158. Glomerulus along with Bowman's capsule is called:

(1) Renal corpuscle   (2) Malpighian tubule

(3) Malpighian body   (4) Both (1) & (3)

159. Which of the following is/are characteristic of mammalian brain ?

(1) Arachnoid layer   (2) Corpus albicans

(3) Corpora quadrigemina   (4) All of the above

160. Match the following columns :-

	Column-I		Column-II
(A)	Polarisation	(i)	$\Delta V = -70$ mv opening of K^+ VGC
(B)	Hyper polarisation	(ii)	$\Delta V = +30$ mv outer membrane is negatively charged due to Na^+ influx
(C)	Depolarisation	(iii)	$\Delta V = -70$ mv opening of $Na^+ - K^+$ pump and passive channels only
(D)	Repolarisation	(iv)	$\Delta V = -90$ mv opening of Cl^- VGC or K^+ VGC for long time

(1) A–iv   B–ii   C–iii   D–i

(2) A–iii   B–iv   C–ii   D–i

(3) A–i   B–iii   C–ii   D–iv

(4) A–iii   B–iv   C–i   D–ii

161. Pituitary gland is controlled by :

(1) Epithalamus   (2) Thalamus

(3) Hypothalamus   (4) Cerebrum

162. Find out the incorrect match from the following table

	Column-I	Column-II
(1)	Heart	Atrial natriuretic factor
(2)	Kidney	Erythropoietin
(3)	Gastro-intestinal tract	CCK
(4)	Ovary	oxytocin

163. Match the column-A with column-B :-

	A		B
A	Hypothalamus	(i)	Aldosterone
B	Parathyroid gland	(ii)	GnRH
C	Thyroid gland	(iii)	PTH
D	Zona glomerulosa	(iv)	Tetra-iodothyronine

(1) A-i, B-ii, C-iii, D-iv   (2) A-ii, B-i, C-iii, D-iv

(3) A-ii, B-iii, C-iv, D-i (4) A-iii, B-i, C-ii, D-iv

164. Match the following-

A-Z-disc	P = contains only thin filament
B-I-Band	Q = separate two sarcomere
C-A-Band	R = Contains thick filaments , no thin filament
D-H-Zone	S = Entire length of thick filament

(1) A = P, B = Q, C = R, D = S

(2) A = Q, B = P, C = S, D = R

(3) A = Q, B = R, C = P, D = S

(4) A = R, B = P, C = S, D = Q

165. Placenta is the region where :-

(1) Foetus is attached to myometrium of uterus.

(2) Foetus receives oxygen and nourishment from mother's blood.

(3) Foetus is covered by fetal membranes.

(4) Foetus is attached to mother by spermatic cord.

166. **Assertion :** Myometrium is essential for parturition.

Reason : Myometrium exhibits strong contractions during delivery of baby.

(1) Both assertion & reason are true & the reason is a correct explanation of the assertion.

(2) Both assertion & reason are true but reason is not a correct explanation of the assertion.

(3) Assertion is true but the reason is false.

(4) Both assertion & reason are false.

167. **Assertion :-** Saheli is a "once a week" pill with very few side effects and high contraceptive value.

Reason :- Saheli is the new oral contraceptive for the females and contains a non-steroidal preparation.

(1) Both Assertion & Reason are True & the Reason is a correct explanation of the Assertion.

(2) Both Assertion & Reason are True but Reason is not a correct explanation of the Assertion.

(3) Assertion is True but the Reason is False.

(4) Both Assertion & Reason are False.

168. Serum of any animal containing antibody for specific antigen is called :-

(1) Antibiotic   (2) Vaccine

(3) Anti-serum   (4) Agglutination

169. Given below are two statements –

Statement-I : Active immunity is fast and do not take time to give its full effective response.

Statement-II : The primary lymphoid organs are bone marrow and thyroid.

In the light of the above statements choose the most appropriate answer from the options given below :

(1) Both Statement-I and Statement-II are incorrect

(2) Statement-I is correct but Statement-II is incorrect

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

(4) Both Statement-I and Statement-II are correct

170. **Statement-I :** Typhoid fever could be confirmed by widal test.

Statement-II : *Salmonella typhi* is pathogenic bacterium which cause typhoid fever in humans.
Which one of the following options is correct ?
(1) Both Statement-I & Statement-II are correct.
(2) Statement-I is correct & Statement-II is incorrect.
(3) Statement-I is incorrect & Statement-II is correct.
(4) Both Statement-I & Statement-II is incorrect.

