AAYAM

Do not open this booklet until you are aksed to do

This Booklet contains 36 pages, including Rough Page.

Important Instructions :

1. **The Answer Sheet is inside this Test Booklet.** When you are directed to open the Test Booklet, take out the Answer Sheet and fill in the particulars on ORIGINAL Copy carefully with **blue/black ball point pen only**.

2. The test is of **3 hours duration** and the Test Booklet contains **180 multiple-choice questions** (four options with a single correct answer) from **Physics, Chemistry and Biology (Botany and Zoology).**

3. Wherever the symbols/constants are not mentioned, they are to be considered as per their standard meaning/value.

4. Each question carries **4 marks**. For each correct response, the candidate will get **4 marks**. For each incorrect response, **one mark will be deducted** from the total score. The **maximum marks are 720**.

5. Use **Blue/Black Ball Point Pen only** for writing particulars on this page/marking responses on Answer Sheet.

6. Rough work is to be done in the space provided for the purpose in the Test Booklet only.

7. On completion of the test, the candidate **must hand over the Answer Sheet (ORIGINAL and OFFICE COPY)** to the Invigilator before leaving the Room/Hall. The candidates are allowed to take away the Test Booklet with them.

8. The **CODE for this Booklet is "47"**. Make sure to enter this code in the OMR answer sheet.

9. The candidates should ensure that the Answer Sheet is not folded. **Do not make any stray marks** on the Answer Sheet. Do not write your Roll No. anywhere else except in the specified space in the Test Booklet/Answer Sheet.

10. Use of white fluid for correction is **NOT permissible** on the Answer Sheet.

11. Each candidate must show on-demand his/her Admit Card to the Invigilator.

12. No candidate, without special permission of the centre Superintendent or Invigilator, would leave his/her seat.

13. The candidates should not leave the Examination Hall without handing over their Answer Sheet to the Invigilator on duty and sign (with time) the Attendance Sheet twice. Cases, where a candidate has not signed the Attendance Sheet second time, will be deemed to **not to have handed over the Answer Sheet** and dealt with as per the Main Exam cases.

14. Use of **Electronic/Manual Calculator is prohibited.**

15. The candidates are governed by all Rules and Regulations of the examination with regard to their conduct in the Examination Room/Hall. All cases of unfair means will be dealt with as per the Rules and Regulations of this examination along with Public Examinations (Prevention of unfair means act 2024).

16. **No part of the Test Booklet and Answer Sheet shall be detached under any circumstances.**

17. The candidates will write the Correct Test Booklet Code as given in the Test Booklet/Answer Sheet in the Attendance Sheet.

18. If a candidate marks more than one answer for a question in the OMR Sheet, it will be treated as incorrect and negative marking will be applicable.

Name of the Candidate (in Capitals) : _____

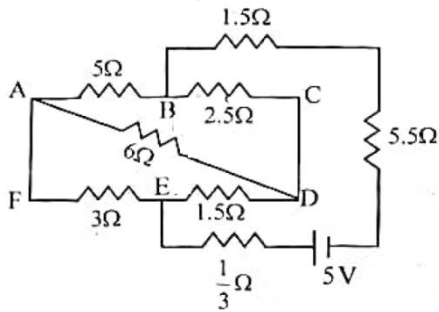Roll Number   :   in figure : _____ in words : _____

Centre of Examination (in Capitals) : _____

Candidate's Signature   :_____   Invigilator's Signature:_____

Facsimile signature stamp of Centre Superintendent :_____

Physics

1. The current passing through the battery in the given circuit, is :

   (1) 1.5 A   (2) 2.0 A

   (3) 0.5 A   (4) 2.5 A

2. The electric field in a plane electromagnetic wave is given by

   $E_2 = 60 \cos (5x + 1.5 \times 120^9 t)V / m.$

   Then expression for the corresponding magnetic field is (here subscripts denote the direction of the field) :

   (1) $B_y = 60 \sin (5x + 1.5 \times 10^9 t)$ T

   (2) $B_y = 2 \times 10^{-7} \cos (5x + 1.5 \times 10^9 t)$ T

   (3) $B_x = 2 \times 10^{-7} \cos (5x + 1.5 \times 10^9 t)$ T

   (4) $B_z = 60 \cos (5x + 1.5 \times 10^9 t)$ T

3. A pipe open at both ends has a fundamental frequency f in air. The pipe is now dipped vertically in a water drum to half of its length. The fundamental frequency of the air column is now equal to :

   (1) 2f   (2) $\dfrac{f}{2}$

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

4. An electron (mass 9×10^{-31} kg and charge 1.6×10^{-19}C) moving with speed c/100 (c = speed of light) is injected into a magnetic field $\vec{B}$ of magnitude 9×10^{-4} T perpendicular to its direction of motion. We wish to apply an uniform electric field $\vec{E}$ together with the magnetic field so that the electron does not deflect from its path. Then (speed of light $c = 3 \times 10^8$ ms^{-1})

   (1) $\vec{E}$ is parallel to $\vec{B}$ and its magnitude is 27×10^4 V m^{-1}

   (2) $\vec{E}$ is perpendicular to $\vec{B}$ and its magnitude is 27×10^4 V m^{-1}

   (3) $\vec{E}$ is perpedicular to $\vec{B}$ and its magnitude is 27×10^2 V m^{-1}

   (4) $\vec{E}$ is parallel to $\vec{B}$ and its magnitude is 27×10^2 V m^{-1}

5. In a certain camera, a combination of four similar thin convex lenses are arranged axially in contact. Then the power of the combination and the total magnification in comparison to the power (p) and magnification (m) for each lens will be, respectively

   (1) p^4 and m^4 (2) 4p and 4m

   (3) p^4 and 4m   **(4) 4p and m^4**

6. A 2 amp current in flowing through two different small circular copper coils having radii ratio 1 : 2. The ratio of their respective magnetic moments will be

   (1) 4 : 1   **(2) 1 : 4**

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

7. A constant voltage of 50 V is maintained between the points A and B of the circuit shown in the figure. The current thorough the branch CD of the circuit is :
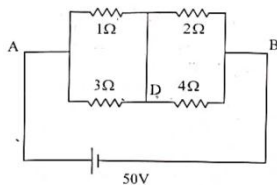
(1) 3.0 A   (2) 1.5 A

(3) 2.0 A   (4) 2.5 A

8. Two gases A and B are filled at the same pressure in separate cylinders with movable pistons of radisu r_A and r_B, respectively. On supplying an equal amount of heat to both the system reversibly under constant pressure, the pistons of gas A and B are displaced by 16 cm and 9 cm, respectively. If the change in their internal energy is the same, then the ratio is $\frac{r_A}{r_B}$ equal to

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

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

9. A container has two chambers of volumes $V_1 = 2$ liters and $V_2 = 3$ liters separated by a partition made of a thermal insulator. The chambers contains $n_1 = 5$ and $n_2 = 4$ moles of ideal gas at pressure $p_1 = 1$ atm and $p_2 = 2$ atm, respectively. When the partition is removed, the mixture attains an equilibrium pressure of :

(1) 1.8 atm   (2) 1.3 atm

(3) 1.6 atm   (4) 1.4 atm

10. The radius of Martion orbit around the Sun is about 4 times the radius of the orbit of Mercury. The Martain year is 687 Earth days. Then which of the following is the length of 1 year on Mercury?

(1) 124 earth days   **(2) 88 earth days**

(3) 225 earth days   (4) 172 earth days

11. To an ac power supply of 220V at 50 Hz, a resistor of 20 Ω, a capacitor of reactance 25 Ω and an inductor of reactance 45 Ω are connected in series. The corresponding current in the circuit and the phase angle between the current and the voltage is, respectively.

(1) 15.6 A and 45º   (2) 7.8 A and 30º

(3) 7.8 A and 45º (4) 15.6 A and 30º

12. A wire of ressitance R is cut into 8 equal pieces. From thess pieces two equivalent resistances are made by adding four of these together in parallel. Then these two sets are added in series. The net effective resistance of the combination is :

(1) $\frac{R}{8}$ (2) $\frac{R}{64}$

(3) $\frac{R}{32}$ **(4) $\frac{R}{16}$**

13. The output (Y) of the given logic implementation is similar to the output of an/a _____ gate.
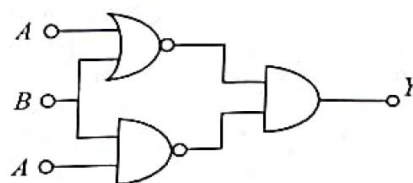
(1) NOR   (2) AND

(3) NAND   (4) OR

14. Two identical charged conducting spheres A and B have their centres separated by a certain distance. Charge on each sphere is q and the force of repulsion between them is F. A third identical uncharged conducting sphere is brought in contact with sphere A first and then with B and finally removed from both. New force of repulsion between spheres A and B (Radii of A and B are negligible compared to the distance of sepration so that for calculating force between them they can be considered as point charges) is best given as :

(1) $\dfrac{3F}{8}$ (2) $\dfrac{3F}{5}$

(3) $\dfrac{2F}{3}$ (4) $\dfrac{F}{2}$

15. Consider the diameter of a spherical object being measured with the help of a Vernier calipers. Suppose its 10 Vernier Scale Divisions (V.S.D) are equal to its 9 Main Scale Divisions (M.S.D). The least division in the M.S. is 0.1 cm and ther zero of V.S. is at x = 0.1 cm when the jaws of Vernier calipers are closed.

