CODE-A

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

MM : 720 Mock Test - 02 **Time : 3 Hrs. 20 Mins.**

Complete Syllabus of Class-XI & XII

Instructions:

(i) There are two sections in each subject, i.e. Section-A & Section-B. You have to attempt all 35 questions from Section-A & only 10 questions from Section-B out of 15.

(ii) Each question carries 4 marks. For every wrong response 1 mark shall be deducted from the total score. Unanswered / unattempted questions will be given no marks.

(iii) Use blue/black ballpoint pen only to darken the appropriate circle.

(iv) Mark should be dark and completely fill the circle.

(v) Dark only one circle for each entry.

(vi) Dark the circle in the space provided only.

(vii) Rough work must not be done on the Answer sheet and do not use white-fluid or any other rubbing material on the Answer sheet.

PHYSICS

Choose the correct answer :

SECTION-A

1. Consider the following statements and choose the **correct** option.

Statement-A: In nuclear reactors, the control rods are made of cadmium.

Statement-B: In nuclear reactors, heavy water can be used as moderator.

(1) Only A is correct

(2) Only B is correct

(3) Both A and B are correct

(4) Both A and B are incorrect

2. Choose the correct statements regarding the α-particle scattering experiment.

(1) About 1 in 8000 particles deflect by more than 90°

(2) About 8.74% of incident α-particles scatter by more than 1°

(3) No α-particle is reflected back

(4) Both (1) and (2)

3. An electron of mass '*m*' is accelerated through a potential difference of *V* and then it enters a magnetic field of induction *B* normal to the lines of force. Then the radius of the circular path is

(1) $\sqrt{\frac{2eV}{m}}$ (2) $\sqrt{\frac{2Vm}{eB^2}}$

(3) $\sqrt{\frac{2Vm}{eB}}$ (4) $\sqrt{\frac{2Vm}{e^2B}}$

4. Two tuning forks have frequencies 380 and 384 Hertz respectively. When they are sounded together. After hearing the maximum sound, how long will it take to hear the minimum sound?

(1) $\frac{1}{2}$s

(2) $\frac{1}{4}$s

(3) $\frac{1}{8}$s

(4) $\frac{1}{16}$s

5. An engine approaches a wall with a constant speed. When it is at a distance of 0.9 km it blows a whistle, whose echo is heard by driver after 5 s. If the speed of sound in air is 330 m/s calculate the speed of engine.

(1) 60 m/s (2) 45 m/s

(3) 90 m/s (4) 30 m/s

6. The dominant mechanisms for motion of charge carriers in forward and reverse biased silicon p-n junctions are

(1) Drift in forward bias, diffusion in reverse bias

(2) Diffusion in forward bias, drift in reverse bias

(3) Diffusion in both forward and reverse bias

(4) Drift in both forward and reverse bias

7. In an n-p-n transistor circuit, the collector current is 10 mA. If 90% of the electrons emitted from the emitter reaches the collector, then the emitter current and base currents are

(1) 0.11 mA, 1.1 mA (2) 10 mA, 11.11 mA

(3) 11.11 mA, 1.11 mA (4) 0.01 mA, 11.11 mA

8. The least count of a stop watch is $\frac{1}{5}$ second. The time of oscillations of a pendulum is measured to be 25 s. The maximum percentage error in this measurement is

(1) 8 % (2) 1 %

(3) 0.8 % (4) 16 %

9. Fundamental unit out of the following is

(1) Ampere (2) Gauss

(3) Ohm (4) Weber

10. A small block of mass 200 g moves with uniform speed in a horizontal circular groove, with vertical side walls of radius 25 cm. If the block takes 2 s to complete one round, find the normal reaction by the side wall of the groove on the block.

(1) 3.8 N (2) 5.8 N

(3) 6 N (4) 0.48 N

11. Cross section area of a steel wire ($Y = 2.0 \times 10^{11}$ N/m^2) is 0.1 cm^2. The required force, to increase its length by 10%, will be

(1) 4×10^5 N (2) 5×10^5 N

(3) 6×10^5 N (4) 2×10^5 N

12. A diatomic gas obeys the law PV^x = constant. For what value of x, it has negative molar specific heat?

(1) $x > 1.4$ (2) $x < 1.4$

(3) $1 < x < 1.4$ (4) $0 < x < 1$

13. An electric bulb of volume 300 cm^3 was sealed off during manufacturing at a pressure of 10^{-2} mm of mercury at 27°C. Compute the approximate number of air molecules contained in the bulb. Given that R = 8.31 J/mol K and $N_A = 6.02 \times 10^{23}$ per mol.

(1) 6×10^{10}

(2) 600×10^{12}

(3) 9.6×10^{16}

(4) 3×10^{15}

14. The permanent magnetic moment of atoms of a material is zero. The material

(1) Must be paramagnetic

(2) Must be diamagnetic

(3) Must be ferromagnetic

(4) May be paramagnetic

15. A coil has a resistance of 10 Ω and an inductance of 0.4 henry. It is connected to an AC source of 6.5 V, $\frac{30}{\pi}$ Hz. Find the average power consumed in the circuit.

(1) $\frac{3}{5}$ W

(2) $\frac{8}{5}$ W

(3) $\frac{5}{8}$ W

(4) Zero

16. Two spheres one solid and other hollow are kept in atmosphere at same temperature. Both are made of same material and they have equal radius. The cooling rate would be

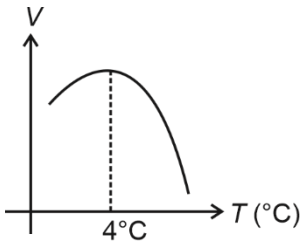
(1) Greater for hollow sphere

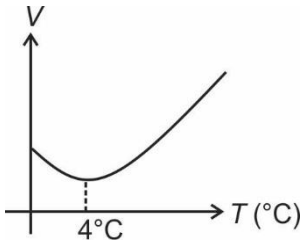
(2) Greater for solid sphere

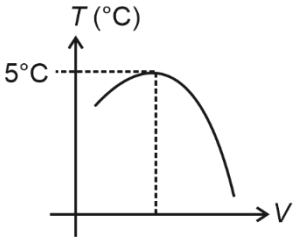
(3) Equal for both solid and hollow sphere

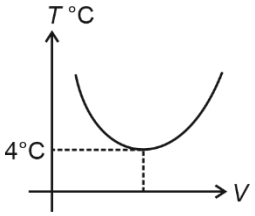
(4) Insufficient information

17. Choose the option which shows correct variation of volume of 1 kg of water with temperature.

(1) 

(2) 

(3) 

(4) 

18. Two slits in Young's experiment have width in the ratio 1 : 25. The ratio of intensity at the maxima and minima in the interference pattern is

(1) $\frac{9}{4}$ (2) $\frac{4}{9}$

(3) $\frac{136}{29}$ (4) $\frac{29}{136}$

19. The correct expression for Ampere-Maxwell's law is

(1) $\oint B \cdot dl = \mu_0 [i_c + i_d]$

(2) $\oint \vec{E} \cdot dl = \frac{-d\phi_B}{dt}$

(3) $\oint \vec{B} \cdot ds = 0$

(4) $\oint \vec{E} \cdot d\vec{s} = \frac{q_{in}}{\varepsilon_0}$

20. A body starting from rest was observed to cover 20 m in 1 second and 40 m during the next second accelerating uniformly. How far had it travelled before the first observation was taken?