171. Fossils found in older rocks are of ?
(1) Complex types   (2) Mixed types
(3) Simpler types   (4) Advanced types

172. How many years ago Prehistoric cave art was developed ?
(1) 12000 Years ago   (2) 15000 Years ago
(3) 18000 Years ago   (4) 10000 Years ago

173. Match the following :

	List-I		List-II
(A)	Cristae	(I)	Infoldings of plasma membrane in Bacteria
(B)	Cisternae	(II)	Disc-shaped sacs in Golgi apparatus
(C)	Mesosomes	(III)	Infolding in Mitochondria
(D)	Thylakoids	(IV)	Flat membranous sacs in stroma

(1) A-I, B-II, C-III, D-IV (2) A-III, B-IV, C-I, D-II
(3) A-II, B-III, C-I, D-IV (4) A-III, B-II, C-I, D-IV

174. The names of different cell organelles / structures are given below -
Mitochondria, Cell wall, Ribosomes, Centrioles, Microbodies, Plastids, Endoplasmic Reticulum
How many of the above are present in both higher plant and animal cells?

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

175. Identify the statements as **true (T)** or **false (F)**
(I) Cells actively involved in protein synthesis have larger and more numerous nucleoli along with RER
(II) Animal cells differ from plant cells in possessing a large central vacuole
(III) Lysosomes are reservoirs of hydrolytic enzymes
(IV) Chromatin contains DNA and histones

(1) I-T II-F III-T IV-T
(2) I-F II-F III-T IV-T
(3) I-F II-T III-F IV-F
(4) I-T II-F III-F IV-T

176. Which of the following statements are not **correct**?
(A) Microbodies are present in both plant and animal cells.
(B) All chromosomes have a staining secondary constriction at constant location.
(C) Each centriole has an organisation like cartwheel in longitudinal section
(D) Matrix of mitochondria contains enzymes required for the synthesis of carbohydrate only.

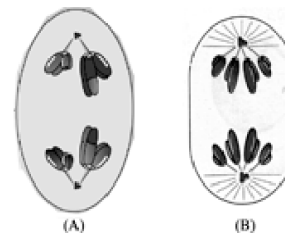(1) A only   (2) only B and C
(3) B, C and D   (4) A, B, C & D

177. The given diagram illustrates a cell :

Which of the following statements regarding the image is false ?
(1) The nuclear envelope is disappearing
(2) It is an animal cell
(3) It is in telophase
(4) The cell furrow is forming

178. Identify the given figures A and B :-

	A	B
(1)	Anaphase-I	Telophase-I
(2)	Anaphase-II	Anaphase-I
(3)	Metaphase-II	Metaphase-I
(4)	Anaphase-I	Mitotic anaphase

179. Below given structure represent amino acids what will be A, B and C
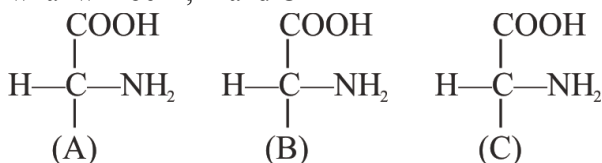
$$COOH \quad COOH \quad COOH$$
$$H—C—NH_2 \quad H—C—NH_2 \quad H—C—NH_2$$
$$(A) \quad (B) \quad (C)$$
Glycine   Alanine   Serine

(1) A–H, B–CH_3, C–CH_2OH

(2) A–CH_3, B–H, C–CH_2OH

(3) A–CH_3, B–CH_2OH, C–H

(4) A–CH_2OH, B–H, C–CH_3

180. Primary strucure of proteins are:

(1) Linear chains of amino acids

(2) Branched chains of amino acids

(3) Linear chains of simple sugars

(4) Branched chains of simple sugars

181. Given below are two statement : One is labelled as Assertion (A) and the other is labelled as Reason(R).

Assertion (A) : Polysaccharides are non - reducing sugar.

Reason (R) : The acid insoluble pellet has polysaccharides.

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

(1) Both (A) and (R) are correct and (R) is the correct explanation of (A).

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

(3) (A) is correct but (R) is not correct.

(4) (A) is not correct but (R) is correct.

182. Which of the following is not the application of PCR?

(1) Detection of very low concentration of bacteria or virus

(2) Detection of mutations in genes in suspected cancer patients

(3) Amplification of desired DNA segment

(4) Detection of antibodies synthesised against pathogens

183. Read the following statement

Statement I :- RNAi takes place in all eukaryotic organism as a method of cellular defense.

Statement II :- Strains of *Bacillus* thuringiensis produce protein that kill all the types of Bacteria.