If the main scale reading for the diameter is M = 5 cm and the number of coinciding vernier division is 8, the measured diameter after zero error correction, is

(1) 5.00 cm

(2) 5.18 cm

(3) 5.08 cm

(4) 4.98 cm

16. In some appropriate units, time (t) and position 9x) relation of a moving particle is given by $t = x^2 + x$. The acceleration of the particle is

(1) $+\dfrac{2}{2x+1}$ (2) $-\dfrac{2}{(x+2)^3}$

(3) $-\dfrac{2}{(2x+1)^3}$ (4) $+\dfrac{2}{(x+1)^3}$

17. Which of the following options represent the variation of photoelectric current with property of light shown on the x-axis?

A.

B.

C.

D.
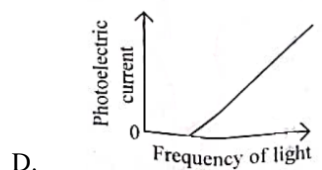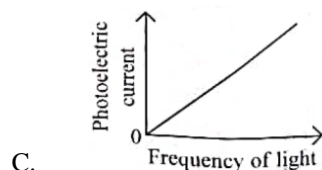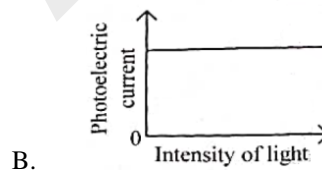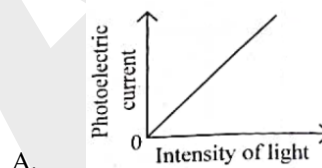
(1) B and D   **(2) A only**

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

18. A particle of mass m is moving around the origin with a constant force F pulling it towards the origin. If Bohr model is used to describe its motion, the radius r of the nth orbit and the particle's speed v in the orbit depend on n as
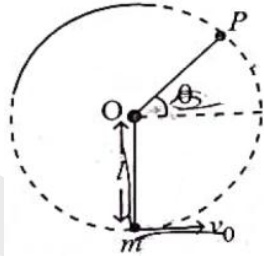
(1) $r \propto n^{4/3}$; $v \propto n^{-1/3}$

(2) $r \propto n^{1/3}$; $v \propto n^{1/3}$

(3) $r \propto n^{1/3}$; $v \propto n^{2/3}$

**(4) $r \propto n^{2/3}$; $v \propto n^{1/3}$**

19. A bob of heavy mass m is suspended by a light string of length l. The bob is given a horizontal velocity v_0 as shown in figure. If the string gets slack at some point P making an angle θ from the horizontal, the ratio of the speed v of the bob at point P to its initial speed v_0 is :

(1) $\left(\dfrac{\sin\theta}{2+3\sin\theta}\right)^{\frac{1}{2}}$

(2) $(\sin\theta)^{\frac{1}{2}}$

(3) $\left(\dfrac{1}{2+3\sin\theta}\right)^{\frac{1}{2}}$

(4) $\left(\dfrac{\cos\theta}{2+3\sin\theta}\right)^{\frac{1}{2}}$

20. A full wave rectifier circuit with diodes (D_1) and (D_2) is shown in the figure. If input supply voltage V_{in} = 220 sin (100 π t) volt, then at t = 15 m sec
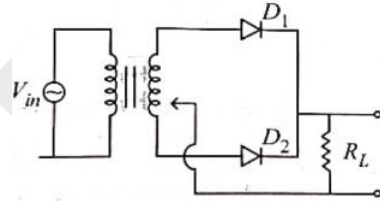
(1) D_1 and D_2 both are reverse biased

(2) D_1 si forward baised, D_2 is reverse biased

(3) D_1 is reverse biased, D_2 is forward biased

(4) D_1 and D_2 both are forward biased

21. A balloon is made of a material of surface tension S and its inflation outlet (from where gas is filled in it) has small area A. It is filled with a gas of dentisty ρ and takes a spherical shape of radius R. When the gas is allowed to flow freely out of it, its radius r changes from R to 0 (zero) in time T. If the speed v(r) of gas coming out of the balloon depends on r as r^a and T $\propto$ $S^{\alpha} A^{\beta} \rho^{\gamma} R^{\delta}$ then

(1) $a=\dfrac{1}{2}, \alpha=\dfrac{1}{2}, \beta=-\dfrac{1}{2}, \gamma=\dfrac{1}{2}, \delta=\dfrac{7}{2}$

(2) $a=\dfrac{1}{2}, \alpha=\dfrac{1}{2}, \beta=-1, \gamma=+1, \delta=\dfrac{3}{2}$

(3) $a=-\dfrac{1}{2}, \alpha=-\dfrac{1}{2}, \beta=-1, \gamma=-\dfrac{1}{2}, \delta=\dfrac{5}{2}$

(4) $a=-\dfrac{1}{2}, \alpha=-\dfrac{1}{2}, \beta=-1, \gamma=\dfrac{1}{2}, \delta=\dfrac{7}{2}$

22. A microscope has an objective of focal length 2 cm, eyepiece of focal length 4 cm and the tube length of 40 cm. If the distance of distinct vision of eye 25 cm, the mangnification in the microsope is

(1)   250
(2)   100
(3)   125
(4)   150

23. Two identical point masses P and Q, suspended from two separate massless springs of spring constants k_1 and k_2, respectively, oscillate vertically. If their maximum speeds are the same, the ratio (A_Q/A_P) of the amplitude A_Q of mass Q to the amplitude A_P of mass P is :

(1) $\sqrt{\dfrac{k_1}{k_2}}$
(2) $\dfrac{k_2}{k_1}$

(3) $\dfrac{k_1}{k_2}$
(4) $\sqrt{\dfrac{k_2}{k_1}}$

24. A parallel plate capacitor made of circular plates is being charged such that the surface charge density on its plates is increasing at a constant rate with time. The magnitude field arising due to displacement current is :

(1)   zero between the plates and non-zero outside

(2)   zero at all places

(3)   constant between the plates and zero outside the plates

(4)   non-zero everywhere with maximum at the imaginary cylindrical surface connecting peripheries of the plates.

25. An electric dipole with dipole moment 5×10^{06} Cm is aligned with the direction of a uniform electric field of magnitude 4×10^5 N/C. The dipole is then rotated thorough an angle of 60° with respect to the electric field. The change in the potential energy of the dipole is :

(1)   1.5 J
(2)   0.8 J
(3)   1.0 J
(4)   1.2 J

26. There are two inclined surfaces of equal length (L) and same angle of inclination 45° with the horizontal. One of them is rough and the other is perfectly smooth. A given body takes 2 times as much time to slide down on rough surface than on the smooth surface. The coefficient of kinetic friction (μ_k) between the object and the rough surface is close to

(1)   0.75
(2)   0.25
(3)   0.40
(4)   0.5

27. De-Broglie wavelength of an electron orbiting in the n = 2 state of hydrogen atom is close to
(Given Bohr radius = 0.052 nm)

(1)   2.67 nm
(2)   0.067 nm
(3)   0.67 nm
(4)   1.67 nm

28. The sun rotates around its centre once in 27 days. What will be the period of revolution if the Sun were to expand to twice its present radius without any external influence? Assume the Sun to be a sphere of uniform density.

(1)   108 days
(2)   100 days
(3)   105 days
(4)   115 days

29. A physical quantity P is realted to four observations a, b, c and d as follows :

$$P = a^3 b^2 / c\sqrt{d}$$

The percentage erros of measurement in a, b, c and d are 1%, 3%, 2% and 4% respectively. The percentage erro in the quanity P is

(1) 15% (2) 10%

(3) 2% **(4) 13%**

30. The plates of a parallel plate capacitor are separated by d. Two slabs of different dielectric constat K_1 and K_2 with thickness $\dfrac{3}{8}$ and $\dfrac{d}{2}$ respectively are inserted in the capacitor Due to this, the capacitance becomes two times larger than when there is nothing between the plates.

If $K_1 = 1.25\, K_2$, the value of K_1 is :

(1) 1.33 **(2) 2.66**

(3) 2.33 (4) 1.60

31. A ball of mass 0.5 kg is dropped form a height of 40 m. The ball hits the ground and rises to a height of 10 m. The impulse imparted to the ball during its collision with the ground is (Take g = 9.8 m/s²)

(1) 84 NS

(2) 21 NS

(3) 7 NS

(4) 0

32. Two cities X and Y connected by a regular bus service with a bus leaving in either direction every T min. A girl is driving scooty with a speed of 60 km/h in the direction X to Y notices that a bus goes past her every 30 minutes in the direction of her motion, and every 10 minutes in the opposite direction. Choose the correct option for the period T fo the bus service and the speed (assumed constant) of the buses.

