VMC MEDICAL

Paper Code

M5

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Maximum Marks: 720 **Time : 3 Hours**

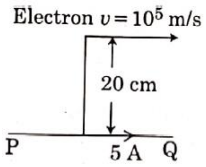
NEET (UG) – 2021

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 OFFICE Copy carefully with **blue/black** ball point pen only.
2. The test is of **3 hours duration** and the Test Booklet contains **200** multiple-choice questions (four options with a single correct answer) from **Physics, Chemistry and Biology (Botany and Zoology)**. **50** questions in each subject are divided into **two Sections (A and B)** as per details given below:
   (a) **Section A** shall consist of **35 (Thirty-five)** Questions in each subject (**Question Nos** - 1 to 35, 51 to 85, 101 to 135 and 151 to 185). All questions are compulsory.
   (b) **Section B** shall consist of **15 (Fifteen)** questions in each subject (**Question Nos** - 36 to 50,86 to 100, 136 to 150 and 186 to 200). In **Section B**, a candidate needs to **attempt any 10 (Ten)** questions out of 15 (Fifteen) in each subject.
   Candidates are advised to read all 15 questions in each subject of Section B before they start attempting the question paper. In the event of a candidate attempting more than ten questions, **the first ten questions answered by the candidate shall be evaluated**.
3. 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 scores. **The maximum marks are 720**.
4. Use **Blue/Black Ball Point Pen only** for writing particulars on this page/marking responses on Answer sheet.
5. Rough work is to be done in the space provided for this purpose in the Test Booklet only.
6. 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 this Test Booklet with them.
7. **The CODE for this Booklet is M5. Make sure that the CODE printed on the Original Copy of the Answer Sheet is the same as that on this Test Booklet**. In case of discrepancy, the candidate should immediately report the matter to the Invigilator for replacement of both the Test Booklet and the Answer Sheet.
8. 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.
9. Use of white fluid for correction is **NOT** permissible on the Answer Sheet.
10. Each candidate must show on-demand his/her Admit Card to the Invigilator.
11. No candidate, without special permission of the centre Superintendent or Invigilator, would leave his/her seat.
12. 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 not to have handed over the Answer Sheet and dealt with as an Unfair Means case**.
13. Use of Electronic/Manual Calculator is prohibited.
14. 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.
15. **No part of the Test Booklet and Answer Sheet shall be detached under any circumstances.**
16. The candidates will write the Correct Test Booklet Code as given in the Test Booklet/Answer Sheet in the Attendance sheet.

SECTION - A (PHYSICS)

1. An infinitely long straight conductor carries a current of 5 A as shown. An electron is moving with a speed of 10^5 m/s parallel to the conductor. The perpendicular distance between the electron and the conductor is 20 cm at an instant. Calculate the magnitude of the force experienced by the electron at that instant.



(1) 4×10^{-20} N **(2)** $8\pi\times10^{-20}$ N **(3)** $4\pi\times10^{-20}$ N **(4)** 8×10^{-20} N

2. A body is executing simple harmonic motion with frequency 'n', the frequency of its potential energy is:

(1) n **(2)** 2n **(3)** 3n **(4)** 4n

3. A radioactive nucleus ${}^{A}_{Z}X$ undergoes spontaneous decay in the sequence

${}^{A}_{Z}X \rightarrow {}_{Z-1}B \rightarrow {}_{Z-3}C \rightarrow {}_{Z-2}D$, where Z is the atomic number of element X. The possible decay particles in the sequence are:

(1) α, β^-, β^+ **(2)** α, β^+, β^- **(3)** β^+, α, β^- **(4)** β^-, α, β^+

4. The escape velocity from the Earth's surface is v. The escape velocity from the surface of another planet having a radius, four times that of Earth and same mass density is:

(1) v **(2)** 2v **(3)** 3v **(4)** 4v

5. The half-life of a radioactive nuclide is 100 hours. The fraction of original activity that will remain after 150 hours would be:

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

6. A convex lens 'A' of focal length 20 cm and a concave lens 'B' of focal length 5 cm are kept along the same axis with a distance 'd' between them. If a parallel beam of light falling on 'A' leaves 'B' as a parallel beam, then the distance 'd' in cm will be:

(1) 25 **(2)** 15 **(3)** 50 **(4)** 30

7. A capacitor of capacitance 'C' is connected across an ac source of voltage V, given by

$V = V_0 \sin\omega t$

The displacement current between the plates of the capacitor, would then be given by:

(1) $I_d = V_0\omega C\cos\omega t$ **(2)** $I_d = \frac{V_0}{\omega C}\cos\omega t$ **(3)** $I_d = \frac{V_0}{\omega C}\sin\omega t$ **(4)** $I_d = V_0\omega C\sin\omega t$

8. A small block slides down on a smooth inclined plane, starting from rest at time t = 0. Let S_n be the distance travelled by the block in the interval t = n-1 to t = n. Then, the ratio $\frac{S_n}{S_{n+1}}$ is:

(1) $\frac{2n-1}{2n}$ **(2)** $\frac{2n-1}{2n+1}$ **(3)** $\frac{2n+1}{2n-1}$ **(4)** $\frac{2n}{2n-1}$

9. A particle is released from height S from the surface of the Earth. At a certain height its kinetic energy is three times its potential energy. The height from the surface of earth and the speed of the particle at that instant are respectively:

(1) $\frac{S}{4}, \frac{3gS}{2}$ **(2)** $\frac{S}{4}, \frac{\sqrt{3gS}}{2}$ **(3)** $\frac{S}{2}, \frac{\sqrt{3gS}}{2}$ **(4)** $\frac{S}{4}, \sqrt{\frac{3gS}{2}}$

10. In a potentiometer circuit a cell of EMF 1.5 V gives balance point at 36 cm length of wire. If another cel) of EMF 2.5 V replaces the first cell, then at what length of the wire, the balance point occurs?

(1) 60 cm **(2)** 21.6 cm **(3)** 64 cm **(4)** 62 cm

11. For a plane electromagnetic wave propagating in x-direction, which one of the following combination gives the correct possible directions for electric field (E) and magnetic field (B) respectively?

(1) $\hat{j}+\hat{k},\hat{j}+\hat{k}$ **(2)** $-\hat{j}+\hat{k},-\hat{j}-\hat{k}$ **(3)** $\hat{j}+\hat{k},-\hat{j}-\hat{k}$ **(4)** $-\hat{j}+\hat{k},-\hat{j}+\hat{k}$

12. Polar molecules are the molecules:

(1) Having zero dipole moment.

(2) Acquire a dipole moment only in the presence of electric field due to displacement of charges.

(3) Acquire a dipole moment only when magnetic field is absent.

(4) Having a permanent electric dipole moment.

13. The velocity of a small ball of mass M and density d, when dropped in a container filled with glycerine becomes constant after some time. If the density of glycerine is $\frac{d}{2}$, then the viscous force acting on 2 the ball will be:

(1) $\frac{Mg}{2}$ **(2)** Mg **(3)** $\frac{3}{2}Mg$ **(4)** 2Mg

14. Match Column -I and Column - II and choose the correct match from the given choices.

	Column-I		**Column-II**
(A)	Root mean square speed of gas molecules	(P)	$\frac{1}{3}nmv^{-2}$
(B)	Pressure exerted by ideal gas	(Q)	$\sqrt{\frac{3RT}{M}}$
(C)	Average kinetic energy of a molecule	(R)	$\frac{5}{2}RT$
(D)	Total internal energy of 1 mole of a diatomic gas	(S)	$\frac{3}{2}k_BT$

(1) (A) -(R), (B)-(P), (C)-(S), (D)-(Q) **(2)** (A)-(Q), (R)-(R), (C)-(S), (D)-(P)

(3) (A)-(Q), (B)-(P), (C)-(S), (D)-(R) **(4)** (A)-(R), (B)-(Q), (C)-(P), (D)-(S)

15. Water falls from a height of 60 m at the rate of 15 kg/s to operate a turbine. The losses due to frictional force are 10% of the input energy. How-much power is generated by the turbine? ($g=10m/s^2$)

(1) 10.2 kW **(2)** 8.1 kW **(3)** 12.3 kW **(4)** 7.0 kW

16. A lens of large focal length and large aperture is best suited as an objective of an astronomical telescope since:

(1) A large aperture contributes to the quality and visibility of the images.

(2) A large area of the objective ensures better light gathering power.

(3) A large aperture provides a better resolution.

(4) All of the above.

17. The electron concentration in an n-type semiconductor is the same as hole concentration in a p-type semiconductor. An external field (electric) is applied across each of them. Compare the currents in them.

(1) Current in n-type = current in p-type.

(2) Current in p-type > current in n-type.