(1) 10 m (2) 5 m

(3) 2.5 m (4) 7.5 m

21. There is an air bubble of radius 1.0 mm in a liquid of surface tension 0.075 N/m and density 10^3 kg/m^3. The bubble is at a depth of 10.0 cm below the free surface. By what amount is the pressure inside the bubble greater than the atmospheric pressure? (Surface tension of water = 0.075 N/m)

(1) 550 N/m^2 (2) 1150 N/m^2

(3) 2150 N/m^2 (4) 680 N/m^2

22. The distance between H^+ and Cl^- ions in HCl molecule is 1.28 Å. What will be the potential due to this dipole at a distance of 12 Å on the axis of dipole?

(1) 0.013 V (2) 0.13 V

(3) 1.3 V (4) 13.0 V

23. What is the colour of third band of a coded resistor having resistance equal to $2.3 \times 10^2\ \Omega$?

(1) Red (2) Black

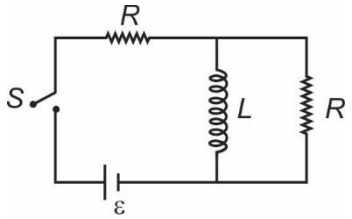
(3) Orange (4) Brown

24. The electric field in the copper wire of area of cross section 2 mm^2 carrying a current of 1 A is (resistivity of copper is $1.7 \times 10^{-8}\ \Omega$ m)

(1) 8.5×10^{-2} V/m (2) 8.5×10^{-3} V/m

(3) 8.5 V/m (4) 0.00085 V/m

25. An ideal battery of emf ε is connected with two resistors of resistance R each and an ideal inductor of self-inductance L as shown in figure.



Ratio of current passing through switch S, immediately and long time after it is closed, will be

(1) 1 : 1 (2) 1 : 2

(3) 3 : 1 (4) 1 : 4

26. Amplitude of a damped harmonic oscillator reduces to half of its initial value in T time. In how much time will amplitude be one fourth of its initial value?

(1) $2T$ (2) $3T$

(3) $4T$ (4) $8T$

27. Column-I list some uniform rigid bodies and column-II lists corresponding value of moment of inertia about their main geometrical axes. Choose the option with correct entries.

Column-I		Column -II	
A.	Solid sphere	P.	$\frac{1}{2}MR^2$
B.	Hollow sphere	Q.	MR^2
C.	Solid cylinder	R.	$\frac{2}{5}MR^2$
D.	Hollow cylinder	S.	$\frac{2}{3}MR^2$

(1) A $\rightarrow$ (R), B $\rightarrow$ (S), C $\rightarrow$ (Q), D $\rightarrow$ (P)

(2) A $\rightarrow$ (P), B $\rightarrow$ (Q), C $\rightarrow$ (S), D $\rightarrow$ (R)

(3) A $\rightarrow$ (Q), B $\rightarrow$ (P), C $\rightarrow$ (S), D $\rightarrow$ (R)

(4) A $\rightarrow$ (R), B $\rightarrow$ (S), C $\rightarrow$ (P), D $\rightarrow$ (Q)

28. A particle is undergoing circular motion of radius R with angular speed ω. It is brought to rest in T time and then again accelerated to same angular speed in $\frac{T}{2}$ time. Angular displacement of the particle in this time interval of $\frac{3T}{2}$ is (consider uniform acceleration and retardation)

(1) $\frac{\omega T}{4}$

(2) $\frac{\omega T}{2}$

(3) $\frac{3\omega T}{4}$

(4) ωT

29. An object is placed at $2f$ distance infront of a convex lens of focal length f. As object is displaced towards the focus with speed v, the image will

(1) Displace towards the lens with speed greater than v.

(2) Displace towards the lens with speed less than v.

(3) Displace away from the lens with speed greater than v.

(4) Displace away from the lens with speed less than v.

30. A light ray is incident at 30° on a mirror. The deviation suffered by it is

(1) 150° (2) 120°

(3) 60° (4) 30°

31. Two identical conducting spheres carrying charges –12 μC and 8 μC respectively are kept in contact and then separated from each other. Which of the statement is true?

(1) In each sphere 1.25×10^{13} electrons are in deficit

(2) In each sphere 1.25×10^{13} electrons are in excess

(3) One sphere has 1.25×10^{13} electrons are in excess while other has 1.25×10^{13} electrons are in deficit

(4) One sphere has excess of electrons while other has deficiency of electrons

32. An electric dipole is placed at an angle of 37° with an uniform electric filed of intensity 4×10^5 NC^{-1}. Dipole experiences a torque equal to 8 N m. If dipole is 2 cm long then charge on the dipole is

(1) 1.67 mC (2) 5 mC

(3) 2.38 mC (4) 3.2 mC

33. A car weighing 1000 kg working against a resistance of 500 N accelerates from rest to 30 m s^{-1} in 10 second. The work done by the engine of the car during this time interval will be

(1) 4.5×10^6 J

(2) 4.5×10^7 J

(3) 5.25×10^5 J

(4) 5.25×10^7 J

34. Four particles are fired with same speed at angles 27°, 42°, 57° and 68° with the horizontal. The range of projectile will be largest for the one projected at angle

(1) 27° (2) 42°

(3) 57° (4) 68°

35. The escape velocity from the surface of a planet of mass m and radius R is 60 km/s. If the planet's mass and radius becomes $4m$ and R respectively, then the corresponding escape velocity would be

(1) 30 km/s (2) 120 km/s

(3) 60 km/s (4) 148 km/s

SECTION-B

36. A particle of mass m is placed at the centre of a uniform spherical shell of mass $3m$ and radius R. The gravitational potential on the surface of the shell is

(1) $\frac{-Gm}{R}$ (2) $\frac{-3Gm}{R}$

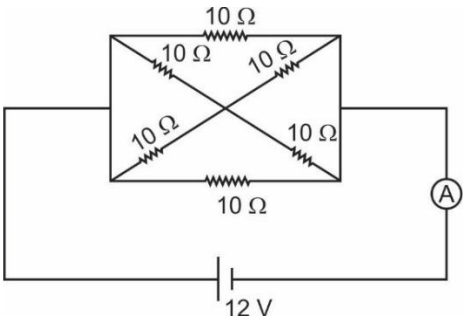
(3) $\frac{-4Gm}{R}$ (4) $\frac{-2Gm}{R}$

37. Two identical particles moving with velocities $\vec{v}_1 = \left(4\hat{i} + 3\hat{j}\right) \text{m s}^{-1}$ and $\vec{v}_2 = \left(\hat{i} + 3\hat{j}\right) \text{m s}^{-1}$, at t = 0. If the two particles collide after 2 second, and then move as a single particle, then find the common velocity of particles after collision.

(1) $\left(\frac{5\hat{i}}{2} + 8\hat{j}\right) \text{m s}^{-1}$ (2) $\left(\frac{-5\hat{i}}{2} + 8\hat{j}\right) \text{m s}^{-1}$

(3) $\left(\frac{-13}{2}\hat{i} + 4\hat{j}\right) \text{m s}^{-1}$ (4) $\left(\frac{5}{2}\hat{i} + 3\hat{j}\right) \text{m s}^{-1}$

38. The current shown by ammeter A in the circuit diagram is



(1) 4.8 A (2) 1.2 A

(3) 2.4 A (4) 3.6 A

39. A fully charged capacitor has a capacitance C. It is discharged through a small coil of resistance wire embedded in a thermally insulated block of specific heat capacity 's' and mass 'm'. If the temperature of the block is raised by ΔT, the potential difference V across the capacitance is

(1) $\frac{ms\Delta T}{C}$ (2) $\sqrt{\frac{2ms\Delta T}{C}}$

(3) $\sqrt{\frac{2mC\Delta T}{s}}$ (4) $\frac{mC\Delta T}{s}$

40. Value of photoelectric current through a photocell are I_1 and I_2 when it is placed at a distance of r_1 and r_2 respectively from the light source. Value of $\frac{I_1}{I_2}$ will be equal to

(1) $\frac{r_2}{r_1}$ (2) $\frac{r_1}{r_2}$

(3) $\sqrt{\frac{r_2}{r_1}}$ (4) $\left(\frac{r_2}{r_1}\right)^2$

41. Choose the incorrect statement among the following.

(1) Surface tension of a liquid decreases on adding soluble impurity to a liquid.