(1) 15 min, 120 km/h (2) 9 min, 40 km/h

(3) 25 min, 100 km/h (4) 10 min, 90 km/h

33. An oxygen cylinder of volume 30 litre has 18.20 moles of oxygen. After some oxygen is withdrawn from the cylinder, its gauge pressure drops to 11 atmospheric pressure at temperature 27°C. The mass of the oxygen withdrawn from the cylinder is nearly equal to :

[Given, $R = \dfrac{100}{12}$ J mol⁻¹ K⁻¹, and molecular mass of $O_2 = 32$, 1 atm pressure = 1.01×10^5 N/m]

(1) 0.156 kg (2) 0.125 kg

(3) 0.144 kg (4) 0.116 kg

34. AB is part of an electrical circuit (see figure). The potential difference "$V_A - V_B$", at the instant when current i = 2A and is increasing at a rate of 1 amp/second is :
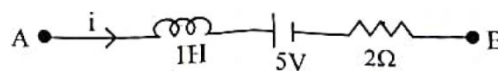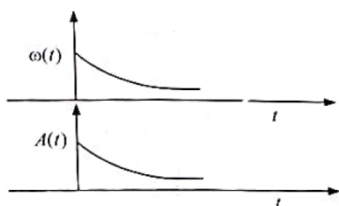

(1) 10 volt (2) 5 volt

(3) 6 volt (4) 9 volt
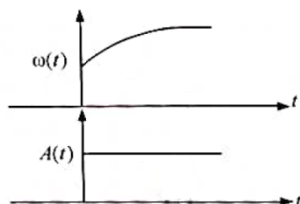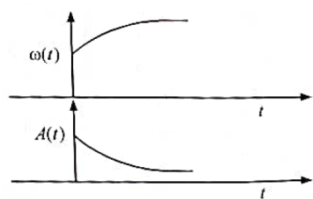
35. In an oscillating spering mass system, a spring is connectd to a box filled with sand. As the box oscillates, sand leaks slowly out of the box vertically so that the average frequency $\omega(t)$ and average amplitude $A(t)$ of the system change with time t. Which one of the following options schematically depicts these changes correctly?
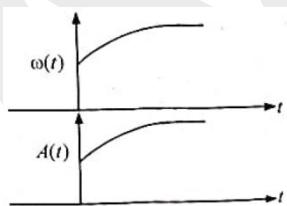

(1)

(2)

(3)

(4)

36. A model for quantized motion of an electron in a uniform magnetic field B states that the flux passing through the orbit of the electron is n(h/e) where n is an integer, h is Planck's constant and e is the magnitude of electron's charge. Accroding to the model, the magnetic moment of an electron in its lowest energy state will be (m is the masses of the electron)

(1) $\dfrac{heB}{2\pi m}$

(2) $\dfrac{he}{\pi m}$

(3) $\dfrac{he}{2\pi m}$

(4) $\dfrac{heB}{\pi m}$

37. A body weights 48 N on the surface of the earth. The gravitational force experienced by the body due to the earth at a height equal to on-third the radius of the earth from its surface is :

(1) 36 N

(2) 16 N

(3) 27 N

(4) 32 N

38. Consider a water tank shown in the figure. It has one wall at x = L and can be taken to be very wide in the z direction. When filled with a liquid of surface thension S and density ρ, the liquid surface makes angle θ_0 ($\theta_0 \ll 1$) with the x-axis at x = L. If y(x) is the height of the surface then the euation for y(x) is :

(take $\theta(x) = \sin\theta(x) = \tan\theta(x) = \dfrac{dy}{dx}$, g is the acceleration due to gravity)

(1) $\dfrac{dy}{dx} = \sqrt{\dfrac{\rho g}{S}} x$ (2) $\dfrac{d^2y}{dx^2} = \dfrac{\rho g}{S} x$

(3) $\dfrac{d^2y}{dx^2} = \dfrac{\rho g}{S} y$ (4) $\dfrac{d^2y}{dx^2} = \sqrt{\dfrac{\rho g}{S}}$

39. The intensity of transmitted light when a polaroid sheet, placed between two crossed polaroid at 22.5° from the polarization axis of one of the polaroid, is)I_0 is the intensity of polarized light after passing through the first polaroid):

(1) $\dfrac{I_0}{16}$ (2) $\dfrac{I_0}{2}$

(3) $\dfrac{I_0}{4}$ **(4)** $\dfrac{I_0}{8}$

40. A photon and an electron (mass m) have the same energy E. The ratio (λ_{photon} / $\lambda_{electron}$) of their de Broglie wavelengths is : (c is the speed of light)

(1) $\dfrac{1}{c}\sqrt{\dfrac{E}{2m}}$ (2) $\sqrt{\dfrac{E}{2m}}$

(3) $c\sqrt{2mE}$ **(4)** $c\sqrt{\dfrac{2m}{E}}$

41. An unpolarized light beam travelling in air is incident on a medium of refractive index 1.73 at Brewster's angle. Then -

(1) transmitted light is completely polarized with angle of refraction close to 30º.

(2) **reflected light is completely polarized and the angle of relfection is close to 60º.**

(3) reflected light is partially polarized and the angle of reflection is close to 30º.

(4) both reflected and transmitted light are perfectly and refraction close to 60º and 30º, respectively.

42. A uniform rod of mass 20 kg and length 5 m length against a smooth vertical wall making an angle of 60º with it. The other end rests on a rough horizontal floor. The friction force that the floor exerts on the rod is (take g = 10 m/s²)

(1) $200\sqrt{3}$ N   (2) 100 N

(3) $100\sqrt{3}$ **N**   (4) 200 N

43. Three identical heat conducting rods are connected in series as shown in the figure. The rods on the sides have thermal conductivity 2K while that in the middle has thermal conductivity K. The left end of the combination is maintained at temperature 3T and the right end at T. rods are thermally insulated from outside. In steady state, temperature at the left junction is T_1 and that at the right junction is T_2. The ratio T_1/T_2 is
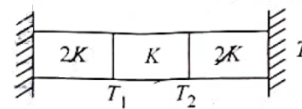
(1) $\dfrac{5}{4}$ (2) $\dfrac{3}{2}$

(3) $\dfrac{4}{3}$ **(4)** $\dfrac{5}{3}$

44. The kinetic energies of two similar cars A and B are 100 J and 225 J respectively. On applying breaks, car A stops after 1000 m and car B stops after 1500 m. If F_A and F_B are the forces applied by the breaks on cars A and B, respectively, then the ratio F_A/F_B is

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

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

45. A sphere of radius R is cut from a larger solid sphere of radius 2R as shown in the figure. The ratio of the moment of inertia of the smaller sphere to that of the rest part of the sphere aobut the Y-axis is :
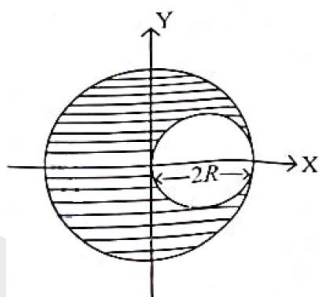
(1) $\dfrac{7}{64}$ (2) $\dfrac{7}{8}$

(3) $\dfrac{7}{40}$ **(4)** $\dfrac{7}{57}$

Chemistry

46. If the molar conductivity (Λ_m) of a 0.050 mol L^{-1} solution of a monobasic weak acid is 90 S cm^2 mol^{-1}, its extent (degree) of dissociation will be

[Assume $\Lambda_+^\circ = 349.6$ S cm^2 mol^{-1} and $\Lambda_-^\circ = 50.4$ S cm^2 mol^{-1}]

(1) 0.215 (2) 0.115

(3) 0.125 **(4) 0.225**

47. Given below are two statements:

Statements I: A hypothetical diatomic molecule with bond order zero is quite statble.

Statements :II As bond order increases, the bond length increases.

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

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

(2) Both Statement I and Statement II are true

(3) Both Statement I and Statement II are false

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

48. The ratio of the wavelengths of the light absorbed by a Hydrogen atom when it undergoes n = 2 $\rightarrow$ n = 3 and n = 4 $\rightarrow$ n = 6 transitions, respectively, is

(1) $\dfrac{1}{4}$ (2) $\dfrac{1}{36}$

(3) $\dfrac{1}{16}$ (4) $\dfrac{1}{9}$

49. The correct order of the wavelength of light absorbed by the following complexes is,

A. $\left[Co(NH_3)_6\right]^{3+}$ B. $\left[Co(CN)_6\right]^{3-}$

C. $\left[Cu(H_2O)_4\right]^{2+}$ D. $\left[Ti(H_2O)_6\right]^{3+}$

Choose the correct answer from the options given belwo:

(1) $C < A < D < B$ (2) $B < D < A < C$

(3) $B < A < D < C$ (4) $C < D < A < B$

50. If the rate constant of a reaction is 0.03 s^{-1} how much time does it take for 7.2 mol L^{-1} concentration of the reactant to get reduced to 0.9 mol L^{-1}?