(1) Statement-I and statement-II both are true

(2) Statement-I is true and statement-II is false

(3) Statement-I is false and statement-II is true

(4) Statement-I and statement-II both are false

184. The experimental manipulation of DNA of different species and producing recombinant DNA is known as :-

(1) Electrophoresis

(2) Recombinant DNA technology

(3) Transformation

(4) Somatic hybridization

185. Arrange the steps of rDNA technology in correct order:-

I. Extraction of the desired gene product.

II. Amplification of gene of interest.

III. Isolation of desired DNA fragment.

IV. Ligation of DNA fragment into vector.

V. Insertion of rDNA into host.

Correct order is :-

(1) I, II, III, IV, V

(2) V, IV, III, II, I

(3) III, II, IV, V, I

(4) III, IV, II, I, V

SECTION - B (ZOOLOGY)

186. What happens when DNA fragment is inserted into plasmid pBR322 using enzyme Pvu-I or Pst-I ?

(a) Inactivation of amp^R gene

(b) Inactivation of tet^R gene

(c) Recombinants are unable to grow in presence of ampicilin

(d) Recombinants are unable to grow in presence of tetracycline

(e) Unable to replicate

(1) b & d are correct

(2) a & c are correct

(3) a, c & e are correct

(4) b, d & e are correct

187. How many animals in the list given below have radial symmetry :

Obelia, Sponge, Leucosolenia, Aurelia, Pleurobranchia, Fasciola, Ascaris, Earthworm, Pila, Larva of star fish.

(1) Two   (2) Three   (3) Five   (4) Four

188. Which of the cells are cartilage destroying cells?

(1) Chondroblast   (2) Osteoblast

(3) Osteoclast   (4) Chondroclast

189. Which of the following structure is responsible for delay of 0.1 sec during the conduction of impulse of heart

(1) S.A. node   (2) A.V. node

(3) Bundle of His   (4) Purkinje's fibre

190. Which statement is incorrect regarding first heart sound ?
    (1) It is produced at the beginning of ventricular systole
    (2) It is associated with the closure of the tricuspid and bicuspid valves
    (3) It is called "LUBB"
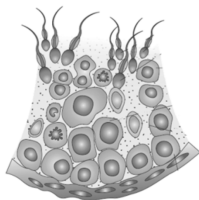   (4) It is high pitch sound for short period

191. In breathing movements, air volume can be estimated by :
    (1) Stethoscope
    (2) Hygrometer
    (3) Sphignomanometer
    (4) Spirometer

192. Fibres which transmit impulse from body organ to brain are called :-
    (1) Efferent fibre
    (2) Afferent fibre
    (3) Motor fibre
    (4) Longitudinal fibre

193. Identify the given diagram :

    (1) Sectional view of seminiferous tubule
    (2) Sectional view of male primary sex organ
    (3) Sectional view of female primary sex organ
    (4) Sectional view of spermatozoa

194. Consider the following four statements (a-d) and select the option which includes all the incorrect ones only.
    (a) Each testicular lobule contains 750 highly coiled seminiferous tubules, in which sperms are produced
    (b) Sertoli cells undergo meiotic divisions finally leading to sperm formation
    (c) The regions outside the seminiferous tubules called interstitial spaces, contain small blood vessels, Leydig cells, and some immunologically competent cells.
    (d) The scrotum helps in maintaining the low temperature of the testes, necessary for spermatogenesis

    (1) Statements (b), (c) and (d)
    (2) Statements (a), (b)
    (3) Statements (a), (b) and (c)
    (4) Statements (a), (c) and (d)

195. Which one of the following is not included in innate immunity ?
    (1) Mucosa
    (2) Secretions
    (3) Cytokines
    (4) Lymphocytes

196. Identify the correct answer with respect to RNA interference (RNAi) :-
    (P) It is an event of post transcriptional gene silencing.
    (Q) It works through RNA induced silencing complex.
    (1) P only
    (2) Both P and Q
    (3) Neither P nor Q
   (4) Q only

197. Which one in not a restriction enzyme ?
    (1) EcoRI
    (2) Cellulase
    (3) Hind III
    (4) EcoRV

198. Which of the following statement is correct in the context of observing DNA fragments separated by agarose gel electrophoresis ?
    (1) DNA can be seen in visible light
    (2) DNA can be seen without staining in visible light
    (3) Ethidium bromide stained DNA can be seen in visible light
    (4) Ethidium bromide stained DNA can be seen under exposure to UV light

199. DNA fragments separated by gel electrophoresis are shown. Mark the correct statement :-
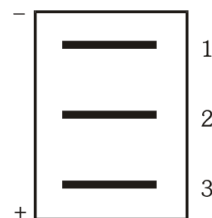
    (1) Band '3' contains more positively charged DNA molecule than '1'
    (2) Band '3' has longer DNA fragment than '1' and '2'
    (3) Band '1' has longer DNA fragment than '2' and '3'
    (4) All the bands have equal length and charges but differ in base composition

200. In gel-electrophoresis, all the DNA fragment move towards the base of the gel with variable velocities because :-
    (1) DNA is positively charged
    (2) DNA is double stranded
    (3) DNA fragments have different molecular weights
    (4) Both 2 and 3

SPACE FOR ROUGH