(2) Viscosity of a liquid increases with increase in temperature of the liquid

(3) If angle of contact of a liquid and a solid surface is greater than 90°, then the liquid will wet the surface of the solid

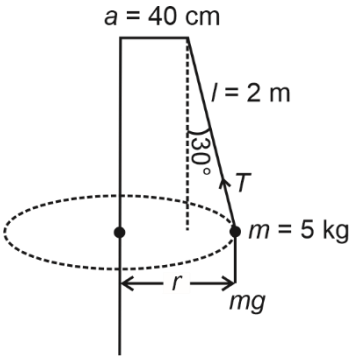
(4) All of these

42. A beam of light of wavelength λ from a distant source falls on a single slit of width D and resulting diffraction pattern is observed on a screen d distance away. The distance between first dark fringe on either side of central bright fringe is nearly

(1) $\frac{\lambda D}{d}$ (2) $\frac{2\lambda d}{D}$

(3) $\frac{\lambda D^2}{d^2}$ (4) $\frac{\lambda d^2}{D^2}$

43. Number of revolutions per minute that apparatus shown in figure should make about a vertical axis so that the cord makes an angle of 30° with the vertical is nearly



(1) 25 rpm

(2) 37 rpm

(3) 19 rpm

(4) 8 rpm

44. A gas follows a process TV^{n-1} = constant, where T is absolute temperature of the gas and V is volume of the gas. The bulk modulus of the gas in the process is given by

(1) $(n-1)p$

(2) $p(n-2)$

(3) np

(4) $\frac{p}{n}$

45. When an AC signal of frequency 1 kHz is applied across a coil of resistance 100 Ω, then the applied voltage leads the current by 45°. The inductance of coil is

(1) 16 mH (2) 12 mH

(3) 8 mH (4) 4 mH

46. Match the following and choose the correct option.

List-I		List -II	
A.	$\overline{A+B}$	P.	$\bar{A}+\bar{B}$
B.	$\overline{A\cdot B}$	Q.	$A+B$
C.	$\overline{\bar{A}+\bar{B}}$	R.	$\bar{A}\cdot\bar{B}$
D.	$\overline{\bar{A}\cdot\bar{B}}$	S.	$A\cdot B$

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

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

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

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

47. The ratio of SI unit to CGS unit of Planck's constant is

(1) 10^7

(2) 10^{-7}

(3) 10^3

(4) 10^5

48. An electric current passes through a long straight wire. At a distance 5 cm from the wire, the magnetic field is B. The magnetic field at 10 cm from the wire would be

(1) $4B$ (2) $\frac{B}{4}$

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

49. Two thin identical equiconvex glass lenses of focal length f each are placed in contact. The space between the two lenses is filled with water. The focal length of combination will be $\left(\mu_g = \frac{3}{2} \text{ and } \mu_w = \frac{4}{3}\right)$

(1) $\frac{4f}{3}$

(2) $\frac{3f}{4}$

(3) $\frac{2f}{3}$

(4) $\frac{3f}{2}$

50. To keep rotating a pulley having moment of inertia 10 kg m^2 with angular speed of 20 rad/s a constant torque of 5 N m is required. The energy lost per unit time due to frictional forces is

(1) 10 W

(2) 1000 W

(3) 100 W

(4) 50 W

CHEMISTRY

SECTION-A

51. Which among the following oxide of nitrogen exists as solid at room temperature?

(1) NO_2 (2) N_2O_3

(3) N_2O (4) NO

52. Correct statement(s) about hypophosphorous acid is/are

I: It contains one P = O bond

II: It contains 2 P–H bonds

III: It contains 4 P–OH bonds

(1) I and II only

(2) I only

(3) II and III only

(4) I, II and III

53. Consider the following reaction,

$$R-Cl+NaI\longrightarrow R-I+NaCl$$

The above reaction known as

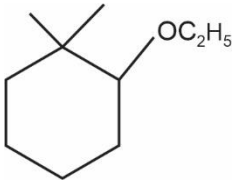
(1) Finkelstein reaction

(2) Wurtz reaction

(3) Swartz reaction

(4) Wurtz-Fittig reaction

54. Correct IUPAC name of the following compound is



(1) 1, 1 – Dimethyl-2-ethoxycyclohexane

(2) 1 – Ethoxy-2, 2-dimethylcyclohexane

(3) 2 – Ethoxy-1, 1-dimethylcyclohexane

(4) 2, 2-Dimethyl-1-ethoxycyclohexane

55. Which of the following nucelophiles cannot be introduced in the benzene ring using Sandmeyer reaction?

(1) Cl^- (2) Br^-

(3) CN^- (4) I^-

56. Match List-I with List-II and identify the correct code.

	List-I		**List-II**
a.	Elastomer	(i)	Terylene
b.	Fibre	(ii)	Buna-S
c.	Thermoplastic polymer	(iii)	Bakelite
d.	Thermosetting polymer	(iv)	Polystyrene

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

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

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

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

57. Which of the following drug has analgesics as well as antipyretic properties?

(1) Aspirin (2) Equanil

(3) Dimetane (4) Tetracycline

58. Select the incorrect statement (s) among the following regarding potassium dichromate.

(I) It is used as an oxidant for preparation of many azo compound.

(II) It is more soluble in water than sodium dichromate.

(III) The hybridisation of Cr atom in both chromate and dichromate is same.

(IV) It is used as primary standard in volumetric analysis.

(1) I and II only (2) II only

(3) III only (4) III & IV only

59. The man-made silicates among the following is

(1) Feldspar (2) Mica

(3) Asbestos (4) Glass

60. The point of similarities between lithium and magnesium is/are

(I) Chlorides of both elements are soluble in ethanol.

(II) Both form a nitride by direct combination with nitrogen.

(III) Both metals do not give flame test.

(1) I & II only (2) I only

(3) III only (4) II & III only

61. The number of angular and radial nodes present in $4d_{yz}$ orbital respectively are

(1) 1 & 1 (2) 2 & 2

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

62. Most electropositive element among the following is

(1) Li (2) Na

(3) Be (4) Mg

63. Ratio of average speed of He and CH_4 at 27°C will be

(1) 3 : 2 (2) 2 : 1

(3) 1 : 4 (4) 3 : 1

64. Maximum prescribed concentration of manganese in drinking water is

(1) 0.2 ppm (2) 3.0 ppm

(3) 0.05 ppm (4) 5.0 ppm

65. The distance between body centre atom to face centre atom in fcc unit cell is (given; a = edge length of unit cell)

(1) $\frac{a}{\sqrt{3}}$ (2) $\frac{a}{2}$

(3) $\frac{2a}{\sqrt{3}}$ (4) $\frac{\sqrt{3a}}{2}$

66. The number of effective atoms per unit cell of element that crystallises is fcc lattice and have 5% Schottky defect is

(1) 3.6 (2) 4

(3) 3 (4) 3.8

67. **Statement-I:** $H_2(g)$ is produced when Ag(s) reacts with dilute HCl solution.

Statement-II: $E^\circ_{H^+/H_2}$ is more than that of $E^\circ_{Ag^+/Ag}$.

In the light of above statements, choose the correct option among the following.

(1) Both statement-I and statement-II are correct

(2) Both statement-I and statement-II are incorrect

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

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

68. In the extraction of iron from haematite ore, which one of the following act as reducing agent in blast furnace at temperature range of 500-800 K?