(Give: L–1)?
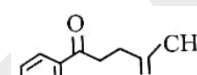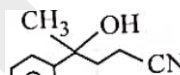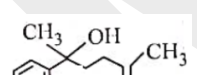
(1) 21.0 s   **(2) 69.3 s**

(3) 23.1 s   (4) 210 s

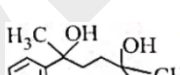**51.** Match List I with List II

	List I (Mixture)		List I (Method of Separation)
A.	CHCl₃+ C₆H₅NH₂	I.	Distillation under reduced pressure
B.	Crude oil in petroleum industry	II.	Steam distillation
C.	Glycerol from spent–lye	III.	Fractional distillation
D.	Aniline –water	IV.	Simple distillation

Choose the correct option answer from the options given below:

(1) A–III, B–IV, C–II, D–I

(2) A–IV, B–III, C–I, D–II

(3) A–IV, B–III, C–II, D–I

(4) A–III, B–IV, C–I, D–II

52.
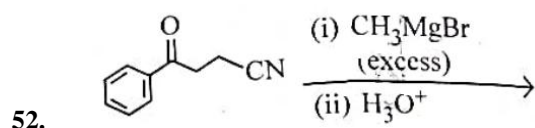
(1)   (2)

(3)   (4)

53. Which one of the following compounds can exist as cis–trans isomers?

(1) 1,2– Dimethylcyclohexane

(2) Pent –1– ene

(3) 2– Methylhex – 2 – ene

(4) 1, 1 – Dimethylcyclopropane

54. Among the following, choose the the ones with equal number of atoms,

A. 212 g of Na₂CO₃ (s) [molar mass = 106 g]

B. 248 g of Na₂O (s) [molar mass = 62 g]

C. 240 g of NaOH (s) [molar mass = 40 g]

D. 12 g of H₂ (g) [molar mass = 2 g]

E. 220 g of CO₂ (g) [molar mass = 44 g]

Choose the correct answer from the options given below:

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

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

55. Among the given compounds I–III, the correct order of bond dissociation energy of C– bond marked with * is :
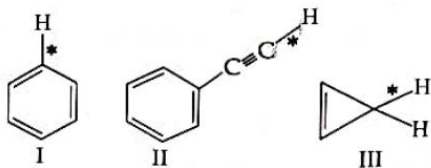
   (1) II > III > I   **(2) II > I > III**

   (3) I > II > III   (4) III > II > I

56. The standard heat of formation, in kcal/mol of Ba^{2+} is:

   [Given : standard heat of formation of SO_4^{2-} ion (aq) = – 216 kcal/mol, standard heat of crystallistion of $BaSO_4(s)$ = – 4.5 kcal/mol, standard heat of formation of $BaSO_4$ (s) = – 349 kcal/mol]

   (1) + 220.5   **(2) – 128. 5**

   (3) –133.0   (4) + 133.0

57. Consider the following compounds:

 $\underline{K}O_2$, $H_2\underline{O}_2$ and $H_2\underline{S}O_4$.
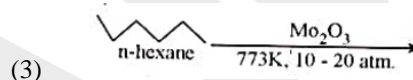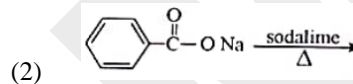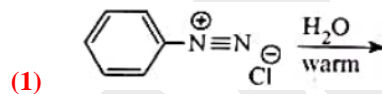
   The oxidation states of the underlined elements in them are, respectively,

   (1) + 4, – 4, and + 6   **(2) + 1, – 1, and + 6**

   (3) + 2, – 2, and + 6   (4) + 1, – 2, and + 4

58. Out of the following complex compounds which of the compound wil be having the minimum conductance in solution?

   (1) [Co $(NH_3)_5Cl$] Cl   **(2) [Co $(NH_3)_3$ Cl_3]**

   (3) [Co $(NH_3)_4$ Cl_2]   (4) [Co $(NH_3)_6$] Cl_3

59. Which one of the following reactions does NOT give benzene as the product?

   (1)

   (2)

   (3)

   (4)
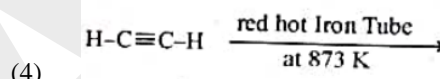
60. Which of the following are paramagnetic?

   A. $[NiCl_4]^{2-}$ B. $Ni(CO)_4$

   C. $[Ni(CN)_4]^{2-}$ D. $[NI(H_2O)_6]^{2+}$

   E. $Ni(PPh_3)_4$

   Choose the correct answer from the options given below:

   (1) A, D and E only   (2) A and C only

   (3) B and E only   **(4) A and D only**

61. Which one of the following compound **does not** decolourize bromine water?
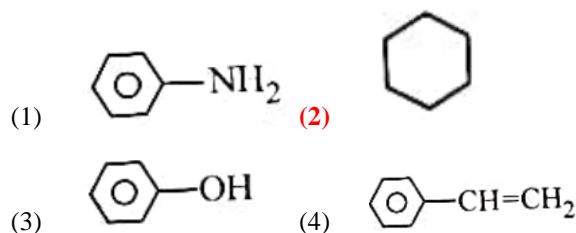
   (1)
             (2)

   (3)
             (4)

62. Match List–I with List–II

	List I		List I
A.	Haber process	I.	Fe catalyst
B.	Wacker oxidation	II.	$PdCl_2$
C.	Wilkinson catalyst	III.	$[(PPh_3)_3RhCl]$
D.	Ziegler catalyst	IV.	$TiCl_4$ with $Cl(CH_3)_3$

Choose the correct answer from the options given below:

(1) A–I, B–IV, C–III, D–II

(2) A–I, B–II, C–IV, D–III

(3) A–II, B–III, C–I, D–IV

(4) A–I, B–II, C–III, D–IV

63. Match List–I with List–II

	List I (Name of Vitamin)		List I (Deficiency disease)
A.	Vitamin B_{12}	I.	Cheilosis
B.	Vitamin D	II.	Convulsions
C.	Vitamin B_2	III.	Rickets
D.	Vitamin B6	IV.	Pernicious anaemia

Choose the correct answer from the options given below:

(1) A–IV, B–III, C–II, D–I

(2) A–I, B–III, C–II, D–IV

(3) A–IV, B–III, C–I, D–II

(4) A–II, B–III, C–I, D–IV

64. Given below are two statements:

Statements I: Ferrromagnetism is considered as an extreme form of paramagnetism.

Statements II : The number of unpaired electrons in a Cr^{2+} ion ($Z = 24$) is the same as that of a Nd^{3+}ion ($Z = 60$)

In the ligh of the above statements, choose the most correct answer from the options given below:

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

(2) Both Statement I and Statement II are true

(3) Both Statement I and Statement II are false

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

65. If the half–life ($t_{1/2}$) for a first order reaction is 1 minute, then the time required for 99.9% completion of the reaction is closed to:

(1) 10 minutes   (2) 2 minutes

(3) 4 minutes   (4) 5 minutes

66. The correct order of decreasing basic strength of the givn amines is:

(1) benzenamine>ethanamine> N–methylaniline >N–ethylethanamine

(2) N–methylaniline>benzenamine>ethanamine > N–ethylethanamine

(3) N–ethylethanamine>ethanamine> benzenamine> N–ethylethanamine

(4) N–ethylethanamine>ethanamine> N–methylaniline>benzenamine

67. Match List–I with List–II

	List I (Ion)		List I (Group Number in Cation Analysis)
A.	Co^{2+}	I.	Group – I
B.	Mg^{2+}	II.	Group – III
C.	Pb^{2+}	III.	Group – IV
D.	Al^{3+}	IV.	Group – VI

Choose the correct answer from the options given below:

(1) A–III, B–II, C–I, D–IV

(2) A–III, B–IV, C–II, D–I

(3) A–III, B–IV, C–I, D–II

(4) A–III, B–II, C–IV, D–I

68. Phosphoric acid ionizes in three steps with their ionization constant values

Ka_1, Ka_2 and Ka_3, respectively, while K is the overall ionization constant.

Which of the following statements are true?

A. $\log K = \log Ka_1 + \log Ka_2 + \log Ka_3$

B. H_3PO_4 is a stronger acid than $H_2PO_4^-$ and HPO_4^{2-}

C. $Ka_1 > Ka_2 > Ka_3$

D. $Ka_1 = \dfrac{Ka_3 + Ka_2}{2}$

Choose the correct answer from the options given below:

(1) A, B and C only

(2) A and B only

(3) A and C only

(4) B, C and D only

69. Which of the following statements are true?

A. Unlike Ga that has a very high melting point. Cs has a very low melting point.

B. On pauling scale, the electronegativity values of N and Cl are not the same.

C. Ar, K^+, Cl^-, Ca^{2+}, and S^{2-} are all isoelectronic species.

D. The correct order of the first ionization enthalpies of Na, Mg, Al, and Si is Si > Al > Mg > Na.

E. The atomic radius of Cs is greater than that of Li and Rb.

Choose the correct answer from the options given below:

(1) A, C, and E only   (2) A, B, and E only

(3) C and E only   (4) C and D only

70. Given below are two statements:

Statements I: Like nitrogen that can form ammonia, arsenic can form arsine.

StatementsII : Antimony cannot form antimony pentoxide.

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

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

(2) Both Statement I and Statement II are correct

(3) Both Statement I and Statement II are incorrect

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

71. Which of the following aqueous solution will exhibit highest boiling point?

(1) 0.015 M $C_6H_{12}O_6$ (2) 0.01 M–Urea

(3) 0.01 M KNO_3 **(4) 0.01 M Na_2SO_4**

72. Given below are two statements:

Statements I: Benzenediazonium salt is prepared by the reaction of aniline with nitrous acid at 273 – 278 K. It decompose easily in the dry state.

Statements II : Insertion of iodine into the benzene ring is difficult and hence iodobenzene is prepared through the reaction of benzendiazonium salt with Kl.

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

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

(2) Both Statement I and Statement II are correct

(3) Both Statement I and Statement II are incorrect

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

73. Identify the suitable reagent for the following conversion.
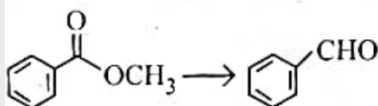
(1) H_2/Pd–BaSO$_4$

(2) (i) LiAlH$_4$, (ii) H$_+$/H$_2$O

(3) (i) AlH(iBu)$_2$ (ii) H$_2$O

(4) (i) NaBH$_4$, (ii) H$^+$/H$_2$O

74. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A): I undergoes S_N2 reaction faster than Cl.

Reason (R): Iodine is a better leaving group because of its large size.

In the light of the above statements, choose the correct answer from the options given below:

(1) A is false but R is true

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

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

(4) A is trued but R is false

75. The correct order of decreasing acidity of the following aliphatic acids is:

(1) HCOOH > $(CH_3)_3$ CCOOH > $(CH_3)_2$ CHCOOH > CH3COOH

(2) $(CH_3)_3$ CCOOH > $(CH_3)_2$CHCOOH > CH$_3$COOH > HCOOH

(3) CH$_3$COOH > $(CH_3)_2$CHCOOH > $(CH_3)_3$CCOOH > HCOOH

(4) HCOOH > CH$_3$COOH > $(CH_3)_2$CHCOOH > $(CH_3)_3$CCOOH

76. Which one of the following reactions does **NOT** belong to "Lassaigne's test"?
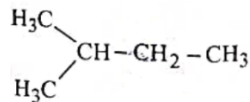
(1) $2CuO + C \xrightarrow{\Delta} 2Cu + CO_2$

(2) $Na + C + N \xrightarrow{\Delta} NaCN$

(3) $2Na + S \xrightarrow{\Delta} Na_2S$

(4) $Na + X \xrightarrow{\Delta} NaX$

77. How many products (including stereoisomers) are expected from monochlorination of the following compound?

$$H_3C - CH(CH_3) - CH_2 - CH_3$$

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

78. Sugar 'X'
    A.   is found in honey.
    B.   is a keto sugar.
    C.   exists in α and β – anomeric forms.
    D.   is laevorotatory.
    'X' is:
    (1)   Sucrose   (2)   D–Glucose
    (3)   **D–Fructose**   (4)   Maltose

79. Dalton's Atomic theory could not explain which of the following?
    (1)   **Law of gaseous volume**
    (2)   Law of conservation of mass
    (3)   Law of constant proportion
    (4)   Law of multiple proportion

80. Higher yield of NO in
    $N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$ can be obtained at
    [ΔH of the reaction $= + 180.7$ kJ mol^{-1}]
    A.   higher temperature
    B.   lower temperature
    C.   higher concentration of N_2
    D.   higher the concentration of O_2
    Choose the correct answer from the options given below:
    (1)   **A, C, D only**
    (2)   A, D only
    (3)   B, C only
    (4)   B, C, D only

81. Match List–I with List–II

	List I		List I
A.	XeO_3	I.	sp^3d; linear
B.	XeF_2	II.	sp^3;pyramidal
C.	$XeOF_4$	III.	sp^3d^3; distorted octahedral
D.	XeF_6	IV.	sp^3d^2; square pyramidal

Choose the correct answer from the options given below:

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

82. Match List–I with List–II

	List I (Example)		List I (Type of Solution)
A.	Humidity	I.	Solid in solid
B.	Alloys	II.	Liquid in gas
C.	Amalgams	III.	Solid in gas
D.	Smoke	IV.	Liquid in solid

Choose the correct answer from the options given below:

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

83. Energy and radius of first Bohr orbit of He^+ and Li^{2+} are

[Given $R_H = 2.18 \times 10^{-18}$ J, $a_0 = 52.9$ pm]

(1)　$E_n(Li^{2+}) = -8.72 \times 10^{-16}$J;

　　$r_n(Li^{2+}) = 17.6$ pm

　　$E_n(He^+) = -19.62 \times 10^{-16}$ J;

　　$r_n(He^+) = 17.6$ pm

(2)　$\mathbf{E_n(Li^{2+}) = -19.62 \times 10^{-18}J;}$

　　$\mathbf{r_n(Li^{2+}) = 17.6\ pm}$

　　$\mathbf{E_n(He^+) = -8.72 \times 10^{-18}J;}$

　　$\mathbf{r_n(He^+) = 26.4\ pm}$

(3)　$E_n(Li^{2+}) = -8.72 \times 10^{-18}J;$

　　$r_n(Li^{2+}) = 26.4$ pm

　　$E_n(He^+) = -19.62 \times 10^{-18}J;$

　　$r_n(He^+) = 17.6$ pm

(4)　$E_n(Li^{2+}) = -19.62 \times 10^{-16}J;$

　　$r_n(Li^{2+}) = 17.6$ pm

　　$E_n(He^+) = -8.72 \times 10^{-16}J;$

　　$r_n(He^+) = 26.4$ pm

84. Which among the following electronic configurations belong to main group elements?

A.　$[Ne]3s^1$　　　B.　$[Ar]3d^34s^2$

C.　$[Kr]4d^{10}5s^25p^5$　　D.　$[Ar]3d^{10}4s^1$

E.　$[Rn]5f^06d^27s^2$
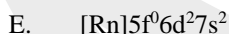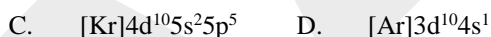
Choose the correct answer from the option given below:

(1)　A, C and D only

(2)　B and E only

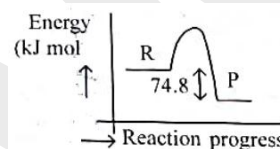**(3)**　**A and C only**

(4)　D and E only

85. $C(s) \rightarrow 2H_2(g) \rightarrow CH_4(g);\ \Delta H = -74.8\,kJ\ mol^{-1}$

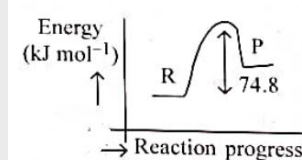Which of the following diagram gives an accurate representation of the above reaction?

[R $\rightarrow$ reactants: P $\rightarrow$ products]
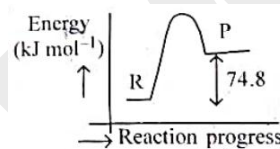
(1)

(2)

(3)
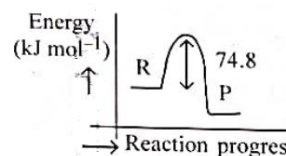
(4)

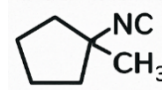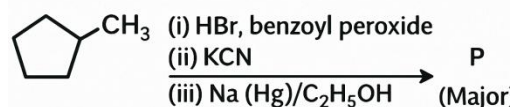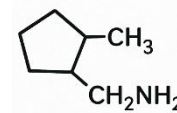**86.** Predict the major product 'P' in the following sequence of reactions –
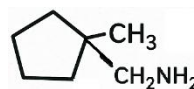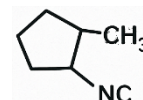
(i) HBr, benzoyl peroxide
(ii) KCN
(iii) Na (Hg)/C_2H_5OH → P (Major)

(1)　NC, CH₃ on cyclopentane

(2)　CH₃, CH₂NH₂ on cyclopentane

(3)　CH₃, CH₂NH₂ on cyclopentane

(4)　CH₃, NC on cyclopentane

87. Identify the correct orders against the property mentioned:
    A. $H_2O > NH_3 > CHCl_3$ – dipole moment
    B. $XeF_4 > XeO_3 > XeF_2$ – number of lone pairs onentral atom
    C. O–H > C–H > N–O – bond length
    D. $N_2 > O_2 > H_2$ – bond enthalpy
    Choose the correct answer from the options given below:
    (1) B, C only
    (2) A, D only
    (3) B, D only
    (4) A, C only

88. Total number of possible isomers (both structural as well as stereoisomers) of cyclic ethers of molecular formula C_4H_8O is:
    (1) 11
    (2) 6
    (3) 8
    (4) 10

89. For the reaction $A(g) \rightleftharpoons 2B(g)$, the backward reaction rate constant is higher than the forward reaction rate constant by a factor of 2500, at 1000 K.
    [Given: R = 0.0831 L atm mol⁻¹ K⁻¹]
    K_p for the reaction at 1000 K is:
    (1) 0.021
    (2) 83.1
    (3) 2.077×10^{-5}
    (4) 0.033