(1) CO (2) Mg

(3) C(graphite) (4) C_3O_2

69. Significant covalent character is found in which of the following hydride?

(1) CaH_2 (2) CsH

(3) BeH_2 (4) KH

70. Percentage of carbon in ethanol is

(1) 59.71 (2) 47.15

(3) 52.17 (4) 62.38

71. **Statement-I:** Exothermic reaction are always spontaneous in nature.

Statement-II: Entropy of the universe is continuously increasing.

In the light of above statements choose the correct option among the following.

(1) Both statement-I and statement-II are true

(2) Both statement-I and statement-II are false

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

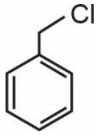
(4) Statement- I is false but statement-II is true

72. When methane is burnt with oxygen to produce CO_2 and H_2O, the oxidation state of carbon changes by

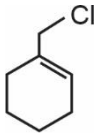
(1) 4 (2) 8

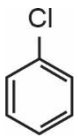
(3) Zero (4) 6

73. Which among the following will react at slowest rate with a nucleophile?

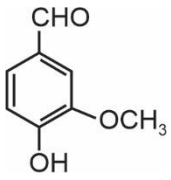
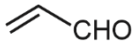
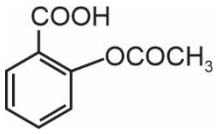
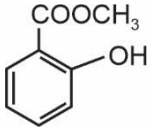
(1) 

(2) 

(3) 

(4) 

74. Match the names given in Column-I with structures given in Column-II.

	Column-I		**Column-II**
(i)	Oil of wintergreen	(a)	
(ii)	Aspirin	(b)	
(iii)	Acrolein	(c)	
(iv)	Vanillin	(d)	

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

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

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

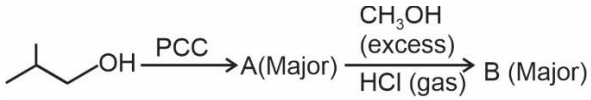
(4) (i)-(d), (ii)-(a), (iii)-(c), (iv)-(b)

75. Which among the following is a basic amino acid?

(1) Lysine (2) Phenylalanine

(3) Valine (4) Leucine

76. Consider the following reaction sequence



Major products (A) and (B) respectively are

(1) Carboxylic acid and ester

(2) Aldehyde and ester

(3) Alkane and ether

(4) Aldehyde and acetal

77. A magnetic moment of 1.73 BM will be shown by

(1) $[CoF_6]^{3-}$ (2) $[Co(NH_3)_6]^{3+}$

(3) $[NiCl_4]^{2-}$ (4) $[Fe(CN)_6]^{3-}$

78. **Statement-I:** Propadiene is a non-planar molecule.

Statement-II: Propadiene is chiral and optically active compound.

In light of the above statements, choose the correct answer.

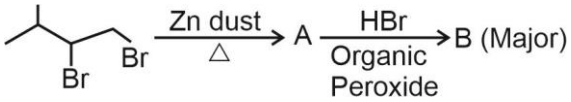
(1) Statement-I is correct but statement-II is incorrect

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

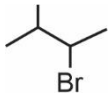
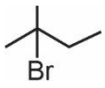
(3) Both statement-I and statement-II are correct

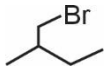
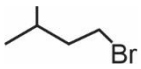
(4) Both statement-I and statement-II are incorrect

79. Consider the following reaction sequence



Major product B is

(1)  (2) 

(3)  (4) 

80. The dispersed phase and dispersion medium in paints respectively are

(1) Liquid and liquid

(2) Liquid and solid

(3) Solid and liquid

(4) Gas and liquid

81. An aqueous solution of NaOH contains 0.4 g NaOH in 500 g of water. The freezing point depression of the solution is

(K_f =1.86 K kg mol^{-1})

(1) 0.074 K (2) –0.074 K

(3) 0.15 K (4) –0.15 K

82. Which of the following pair can form acidic buffer?

(1) $CH_3COOH + HNO_3$

(2) $NH_4OH + HNO_3$

(3) $CH_3COOH + NaOH$

(4) $HNO_3 + NaOH$

83. A binary solution is formed by mixing two volatile liquids A $\left(P_A^0 = 100\,\text{torr}\right)$ and B $\left(P_B^0 = 400\,\text{torr}\right)$.

What is the mole fraction of A in solution when the mole fraction of A is double than that of B in vapour phase?

(1) $\frac{1}{2}$ (2) $\frac{1}{5}$

(3) $\frac{9}{8}$ (4) $\frac{8}{9}$

84. **Statement I:** Rate law for any reaction can be predicted by merely looking at balanced chemical equation.

Statement II: Sum of the powers of the concentration of the reactants in the rate law expression is called order of reaction.

In the light of above statements choose the correct option among the following.

(1) Statement-I is false but statement-II is true

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

(3) Both statement-I and II are true

(4) Both statement-I and II are false

85. Number of 90° bond angle (s) in PCl_5 molecule is

(1) Zero (2) Two

(3) Five (4) Six

SECTION-B

86. Consider the following statements:

(I) Lower aliphatic amines have fishy odour.

(II) Aniline and other arylamines gets coloured on storage due to atmospheric oxidation.

(III) Primary amines with three or more carbon atoms are solids.

Correct statements among the following are

(1) I and III only

(2) II and III only

(3) I and II only

(4) I, II and III

87. The unit of coefficient of viscosity is

(1) Nm^{-1} (2) Ns^{-1}

(3) Nsm^{-2} (4) Nsm^{-1}

88. The products of which of the following reactions is not correctly matched?

(1) $2BeCl_2 + LiAlH_4 \rightarrow 2BeH_2 + LiCl + AlCl_3$

(2) $2NH_3 + H_2O + CO_2 \longrightarrow (NH_4)_2CO_3$

(3) $BeO + C + Cl_2 \xrightarrow{600-800K} BeCl_2 + CO$

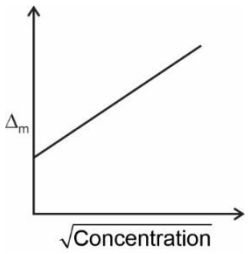
(4) $CaCO_3 + 2HCl \longrightarrow CaCl_2 + H_2O + CO$

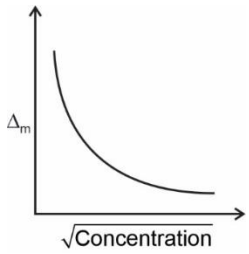
89. Which among the following elements contain same number at *s*-electrons as the number of *d*-electrons in Co^{2+}?

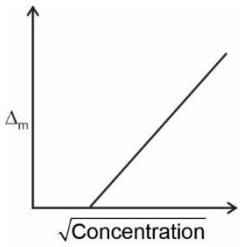
(1) Si (2) Cu

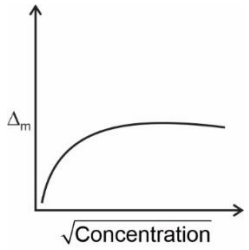
(3) Al (4) Ca

90. Variation of Δ_m vs $\sqrt{\text{Concentration}}$ for weak acid (HA) is given by

(1) 

(2) 

(3) 

(4) 

91. n-factor of Cu_3P in the following conversion is

$Cu_3P \longrightarrow Cu^{2+} + H_3PO_4$

(1) 3 (2) 8

(3) 11 (4) 15

92. Compounds $[Co(NH_3)_5(SO_4)]$ Br and $[Co(NH_3)_5Br]SO_4$ are related as

(1) Linkage isomerism

(2) Coordination isomerism

(3) Ionisation isomerism

(4) Geometrical isomerism

93. Consider the following statements

(a) Cinnamaldehyde can be prepared by heating acetaldehyde and benzaldehyde in presence of dilute alkali.

(b) Acetaldehyde gives positive Tollens' and Fehling's test.

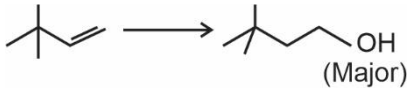
(c) Benzaldehyde undergoes disproportionation reaction in presence of concentrated alkali.

The correct statements are

(1) (a) and (b) only (2) (b) and (c) only

(3) (a) and (c) only (4) (a), (b) and (c)

94. Most suitable Reagent(s) used in the given conversion is



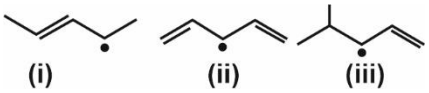
(1) Dilute H_2SO_4

(2) (i) B_2H_6; (ii) $H_2O_2/\overline{O}H$

(3) Aqueous NaOH

(4) (i) $Hg(OAc)_2$; (ii) $NaBH_4/\overline{O}H$

95. Consider the following species



Hyperconjugation occurs in

(1) (ii) only (2) (i) only

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

96 Molar heat capacity of an adiabatic process is

(1) 0 (2) 1

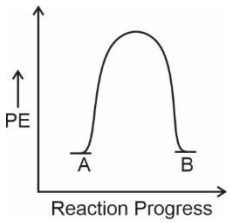
(3) $\frac{3}{2}$ (4) ∞

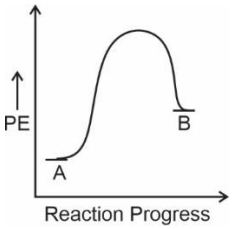
97. Which of the following colloids can be prepared by Bredig's arc method?

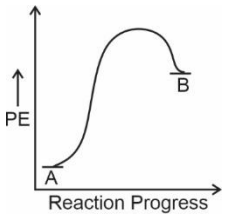
(1) As_2S_3 (2) Sulphur sol

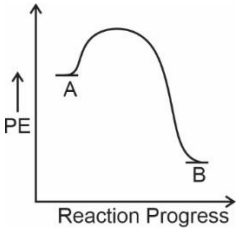
(3) Gold sol (4) $Fe(OH_3)$ sol

98. For a given reaction A $\rightarrow$ B, enthalpy of reaction is –100 kJ mol^{-1} and activation energy is 20 kJ mol^{-1}. The correct potential energy profile for the reaction is shown in option.

(1)


(2)


(3)


(4)


99. Numbers of σ and π bonds are same in which of the following molecule?

(1) $(CN)_2$ (2) C_3O_2

(3) C_6H_6 (4) C_2H_2

100. If K_{sp} of $MgSO_4$ is 10^{-10} mol^2L^{-2}, then maximum mass of $MgSO_4$ in 2 L solution is

(1) 10^{-5} g (2) 1.2×10^{-3} g

(3) 2.4×10^{-3} g (4) 1.44×10^{-2} g

BOTANY

SECTION-A

101. Complex permanent tissues in plant do **not**

(1) Store various organic materials

(2) Assimilate food from carbon dioxide

(3) Have dead cells

(4) Have thin walled cells

102. Select the **incorrect** statement regarding monocot stem.

(1) Hypodermis provides mechanical support

(2) Vascular bundles are surrounded by sclerenchymatous sheath

(3) Protoxylem lies towards the periphery and metaxylem towards centre

(4) Ground tissue is not well differentiated

103. The feature which is true for mango fruit but not for coconut fruit is

(1) Development from monocarpellary ovary

(2) One seeded

(3) Stony hard endocarp

(4) Edible mesocarp

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

	Column-I		**Column-II**
(A)	*Aloe*	(i)	Whorled phyllotaxy
(B)	*Nerium*	(ii)	Thorn
(C)	Cucumber	(iii)	Leaf spine
(D)	Citrus	(iv)	Stem tendril

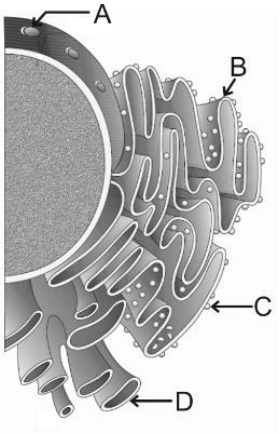
	A	**B**	**C**	**D**
(1)	(iv)	(ii)	(i)	(iii)
(2)	(iii)	(i)	(iv)	(ii)
(3)	(iv)	(i)	(ii)	(iii)
(4)	(iii)	(iv)	(ii)	(i)

105. Cell well is **not** absent in

(1) *Euglena* (2) *Amoeba*

(3) Mycoplasma (4) *Nostoc*

106. Consider the following diagram related to a cell.



Choose the option that **does not** define the labelled part A – D.

(1) A – It is formed by the fusion of inner and outer nuclear membrane

(2) B – It provides precursors of enzyme for the formation of lysosomes

(3) C – It has 50S and 30S subunits

(4) D – It is specialised in the synthesis of lipids

107. In eukaryotic cells, the nucleolus is the site where

(1) Active ribosomal RNA synthesis occurs

(2) Polymerisation of amino acids occurs

(3) Replication of DNA occurs

(4) Lipids and steroids are synthesised

108. Solanaceae is

(1) Order of mango

(2) Family of *Solanum*

(3) Scientific name of potato

(4) Category which includes brinjal and wheat

109. A book which contains complete listing and description of the plants growing in a particular area is

(1) Manograph

(2) Herbarium

(3) Catalogue

(4) Manual

110. Select the **incorrect** statement.

(1) Succinate dehydrogenase is found in matrix of mitochondria

(2) In alcoholic fermentation, CO_2 is released

(3) Acetyl CoA is 2C compound

(4) Fats are first broken down into glycerol and fatty acids before entering respiratory pathway

111. Read the following statements and select the **correct** option.

Statement A: Cyanobacteria can be used as source for single cell protein.

Statement B: Single cell protein is protein-rich biomass which is used as food or feed.

(1) Only statement A is correct

(2) Only statement B is correct

(3) Both statements A and B are correct

(4) Both statements A and B are incorrect

112. State true (T) or false (F) for the following statements and select the **correc**t option.

A. Natality and immigration contribute to an increase in population density.

B. Growth pattern is logistic type if resources are limiting.

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

113. In a food chain, energy flow is

(1) Cyclic

(2) Unidirectional

(3) Bidirectional

(4) Always from carnivores to herbivores

114. Which among the following is **not** a moss?

(1) *Funaria* (2) *Sphagnum*

(3) *Selaginella* (4) *Polytrichum*

115. Isogamous sexual reproduction is found in

(1) *Volvox* (2) *Spirogyra*

(3) *Fucus* (4) Both (1) and (2)

116. Root endodermis has the ability to actively transport ions in only one direction

(1) Because of the layer of suberin

(2) Due to downhill transport

(3) Because of apoplastic pathway

(4) Because of cytoplasmic streaming

117. Nitrogenase enzyme

(1) Is a Mg-Fe protein

(2) Is exclusively present in prokaryotes

(3) Require aerobic condition for its functioning

(4) Helps in nitrogen and carbon fixation

118. In Meiosis-I synapsis occurs during

(1) Zygotene (2) Leptotene

(3) Pachytene (4) Diplotene

119. During S phase

(1) DNA replication does not occur

(2) Chromosome number is doubled

(3) Centriole duplicates in the cytoplasm of animal cells

(4) Both DNA content and chromosome number doubles

120. Select the **incorrect** feature of cells present in the meristematic phase of growth.

(1) Possess large conspicuous nuclei

(2) Cell wall is thin and cellulosic

(3) They are rich in protoplasm

(4) The secondary cell wall is with few plasmodesmatal connections

121. Streptokinase is

(1) Used as an immunosuppressive agent

(2) Competitive inhibitor of the enzyme responsible for synthesis of cholesterol

(3) Produced by a bacterium

(4) Used for commercial production of ethanol

122. Select the diploid structure present in the embryo sac

(a) Antipodal cells (b) Definitive nucleus

(c) Zygote (d) Synergid cells

(e) Egg cell

(1) a, c and d (2) b and c only

(3) c and e only (4) c only

123. Embryo formation is present in all plant groups, **except**

(1) Bryophyte (2) Pteridophyte

(3) Angiosperm (4) Algae

124. Consider the given stages of translation.

(A) Binding of next charged tRNA at A site

(B) Peptide bond formation

(C) Binding of first charged tRNA at P site

(D) Movement of ribosome on mRNA

Which of the given option is **true** for sequential arrangement for stage(s) of translation?