90. 5 moles of liquid X and 10 moles of liquid Y make a solution having a vapour pressure of 70 torr. The vapour pressures of pure X and Y are 63 torr and 78 torr respectively. Which of the following is true regarding the described solution?
    (1) The solution has volume greater than the sum ofindividual volumes
    (2) The solution shows positive deviation
    (3) The solution shows negative deviation
    (4) The solution is ideal

Biology–I

91. Which of the following is the unit of productivity of anecosystem?
    (1) KCal m⁻² yr⁻¹
    (2) gm⁻²
    (3) KCal m⁻²
    (4) KCal m⁻³

92. The first menstruation is called:
    (1) Ovulation
    (2) Menopause
    (3) Menarche
    (4) Diapause

93. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
    Assertion (A): All vertebrates are chordates but all chordates are not vertebrates.
    Reason (R): The members of subphylum vertebrata possess notochord during the embryonic period; the notochord is replaced by a cartilaginous or bony vertebral column in adults.
    Choose the correct answer:
    (1) A is false but R is true
    (2) Both A and R are true and R is the correct explanation of A
    (3) Both A and R are true but R is not the correct explanation of A
    (4) A is true but R is false

94. Genes R and Y follow independent assortment. If RRYY produce round yellow seeds and rryy produce wrinkled green seeds, what will be the phenotypic ratio of the F_2 generation?
    (1) 9 : 7
    (2) 1 : 2 : 1
    (3) 3 : 1
    (4) 9 : 3 : 3 : 1

95. Given below are two statements:

Statement I: The DNA fragments extracted from gel electrophoresis can be used in construction of recombinant DNA.

Statement II: Smaller-size DNA fragments are observed near anode while larger fragments are found near the wells in an agarose gel.

Choose the most appropriate answer:

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

(2) Both Statement I and Statement II are correct

(3) Both Statement I and Statement II are incorrect

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

96. What is the main function of the spindle fibers during mitosis?

(1) To regulate cell growth

(2) To separate the chromosomes

(3) To synthesize new DNA

(4) To repair damaged DNA

97. How many meiotic and mitotic divisions need to occur for the development of a mature female gametophyte from the megaspore mother cell in an angiosperm plant?

(1) No meiosis and 2 mitosis

(2) 2 meiosis and 3 mitosis

(3) 1 meiosis and 2 mitosis

(4) 1 meiosis and 3 mitosis

98. Identify the statement that is NOT correct.

(1) Constant region of heavy and light chains are located at C-terminus of antibody molecules

(2) Each antibody has two light and two heavy chains

(3) The heavy and light chains are held together by disulfide bonds

(4) Antigen binding site is located at C-terminal region of antibody molecules

99. Consider the following:

A. The reductive division for the human female gametogenesis starts earlier than that of the male gametogenesis.

B. The gap between the first meiotic division and the second meiotic division is much shorter for males compared to females.

C. The first polar body is associated with the formation of the primary oocyte.

D. Luteinizing Hormone (LH) surge leads to disintegration of the endometrium and onset of menstrual bleeding.

Choose the correct answer:

(1) B and C are true

(2) A and B are true

(3) A and C are true

(4) B and D are true

100. Given below are two statements:

Assertion (A): Cells of the tapetum possess dense cytoplasm and generally have more than one nucleus.

Reason (R): Presence of more than one nucleus in the tapetum increases the efficiency of nourishing the developing microspore mother cells.

Choose the most appropriate answer:

(1) A is false but R is true

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

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

(4) A is true but R is false

101. The blue and white selectable markers have been developed which differentiate recombinant colonies from non-recombinant colonies on the basis of their ability to produce colour in the presence of a chromogenic substrate.

Given below are two statements about this method:

Statement I: The blue coloured colonies have DNA insert in the plasmid and they are identified as recombinant colonies.

Statement II: The colonies without blue colour have DNA insert in the plasmid and are identified as recombinant colonies.

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

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

(2) Both Statement I and Statement II are correct

(3) Both Statement I and Statement II are incorrect

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

102. In bryophytes, the gemmae help in which one of the following?

(1) Gaseous exchange (2) Sexual reproduction

(3) Asexual reproduction

(4) Nutrient absorption

103. Match List I with List II.

List I	List II
A. Adenosine	I. Nitrogen base
B. Adenylic acid	II. Nucleotide
C. Adenine	III. Nucleoside
D. Alanine	IV. Amino acid

Choose the option with all correct matches:

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

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

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

(4) A-III, B-I, C-I, D-IV

104. With the help of given pedigree, find out the probability for the birth of a child having no disease and being a carrier (has the disease mutation in one allele of the gene) in F_3 generation.
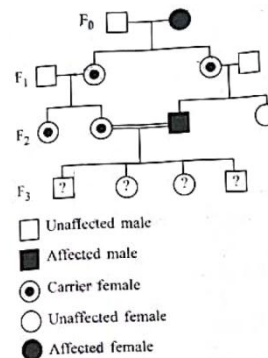
□ Unaffected male
■ Affected male
⊙ Carrier female
○ Unaffected female
● Affected female

(1) Zero **(2) 1/4**

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

105. Consider the following statements regarding function of adrenal medullary hormones:

A. It causes pupillary constriction

B. It is a hyperglycemic hormone

C. It causes piloerection

D. It increases strength of heart contraction

Choose the **correct** answer from the options given below:

(1) D only   (2) C and D only

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

106. Which of the following is an example of a zygomorphic flower?

(1) Chilli   (2) Petunia

(3) Datura   **(4) Pea**

107. Who proposed that the genetic code for amino acids should be made up of three nucleotides?

(1) Franklin Stahl   **(2) George Gamow**

(3) Francis Crick   (4) Jacque Monod

108. Given below are two statements:

Statement I: In ecosystem, there is unidirectional flow of energy of sun from producers to consumers.

Statement II: Ecosystems are exempted from 2nd law of thermodynamics.

Choose the **most appropriate** answer from the options given below:

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

(2) Both Statement I and Statement II are correct

(3) Both Statement I and Statement II are incorrect

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

109. Sweet potato and potato represent a certain type of evolution. Select the correct combination of terms to explain the evolution.

(1) Analogy, divergent

(2) Analogy, convergent

(3) Homology, divergent

(4) Homology, convergent

110. All living members of the class Cyclostomata are:

(1) Ectoparasite

(2) Free living

(3) Endoparasite

(4) Symbiotic

111. Histones are enriched with:

(1) Phenylalanine & Arginine

(2) Lysine & Arginine

(3) Leucine & Lysine

(4) Phenylalanine & Leucine

112. Which one of the following equations represents the Verhulst-Pearl Logistic Growth of population?

(1) $dN/dt = N[(r – K)/K]$

(2) $dN/dt = r[(K–N)/K]$

(3) $dN/dt = rN[(K–N)/K]$

(4) $dN/dt = rN[(N – K)/N]$

113. Assertion (A): The primary function of the Golgi apparatus is to package the materials made by the endoplasmic reticulum and deliver it to intracellular targets and outside the cell.

Reason (R): Vesicles containing materials made by the endoplasmic reticulum fuse with the cis face of the Golgi apparatus, and they are modified and released from the trans face of the Golgi apparatus.

Choose the correct answer:

(1) A is false but R is true

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

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

(4) A is true but R is false

114. Which of the following statements about RuBisCO is true?

(1) It catalyzes the carboxylation of RuBP

(2) It is active only in the dark

(3) It has higher affinity for oxygen than carbon dioxide

(4) It is an enzyme involved in the photolysis of water

115. Match List I with List II.

A. Progesterone   I. Pars intermedia

B. Relaxin   II. Ovary

C. Melanocyte   III. Adrenal Medulla
   stimulating hormone

D. Catecholamines   IV. Corpus luteum

Choose the correct answer:

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

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

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

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

116. The protein portion of an enzyme is called:

(1) Prosthetic group

(2) Cofactor

(3) Coenzyme

(4) Apoenzyme

117. Which of the following enzyme(s) are NOT essential for gene cloning?

A. Restriction enzymes

B. DNA ligase

C. DNA mutase

D. DNA recombinase

E. DNA polymerase

Choose the correct answer:

(1) B and C only   **(2) C and D only**

(3) A and B only   (4) D and E only

118. Which of the following type of immunity is present at the time of birth and is a non-specific type of defense in the human body?

(1) Humoral Immunity

(2) Acquired Immunity

(3) Innate Immunity

(4) Cell-mediated Immunity

119. Which factor is important for termination of transcription?

(1) γ (gamma)   (2) α (alpha)

(3) σ (sigma)   **(4) ρ (rho)**

120. Which of the following hormones released from the pituitary is actually synthesized in the hypothalamus?

(1) ACTH   (2) LH

(3) ADH   (4) FSH

121. Which of the following microbes is NOT involved in the preparation of household products?

A. Aspergillusniger

B. Lactobacillus

C. Trichodermapolysporum

D. Saccharomyces cerevisiae

E. Propionibacteriumshermanii

Choose the correct answer:

(1) C and E only   (2) A and B only

(3) A and C only   (4) C and D only

122. Statement I: Fig fruit is a non-vegetarian fruit as it has enclosed fig wasps in it.

Statement II: Fig wasp and fig tree exhibit mutual relationship as fig wasp completes its life cycle in fig fruit and fig fruit gets pollinated by fig wasp.

Choose the most appropriate answer:

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

(2) Both Statement I and Statement II are correct

(3) Both Statement I and Statement II are incorrect

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

123. Role of the water vascular system in echinoderms is:

A. Respiration and locomotion

B. Excretion and locomotion

C. Capture and transport of food

D. Digestion and respiration

E. Digestion and excretion

Choose the correct answer:

(1) B, D and E only   (2) A and B only

(3) A and C only   (4) B and C only

124. After maturation in primary lymphoid organs, the lymphocytes migrate for interaction with antigens to secondary lymphoid organs:

A. Thymus   B. Bone marrow

C. Spleen   D. Lymph nodes

E. Peyer's patches

Choose the correct answer:

(1) C, D, E only   (2) B, C, D only

(3) A, B, C only   (4) E, A, B only

125. Match List I with List II:

List I:	List II:
A. The Evil Quartet	I. Cryopreservation
B. Ex situ conservation	II. Alien species invasion
C. Lantana camara	III. Causes of biodiversity losses
D. Dodo	IV. Extinction

Choose the option with all correct matches:

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

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

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

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

126. Read the following statements on plant growth and development:

A. Parthenocarpy can be induced by auxins.

B. Plant growth regulators can be involved in promotion as well as inhibition of growth.

C. Dedifferentiation is a pre-requisite for redifferentiation.

D. Abscisic acid is a plant growth promoter.

E. Apical dominance promotes the growth of lateral buds.

Choose the option with all correct statements:

(1) B, D, E only

(2) A, B, C only

(3) A, C, E only

(4) A, D, E only

127. Match List I with List II:

List I:	List II:
A. Pteridophyte	I. Salvia
B. Bryophyte	II. Ginkgo
C. Angiosperm	III. Polytrichum
D. Gymnosperm	IV. Salvinia

Choose the option with all correct matches:

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

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

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

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

128. Why can't insulin be given orally to diabetic patients?

(1) Its bioavailability will be increased

(2) Human body will elicit strong immune response

(3) It will be digested in Gastro-Intestinal (GI) tract

(4) Because of structural variation

129. Which one of the following is the characteristic feature of gymnosperms?

(1) Gymnosperms have flowers for reproduction

(2) Seeds are enclosed in fruits

(3) Seeds are naked

(4) Seeds are absent

130. Frogs respire in water by skin and buccal cavity and on land by skin, buccal cavity and lungs.

Choose the correct answer:

(1) The statement is false for both the environment

(2) The statement is true for water but false for land

(3) The statement is true for both the environment

(4) The statement is false for water but true for land

131. Silencing of specific mRNA is possible via RNAi because of -

(1) Non-complementary ssRNA

(2) Complementary dsRNA

(3) Inhibitory ssRNA

(4) Complementary tRNA

132. Twins are born to a family that lives next door to you. The twins are a boy and a girl. Which of the following must be true?

(1) They have 75% identical genetic content

(2) They are monozygotic twins

(3) They are fraternal twins

(4) They were conceived through in vitro fertilization

133. Match List I with List II:

List I:		List II:
A. Scutellum	I.	Persistent nucellus
B. Non-albuminous seed	II.	Cotyledon of Monocot seed
C. Epiblast	III.	Groundnut
D. Perisperm	IV.	Rudimentary cotyledon

Choose the option with all correct matches:

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

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

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

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

134. In frog, the renal portal system is a special venous connection that acts to link:

(1) Kidney and lower part of body

(2) Liver and intestine

(3) Liver and kidney

(4) Kidney and intestine

135. Match List I with List II:

List I:	List II:
A. Heart	I. Erythropoietin
B. Kidney	II. Aldosterone
C. Gastro-intestinal tract	III. Atrial natriuretic factor
D. Adrenal Cortex	IV. Secretin

Choose the correct answer:

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

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

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

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

136. Cardiac activities of the heart are regulated by:

A. Nodal tissue

B. A special neural centre in the medulla oblongata

C. Adrenal medullary hormones

D. Adrenal cortical hormones

Choose the correct answer:

(1) A, B and D only

(2) A, B and C only

(3) A, B, C and D

(4) A, C and D only

137. Streptokinase produced by *bacterium Streptococcus* is used for:

(1) **Removing clots from blood vessels**

(2) Curd production

(3) Ethanol production

(4) Liver disease treatment

138. Who is known as the father of Ecology in India?

(1) BirbalSahni

(2) S. R. Kashyap

(3) **RamdeoMisra**

(4) Ram Udar

139. Assertion (A): A typical unfertilised, angiosperm embryo sac at maturity is 8 nucleate and 7-celled.

Reason (R): The egg apparatus has 2 polar nuclei.

Choose the correct answer:

(1) A is false but R is true

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

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

(4) **A is true but R is false**

140. Neoplastic characteristics of cells refer to:

A. A mass of proliferating cell

B. Rapid growth of cells

C. Invasion and damage to surrounding tissue

D. Those confined to original location

Choose the correct answer:

(1) B, C, D only

(2) A, B only

(3) **A, B, C only**

(4) A, B, D only

141. Given below are the stages in the life cycle of pteridophytes. Arrange the following stages in the correct sequence:

A. Prothallus stage

B. Meiosis in spore mother cells

C. Fertilisation

D. Formation of archegonia and antheridia in gametophyte

E. Transfer of antherozoids to the archegonia in presence of water

Choose the correct answer:

(1) E, D, C, B, A

(2) **B, A, D, E, C**

(3) B, A, E, C, D

(4) D, E, C, A, B

142. Assertion (A): Both wind and water pollinated flowers are not very colourful and do not produce nectar.

Reason (R): The flowers produce enormous amount of pollen grains in wind and water pollinated flowers.

Choose the correct answer:

(1) A is false but R is true

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

(3) **Both A and R are true but R is NOT the correct explanation of A**

(4) A is true but R is false

143. Which one of the following enzymes contains 'Haem' as the prosthetic group?

(1) Catalase

(2) RuBisCO

(3) Carbonic anhydrase

(4) Succinate dehydrogenase

144. Match List I with List II:

List I:	List II:
A. Emphysema	I. Rapid spasms in muscle due to low Ca++ in body fluid
B. Angina Pectoris	II. Damaged alveolar walls and decreased respiratory surface
C. lomerulonephritis	III. Acute chest pain when not enough oxygen is reaching to heart muscle
D. Tetany	IV. Inflammation of glomeruli of kidney

Choose the correct answer:

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

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

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

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

145. Find the statement that is NOT correct with regard to the structure of monocot stem.

(1) Phloem parenchyma is absent.

(2) Hypodermis is parenchymatous.

(3) Vascular bundles are scattered.

(4) Vascular bundles are conjoint and closed.

146. Which of the following statement is correct about location of the male frog copulatory pad?

(1) First digit of the fore limb

(2) First and second digit of fore limb

(3) First digit of hind limb

(4) Second digit of fore limb

147. Statement I: The primary source of energy in an ecosystem is solar energy.

Statement II: The rate of production of organic matter during photosynthesis in an ecosystem is called net primary productivity (NPP).

Choose the most appropriate answer:

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

(2) Both Statement I and Statement II are correct

(3) Both Statement I and Statement II are incorrect

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

148. Identify the part of a bioreactor which is used as a foam breaker from the given figure.
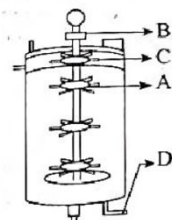
(1) C (2) A

(3) B (4) D

149. Polymerase chain reaction (PCR) amplifies DNA following the equation:

(1) $2N^2$ (2) N^2

(3) 2n (4) $2n + 1$

150. Match List I with List II:

List I:	List II:
A. Head	I. Enzymes
B. Middle piece	II. Sperm motility
C. Acrosome	III. Energy
D. Tail	IV. Genetic material

Choose the correct answer:

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

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

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

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

151. Statement I: In a floral formula $\oplus$ stands for zygomorphic nature of the flower, and G stands for inferior ovary.

Statement II: In a floral formula $\oplus$ stands for actinomorphic nature of the flower and G stands for superior ovary.

Choose the correct answer:

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

(2) Both Statement I and Statement II are correct

(3) Both Statement I and Statement II are incorrect

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

152. From the statements given below choose the correct option:

A. The eukaryotic ribosomes are 80S and prokaryotic ribosomes are 70S.

B. Each ribosome has two sub-units.

C. The two sub-units of 80S ribosome are 60S and 40S while that of 70S are 50S and 30S.

D. The two sub-units of 80S ribosome are 60S and 20S and that of 70S are 50S and 20S.

E. The two sub-units of 80S are 60S and 30S and that of 70S are 50S and 30S.

Choose the correct answer:

(1) B, D, E are true

(2) A, B, C are true

(3) A, B, D are true

(4) A, B, E are true

153. Each of the following characteristics represent a Kingdom proposed by Whittaker. Arrange the following in increasing order of complexity of body organization.