(1) $C \rightarrow A \rightarrow B \rightarrow D$

(2) $A \rightarrow B \rightarrow C \rightarrow D$

(3) $B \rightarrow C \rightarrow D \rightarrow A$

(4) $D \rightarrow C \rightarrow A \rightarrow B$

125. Aminoacyl synthetase binding loop in tRNA is/has

(1) First loop from 5′ end

(2) Also called TψC loop

(3) Anticodon loop with 7 unpaired bases

(4) 3 bases that act as anticodon.

126. The distance between two adjacent base pairs in double helical DNA is approximately

(1) 3.4 nm (2) 0.34 nm

(3) 2.0 nm (4) 0.2 nm

127. Select the **correct** statement for NADPH.

(1) It is called reducing power

(2) It is used as assimilatory power in krebs cycle

(3) It is produced during cyclic photophosphorylation

(4) These are not consumed in C_3 cycle

128. Aravalli Hill of Rajasthan is

(1) A sacred grove

(2) A biosphere reserve

(3) Comprised of core and buffer zone

(4) Consists of a specific area of active cooperation between reserve management and local people that is called core zone

129. Biological magnification

(1) Includes increased accumulation of toxicants successively at higher trophic level.

(2) Has no effect on metabolism of organisms at various trophic levels

(3) Refers to decrease of BOD in aquatic body.

(4) Is result of accumulation of secondary air pollutants

130. Which of the following statements is **not** associated with fungi?

(1) Fungi prefer to grow in warm and humid places

(2) They show a great diversity in morphology and habitat

(3) Asexual reproduction takes place by ascospores and basidiospores

(4) Network of hyphae is known as mycelium

131. Mark the **incorrect** statement

(1) Viruses are facultative parasites

(2) Prions are almost equal in size to viruses

(3) Viroids have RNA of low molecular weight

(4) A virus contains either DNA or RNA

132. Viruses that infect plants usually have

(1) dsRNA (2) ssDNA

(3) dsDNA (4) ssRNA

133. A male suffering from colourblindness as well as haemophilia, marries a normal vision female whose father was colourblind, then find out probability of colourblind daughter.

(1) 50% (2) 25%

(3) 100% (4) 75%

134. Birds are different from grasshopper as each somatic cell of the former has

(1) Only one sex chromosome in male individual

(2) Two dissimilar sex chromosomes in female individual

(3) Only one sex chromosome in female individual

(4) Only autosomes in male individual

135. Sickle cell anaemia

a. Is an example of point mutation.

b. Is caused by transversion mutation of the gene which synthesises the alpha chain of haemoglobin.

c. Involves replacement of amino acid valine by glutamic acid.

The correct one(s) is/are

(1) All a, b and c (2) a only

(3) a and b (4) b and c

SECTION-B

136. Select the **incorrect** match from the following.

(1) Late wood – Forms during winter

(2) Heartwood – Comprises dead elements

(3) Alburnum – Darker in colour

(4) Autumn wood – Higher density

137. Read the following features:

(a) Flower are bisexual and actinomorphic.

(b) Stamens are epiphyllous.

(c) Leaves have reticulate venation.

(d) Gynoecium is syncarpous and ovary is superior.

Which of the given features is/are **true** w.r.t members of family Liliaceae?

(1) (a), (b) and (d) (2) (b) (c) and (d)

(3) (a) only (4) (a) and (b) only

138. Ribosomes were first observed under the (i) by (ii) .

Select the **correct** option to fill in the blanks (i) and (ii).

	(i)	**(ii)**
(1)	Compound microscope	Robert Brown
(2)	Electron microscope	George Palade
(3)	Phase contrast microscope	Singer
(4)	Simple microscope	Rudolf Virchow

139. Which of the following statements about DFC is **incorrect**?

(1) Detritivores act on detritus

(2) Begins with detritus

(3) Sun is the direct source of energy

(4) Major conduit of energy in terrestrial ecosystem

140. The body temperature changes with the ambient temperature in

(1) Regulators

(2) Conformers

(3) Migrators

(4) Suspend

141. Select the **incorrect** statement w.r.t. transpiration

(1) It is the evaporative loss of water by plants

(2) It supplies water for photosynthesis

(3) It is not affected by canopy structure of plant

(4) It maintains the shape and structure of the plants

142. In haplontic life cycle

(1) Sporophyte is dominant and photosynthetic

(2) Gametophytic phase is represented by multicellular, non-photosynthetic spore

(3) Both phases are multicellular

(4) The haploid spore divide mitotically and form the gametophyte

143. Select the odd one out w.r.t. redifferentiated tissue.

(1) Secondary phloem

(2) Secondary cortex

(3) Cork cambium

(4) Secondary xylem

144. During fermentation of dough, cheese making and beverage making, the main gas produced is

(1) Hydrogen (2) Carbon dioxide

(3) Oxygen (4) Methane

145. In double fertilization, syngamy is

(1) Fusion of male gamete with two polar nuclei and results in zygote formation

(2) Release of two male gamete into the cytoplasm through pollen tube

(3) Fusion of male gamete with the egg cell

(4) Fusion of polar nuclei located in the central cell

146. Release of hot waste water in aquatic body

(1) Increases dissolved oxygen

(2) Reduces BOD

(3) Reduces DO content

(4) Increase the number of organisms sensitive to high temperature

147. Which of the given levels of biodiversity helps in formation of ecotype and plays a key role in speciation?

(1) Genetic diversity

(2) Species diversity

(3) Ecological diversity

(4) Community diversity

148. Which of the given gene w.r.t *lac* operon is constitutive?

(1) Structural gene

(2) Operator gene

(3) Promote gene

(4) Regulator gene

149. Select the **incorrect** statement w.r.t. lichens

(1) Algal partner is called phycobiont

(2) They can grow easily in SO_2 polluted areas

(3) Fungal partner is called mycobiont

(4) Their relationship is called mutualism

150. Genes responsible for eye and body colour in *Drosophila* are present on

(1) Two different autosomes

(2) The same chromosome

(3) An autosome and X-chromosome respectively

(4) Both X and Y-chromosomes

ZOOLOGY

SECTION-A

151. The junction through which a nerve impulse is transmitted from one neuron to another is formed by

(1) Pre-synaptic membrane only

(2) Pre-synaptic membrane and synaptic cleft only

(3) Synaptic cleft and neurotransmitters

(4) Pre-synaptic membrane, synaptic cleft, post-synaptic membrane

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

	Column-I		**Column-II**
a.	Melatonin	(i)	Adrenal cortex
b.	T_3	(ii)	Thyroid gland
c.	PRL	(iii)	Pars distalis
d.	Norepinephrine	(iv)	Pineal gland
		(v)	Adrenal medulla

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

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

153. IUT and IUI are processes included in ART, which help couples to have children through special techniques. The processes IUT and IUI involve _A_ and _B_ fertilization respectively. Choose the option which **correctly** fills up A and B.