A. Multicellular heterotrophs with cell wall made of chitin.

B. Heterotrophs with tissue/organ/organ system level of body organization.

C. Prokaryotes with cell wall made of polysaccharides and amino acids.

D. Eukaryotic autotrophs with tissue/organ level of body organization.

E. Eukaryotes with cellular body organization.

Choose the correct answer:

(1) C, E, A, B, D

(2) A, C, E, B, D

(3) C, E, A, D, B

(4) A, C, E, D, B

154. The correct sequence of events in the life cycle of bryophytes is:

A. Fusion of antherozoid with egg

B. Attachment of gametophyte to substratum

C. Reduction division to produce haploid spores

D. Formation of sporophyte

E. Release of antherozoids into water

Choose the correct answer:

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

(3) B, E, A, C, D   **(4) B, E, A, D, C**

155. Which are correct:

A. Computed tomography and magnetic resonance imaging detect cancers of internal organs.

B. Chemotherapeutics drugs are used to kill non-cancerous cells.

C. α-interferon activate the cancer patients' immune system and helps in destroying the tumour.

D. Chemotherapeutic drugs are biological response modifiers.

E. In the case of leukaemia blood cell counts are decreased.

Choose the correct answer:

(1) A and C only

(2) B and D only

(3) D and E only

(4) C and D only

156. Name the class of enzyme that usually catalyze the following reaction:

$$S\text{-}G + S^{\#} \rightarrow S + S^{\#}\text{-}G$$
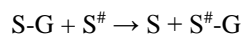
Where $G \rightarrow$ a group other than hydrogen, $S \rightarrow$ a substrate, $S^{\#} \rightarrow$ another substrate.

(1) Ligase

(2) Hydrolase

(3) Lyase

(4) Transferase

157. Find the correct statements:

    A. In human pregnancy, the major organ systems are formed at the end of 12 weeks.

    B. In human pregnancy the major organ systems are formed at the end of 8 weeks.

    C. In human pregnancy heart is formed after one month of gestation.

    D. In human pregnancy, limbs and digits develop by the end of second month.

    E. In human pregnancy the appearance of hair is usually observed in the fifth month.

    Choose the correct answer:

    (1) A, C, D and E only

    (2) A and E only

    (3) B and C only

    (4) B, C, D and E only

158. Which of the following is an example of non-distilled alcoholic beverage produced by yeast?

    (1) Rum

    (2) Whisky

    (3) Brandy

    (4) Beer

159. **Statement I:** In the RNA world, RNA is considered the first genetic material evolved to carry out essential life processes. RNA acts as a genetic material and also as a catalyst for some important biochemical reactions in living systems. Being reactive, RNA is unstable.

    Statement II: DNA evolved from RNA and is a more stable genetic material. Its double helical strands being complementary, resist changes by evolving repairing mechanism.

    Choose the most appropriate answer:

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

    (2) Both statement I and statement II are correct

    (3) Both statement I and statement II are incorrect

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

160. Statement I: Transfer RNAs and ribosomal RNA do not interact with mRNA.

    Statement II: RNA interference (RNAi) takes place in all eukaryotic organisms as a method of cellular defence.

    Choose the most appropriate answer:

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

    (2) Both statement I and statement II are correct

    (3) Both statement I and statement II are incorrect

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

161. Which of the following diagrams is correct with regard to the proximal (P) and distal (D) tubule of the Nephron?

(1)

(2)

(3)

(4)
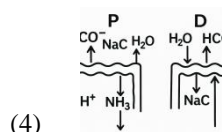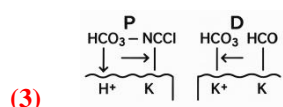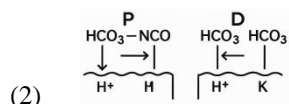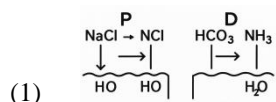
162. What is the pattern of inheritance for polygenic trait?

(1) X-linked recessive inheritance pattern

(2) Mendelian inheritance pattern

(3) Non-mendelian inheritance pattern

(4) Autosomal dominant pattern

163. In the seeds of cereals, the outer covering of endosperm separates the embryo by a protein-rich layer called:

(1) Aleurone layer

(2) Coleoptile

(3) Coleorhiza

(4) Integument

164. Match List I with List II:

List I:	List II:
A. Chlorophyll a	I. Yellow-green
B. Chlorophyll b	II. Yellow
C. Xanthophylls	III. Blue-green
D. Carotenoids	IV. Yellow to Yellow-orange

Choose the option with all correct matches:

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

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

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

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

165. Which of the following genetically engineered organisms was used by Eli Lilly to prepare human insulin?

(1) Phage   **(2) Bacterium**

(3) Yeast   (4) Virus

166. Which of the following are the post-transcriptional events in an eukaryotic cell?

A. Transport of pre-mRNA to cytoplasm prior to splicing

B. Removal of introns and joining of exons

C. Addition of methyl group at 5' end of hnRNA

D. Addition of adenine residues at 3' end of hnRNA

E. Base pairing of two complementary RNAs

Choose the correct answer:

(1) C, D, E only   (2) A, B, C only

(3) B, C, D only   (4) B, C, E only

167. Match List I with List II:

List I: List II:

A. Centromere   I. Mitochondrion

B. Cilium   II. Cell division

C. Cristae   III. Cell movement

D. Cell membrane   IV. Phospholipid bilayer

Choose the correct answer:

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

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

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

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

168. Match List I with List II:

List I:		List II:	
A.	Alfred Hershey and Martha Chase	I.	Streptococcus pneumoniae
B.	Euchromatin	II.	Densely packed and dark-stained
C.	Frederick Griffith	III.	Loosely packed and light-stained
D.	Heterochromatin	IV.	DNA as genetic material confirmation

Choose the correct answer:

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

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

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

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

169. Which chromosome in the human genome has the highest number of genes?

(1)   Chromosome 10

(2)   Chromosome X

(3)   Chromosome Y

(4)   Chromosome 1

170. What are the potential drawbacks in adoption of the IVF method?

A. High fatality risk to mother

B. Expensive instruments and reagents

C. Husband/wife necessary for being donors

D. Less adoption of orphans

E. Not available in India

F. Possibility that the early embryo does not survive

Choose the correct answer:

(1)   A, B, C, E, F only

(2)   B, D, F only

(3)   A, C, D, F only

(4)   A, B, C, D only

171. Which one of the following is an example of ex-situ conservation?

(1)   Protected areas

(2)   National Park

(3)   Wildlife Sanctuary

(4)   Zoos and botanical gardens

172. A specialised membranous structure in a prokaryotic cell which helps in cell wall formation, DNA replication and respiration is:

(1) Endoplasmic Reticulum

(2) Mesosome

(3) Chromatophores

(4) Cristae

173. In the above represented plasmid an alien piece of DNA is inserted at EcoRI site. Which of the following strategies will be chosen to select the recombinant colonies?
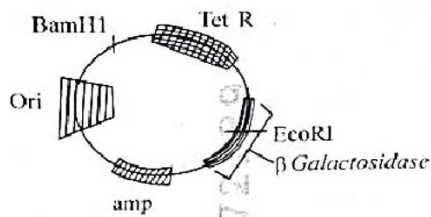
(1) Blue color colonies grown on ampicillin plates can be selected.

(2) Using ampicillin &tetracyclin containing medium plate

(3) Blue color colonies will be selected.

(4) White color colonies will be selected.

174. What is the name of the blood vessel that carries deoxygenated blood from the body to the heart in a frog?

(1) Vena cava

(2) Aorta

(3) Pulmonary artery

(4) Pulmonary vein

175. Which of the following organisms cannot fix nitrogen?

A. Azotobacter   B. Oscillatoria

C. Anabaena   D. Volvox

E. Nostoc

Choose the correct answer:

(1) E only   (2) A only

(3) D only   (4) B only

176. While trying to find out the characteristic of a newly found animal, a researcher did the histology of adult animal and observed a cavity with presence of mesodermal tissue towards the body wall but no mesodermal tissue was observed towards the alimentary canal. What could be the possible coelome of that animal?

(1) Spongocoelomate

(2) Acoelomate

(3) Pseudocoelomate

(4) Schizocoelomate

177. Which one of the following statements refers to Reductionist Biology?

(1) Behavioural approach to study and understand living organisms

(2) Physico-chemical approach to study and understand living organisms

(3) Physiological approach to study and understand living organisms

(4) Chemical approach to study and understand living organisms

178. Epiphytes that are growing on a mango branch is an example of which of the following?

    (1) Amensalism   **(2) Commensalism**

    (3) Mutualism   (4) Predation

179. Which one of the following phytohormones promotes nutrient mobilization which helps in the delay of leaf senescence in plants?

    (1) Cytokinin   (2) Ethylene

    (3) Abscisic acid   (4) Gibberellin

180. The complex II of mitochondrial electron transport chain is also known as:

    (1) NADH dehydrogenase

    (2) Cytochrome bc_1

    (3) Succinate dehydrogenase

    (4) Cytochrome c oxidase