	A	**B**
(1)	*In vitro*	*In vivo*
(2)	*In vitro*	*In vitro*
(3)	*In vivo*	*In vivo*
(4)	*In vivo*	*In vitro*

154. Enzyme Linked Immuno Sorbent Assay is based on the principle of

(1) Radioactive tagging

(2) Amplification of DNA

(3) Autoradiography

(4) Antigen – antibody interaction

155. **Assertion (A):** The most commonly used bioreactors are of stirring type.

Reason (R): A bioreactor provides the optimal growth conditions like pH, substrate, salts, vitamins, oxygen, temperature etc for achieving the desired product.

Choose the **correct** answer from the following options.

(1) (A) is true but (R) is false

(2) (A) is false but (R) is true

(3) Both (A) and (R) are true and (R) is the correct explanation of (A)

(4) Both (A) and (R) are true and (R) is not the correct explanation of (A)

156. Choose the **odd one** w.r.t downstream processing.

(1) Separation of product

(2) Biosynthetic stage

(3) Purification of product

(4) Extraction of product

157. Which of the following are not required for the isolation of DNA from bacteria?

(a) Lysozyme (b) DNase

(c) Protease (d) Spooling

(e) Chilled ethanol

Choose the **correct** option.

(1) (a), (c), (d), (e) (2) (b) only

(3) (b), (d), (e) (4) (d) and (e)

158. Different structures evolving for the same function have similarity among them. This is exemplified by

(1) Vertebrate brains

(2) Forelimbs of mammals

(3) Flippers of penguins and dolphins

(4) Thorns of *Bougainvillea* and tendrils of *Cucurbita*

159. S.L Miller, in 1953 initially created vacuum in his experimental setup to facilitate which condition on early earth?

(1) Lightning

(2) Reducing atmosphere

(3) High temperature

(4) Electric discharge

160. Match column-I with column-II w.r.t. evidences for evolution and choose the **correct** option.

	Column-I		Column-II
a.	Vestigial gill slits in embryos of vertebrates	(i)	Embryological evidences
b.	Hard parts of life-forms in rocks	(ii)	Biogeographical evidences
c.	Vertebrate brains	(iii)	Palaentological evidences
		(iv)	Evidences from comparative anatomy and morphology

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

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

161. Consider the given statements and select the option that **correctly** states them as true (T) or false (F).

a. Long exposure to harmful substances, gases, fumes and dust produced in certain industries can give rise to inflammation in lungs leading to fibrosis.

b. When percentage saturation of haemoglobin with O_2 is plotted against pO_2, the curve obtained is described as hyperbola.

c. Presence of low levels of HCO_3^- ions and high levels of O_2 can activate the chemosensitive area present adjacent to rhythm centre.

d. Skin is not a respiratory organ in humans.

	(a)	(b)	(c)	(d)
(1)	T	T	T	T
(2)	T	F	F	T
(3)	F	T	T	T
(4)	T	T	F	T

162. Match column-I with column-II and select the **correct** option w.r.t role of organs in excretion.

	Column-I		Column-II
a.	Lungs	(i)	Degraded steroid hormones, Vitamins
b.	Skin	(ii)	CO_2
c.	Liver	(iii)	Lactic acid

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

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

163. Select the joint that does not allow any movement.

(1) Fibrous joint (2) Cartilaginous joint

(3) Saddle joint (4) Synovial joint

164. Complete the analogy and select the correct option w.r.t human limbs.

Carpals : 8 :: Tarsals : ___

(1) 5 (2) 8

(3) 7 (4) 14

165. Bees are the pollinators of the given crop species except

(1) Sunflower (2) Apple

(3) Pear (4) Wheat

166. Read the statements given below and select the **correct** option.

(a) Enzymes are denatured at high temperature but in thermophilic organisms they are effective at temperatures 80°-90°C.

(b) Adenylic acid is composed of adenosine with a glucose phosphates molecule.

(c) Carbohydrates are the most abundant biomolecules on earth.

(d) Alanine contains an amino group and an acidic group anywhere in the molecule.

How many statements given above are **correct**?

(1) Four (2) Three

(3) Two (4) One

167. Select the option among the following that is associated with exoskeleton of *Periplaneta*.

(1) D- glucuronic acid

(2) N-acetyl glucosamine

(3) Keratin sulphate

(4) N-acetyl galactosamine

168. Which of the following chemical is characteristic of human and other animal cartilages?

(1) Lipoglycans

(2) Inulin

(3) Chondroitin sulphate

(4) Lipopolysaccharide

169. Read the statements A and B and select the **correct** option.

Statement A: Psoriasis and Alzheimer's disease are the result of autoimmunity.

Statement B: Autoimmune response is responsible for non-acceptance of transplanted tissue/organ.

(1) Both statements A and B are correct.

(2) Both statements A and B are incorrect.

(3) Only statement A is correct.

(4) Only statement B is correct.

170. Injection against the *Naja* bite contains preformed antibodies whereas injection that is given at the birth for prevention against tuberculosis contains

(1) Attenuated pathogens

(2) Harvested antibodies

(3) Killed pathogen

(4) Gamma globulin

171. Complete the analogy w.r.t. animals and their taxonomic categories.

Ichthyophis : Amphibia :: *Eptatretus* : _____

(1) Urochordata (2) Hemichordata

(3) Cephalochordata (4) Cyclostomata

172. Choose the **correct** statement among the following.

(1) Water vascular system is a characteristic feature of sponges.

(2) All mammals are homoiothermous and viviparous.

(3) All gnathostomes are placed in superclass Tetrapoda.

(4) Presence of scales is not an exclusive feature of only reptiles.

173. Match column-I with column-II and choose the **correct** option.

	Column-I		**Column-II**
a.	*Petromyzon*	(i)	Marine bony fish
b.	*Psittacula*	(ii)	Cloaca is present
c.	*Exocoetus*	(iii)	Maintains constant body temperature
d.	*Hyla*	(iv)	Spawning in fresh water

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

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

174. Which of the following is **incorrect** for placenta?

(1) Placenta is formed by chorionic villi and uterine tissue.

(2) After implantation, finger like projections called chorionic villi are surrounded by uterine tissue but not by maternal blood.

(3) The placenta facilitates supply of oxygen and nutrients to the foetal tissue.

(4) Placenta also acts as an endocrine tissue.

175. Select the **incorrect** match w.r.t. humans.

(1)	Corpus luteum	–	Secretes large amount of progesterone
(2)	Mature follicle	–	Formed during follicular phase
(3)	Menstruation phase	–	Lasts for 28-29 days
(4)	Morula	–	Embryo with 8-16 blastomeres

176. In all of the following organisms, cell division is itself a mode of reproduction, except

(1) *Paramecium* (2) *Amoeba*

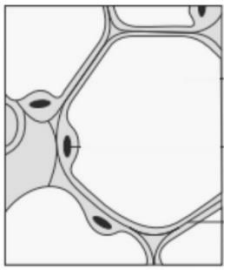
(3) *Hydra* (4) *Euglena*

177. Which of the following hormones maintains the endometrium and also plays a role in implantation of fertilized ovum and other events of pregnancy?

(1) Oestrogen (2) Progesterone

(3) FSH (4) LH

178. Choose the option that is not true for the type of connective tissue shown in the diagram below.



(1) It is located beneath the skin.

(2) The cells of this tissue are specialised to store fats.

(3) The fibres present provide strength, elasticity and flexibility to this tissue.

(4) It is a type of dense connective tissue.

179. How many of the parts given in the box below are present in digestive system of both cockroaches and humans?

Pharynx, Hepatic caeca, Gizzard, Ileum, Crop, Oesophagus, Rectum

(1) Three (2) Six

(3) Five (4) Four

180. Read the given statements and select the **correct** one.

(1) The major components of our food are carbohydrates, proteins, vitamins and fats.

(2) Majority of mammals form two sets of teeth during their life, this type of dentition is called heterodont.

(3) Partially hydrolysed proteins in the chyme reaching the stomach are acted upon by the proteolytic enzymes.

(4) The digestive wastes, solidified into coherent faeces in the rectum initiate a neural reflex causing an urge or desire for its removal.

181. Which of the following represents **correct** sequence of absorption of fats after digestion?

a. Formation of very small protein coated fat globules

b. Transported into lacteals in the villi

c. Move into the intestinal mucosa

d. Formation of micelles

(1) $a \rightarrow c \rightarrow d \rightarrow b$

(2) $a \rightarrow c \rightarrow b \rightarrow d$

(3) $d \rightarrow c \rightarrow a \rightarrow b$

(4) $d \rightarrow c \rightarrow b \rightarrow a$

182. Select the **correct** option for the given statements.

(A). People with 'O' blood group are called universal donors.

(B). There is absence of A and B antigens on RBCs of 'O' blood group.

(1) Both (A) and (B) are true

(2) Both (A) and (B) are false

(3) (A) is true but (B) is false

(4) (A) is false but (B) is true

183. All of the following are correct about QRS complex in a standard ECG, except

(1) It represents the depolarisation of ventricles

(2) It represents one complete pulse

(3) Its end marks the end of ventricular systole

(4) Ventricular contraction starts shortly after Q wave.

184. What is the function of valves in the heart?

(1) Bidirectional flow

(2) Allows the flow of blood only in one direction, that is from ventricles to the atria

(3) Unidirectional flow

(4) Promote backward flow of blood

185. Read the statements A and B and select the **correct** option.

Statement A: The biological carcinogens present in tobacco smoke have been identified as major cause of lung caner.

Statement B: Activation of cellular proto-oncogenes can lead to oncogenic transformations.

(1) Both statements A and B are correct

(2) Both statements A and B are incorrect

(3) Only statement A is correct

(4) Only statement B is correct

SECTION-B

186. Choose the **correct** statement from the following.

(1) The sound waves received by the external ear are directed to the semi-circular canals.

(2) The movements of the tectorial membrane bend the hair cells, pressing them against the basilar membrane.

(3) The vibrations are transmitted by the ear ossicles to the oval window by the ear drum.

(4) The oval window passes the vibrations to the fluid of the cochlea, where they generate waves in the lymphs.

187. A and B constitute the endocrine system in the human body.

Identify A and B by selecting the **correct** option.

	A	**B**
(1)	Hormone producing diffused tissues/cells	Endocrine glands
(2)	All glands	Hormone producing cells
(3)	Hormone producing cells	Ducted glands
(4)	Ductless glands	Exocrine glands

188. **Assertion (A):** The mode of action of implants is similar to that of oral contraceptive pills.

Reason (R): Pills, injection and implants contain progestogens alone or in combination with estrogen.

In the light of above statements select the **correct** option.

(1) (A) is true, (R) is false

(2) (A) is false, (R) is true

(3) (A) and (R) both are true, and (R) correctly explains (A)

(4) (A) and (R) both are true, but (R) does not explain (A)

189. Choose the **odd one** w.r.t. bacterial diseases.

(1) Typhoid (2) Trichomoniasis

(3) Syphilis (4) Cholera

190. '*Bacillus thuringiensis* forms protein crystals during a particular phase of their growth'. These protein crystals can be classified in which of the following categories.

(1) Insecticidal (2) Nutritive

(3) Yield enhanching (4) Mineral absorbing

191. Recognition sequence of *Eco*R I is

(1) $\begin{matrix} —^{3'}GAATTC^{5'}— \\ —_{5'}CTTAAG_{3'}— \end{matrix}$

(2) $\begin{matrix} —^{5'}CCCGGG^{3'}— \\ —_{3'}GGGCCC_{5'}— \end{matrix}$

(3) $\begin{matrix} —^{5'}GATATC^{3'}— \\ —_{3'}CTATAG_{5'}— \end{matrix}$

(4) $\begin{matrix} —^{5'}GAATTC^{3'}— \\ —_{3'}CTTAAG_{5'}— \end{matrix}$

192. Select the **incorrect** match from the following.

(1)	Restriction endonuclease	–	Molecular scissors
(2)	DNA ligase	–	Hydrolase
(3)	*Hin*d II	–	First restriction endonuclease
(4)	Methylase	–	Adds methyl group to DNA

193. Migration of a section of one population to another place and population multiple times is known as

(1) Genetic recombination

(2) Gene flow

(3) Natural selection

(4) Mutation

194. Select the **incorrect** statement from the following.

(1) Pneumonia is not an occupational respiratory disease.

(2) In mature mammalian erythrocytes, respiration is anaerobic.

(3) Bulk of CO_2 released from body tissues into the blood is present as carbamino haemoglobin in RBCs.

(4) One cannot breathe out air which is totally devoid of oxygen.

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

Telomerase : Ribonucleoprotein :: Asparagine : _____

(1) Simple protein (2) Oligosaccharide

(3) Amino acid (4) Nucleic acid

196. Consider the statements given below.

(a) Heroin is synthesized by glycosylation of morphine.

(b) MALT constitutes about 50% of the lymphoid tissue in the human body.

(c) Cirrhosis of liver is associated with chronic intake of alcohol.

(d) Infection of giant intestinal roundworm usually occurs by eating imperfectly cooked pork.

Select the option that contains **correct** statements only.

(1) (a) and (b) (2) (b) and (c)

(3) (c) and (d) (4) (a) and (d)

197. Notochord is a/an

(1) Mesodermally derived hollow tube

(2) Ectodermally derived tube-like structure

(3) Mesodermally derived rod-like structure

(4) Derived from stomochord in all protochordates

198. How many animals in the given box are bilaterally symmetrical, triploblastic, coelomate in adult stage of life?

Fasciola, *Octopus*, *Ancylostoma*, *Nereis*, *Antedon Neophron*, *Macropus*, *Taenia*

(1) 4 (2) 2

(3) 6 (4) 5

199. Read the following statements (a to e) and choose the option with only **correct** statements.

(a) Primary spermatocytes undergo spermiogenesis to form secondary spermatocytes.

(b) Secondary spermatocytes periodically undergo meiosis to form sperms and seminal plasma.

(c) First meiotic division is completed prior to ovulation.

(d) Primary oocyte is formed after puberty and completes its meiosis to form secondary oocyte.

(e) Oogonia undergo mitosis and differentiation to form primary oocyte.

(1) Statements (a) and (b) are correct

(2) Statements (c), (d) and (e) are correct

(3) Statements (c) and (e) are correct

(4) Statements (a), (c), (d) and (e) are correct

200. Read the given statements and select the option that **correctly** identifies them as true (T) or false (F).

a. The entire nodal tissue from sino-atrial node to Purkinje fibers has the ability to generate action potentials.

b. Chordae tendinae in the heart are connections between the cuspid valves and the papillary muscles of the ventricles.

c. Lymph node is a secondary lymphoid organ and graveyard of RBCs.

d. RBCs are formed in the red bone marrow in the adults.

	a	b	c	d
(1)	T	T	F	T
(2)	T	T	T	T
(3)	F	F	F	T
(4)	F	T	T	F

❑ ❑ ❑