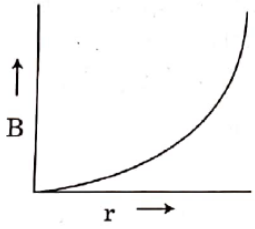
(3) Current in n-type > current in p-type.

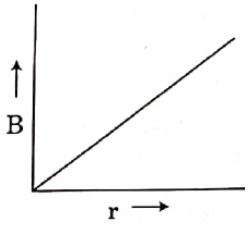
(4) No current will flow in p-type, current will only flow in n-type.

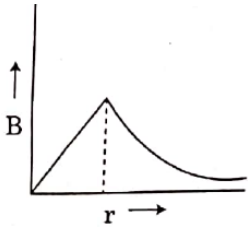
18. A nucleus with mass number 240 breaks into two fragments each of mass number 120, the binding energy per nucleon of unfragmented nuclei is 7.6 MeV while that of fragments is 8.5 MeV. The total gain in the Binding Energy in the process is:

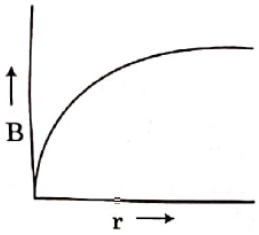
(1) 0.9 MeV **(2)** 9.4 MeV **(3)** 804 MeV **(4)** 216 MeV

19. A thick current carrying cable of radius 'R' carries current 'I' uniformly distributed across its cross-section. The variation of magnetic-field B(r) due to the cable with the distance 'r' from the axis of the cable is represented by:

(1) 

(2) 

(3) 

(4) 

20. Two charged spherical conductors of radius R_1 and R_2 are connected by a wire. Then the ratio of surface charge densities of the spheres (σ_1 / σ_2) is:

(1) $\frac{R_1}{R_2}$ **(2)** $\frac{R_2}{R_1}$ **(3)** $\sqrt{\left(\frac{R_1}{R_2}\right)}$ **(4)** $\frac{R_1^2}{R_2^2}$

21. If E and G respectively denotes energy and gravitational constant, then $\frac{E}{G}$ has the dimensions of:

(1) $\left[M^2\right]\left[L^{-1}\right]\left[T^{\circ}\right]$ **(2)** $\left[M\right]\left[L^{-1}\right]\left[T^{-1}\right]$ **(3)** $\left[M\right]\left[L^{\circ}\right]\left[T^{\circ}\right]$ **(4)** $\left[M^2\right]\left[L^{-2}\right]\left[T^{-1}\right]$

22. A spring is stretched by 5 cm by a force ION. The time period of the oscillations when a mass of 2 kg is suspended by it is:

(1) 0.0628 s **(2)** 6.28 s **(3)** 3.14 s **(4)** 0.628 s

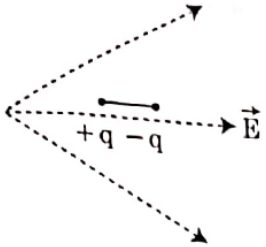
23. Column -I gives certain physical terms associated with flow of current through a metallic conductor. Column - II gives some mathematical relations involving electrical quantities. Match Column - I and Column - II with appropriate relations.

	Column-I		**Column-II**
(A)	Drift Velocity	(P)	$\frac{m}{ne^2\rho}$
(B)	Electrical Resistivity	(Q)	nev_d
(C)	Relaxation Period	(R)	$\frac{eE}{m}\tau$
(D)	Current Density	(S)	$\frac{E}{J}$

(1) (A)-(R), (B)-(S), (C)-(P), (D)-(Q) **(2)** (A)-(R), (B)-(S), (C)-(Q),(D)-(P)

(3) (A)-(R), (B)-(P), (C)-(S), (D)-(Q) **(4)** (A)-(R), (B)-(Q), (C)-(S),(D)-(P)

24. A dipole is placed in an electric field ns shown. In which direction will it move?

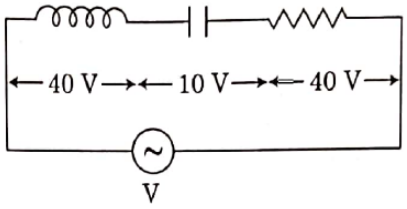


(1) towards the left as its potential energy will increase
(2) towards the right as its potential energy will decrease.
(3) towards the left as its potential energy will decrease.
(4) towards the right as its potential energy will increase.

25. Consider the following statements (A) and (B) and identify the correct answer.
(A) A zener diode is connected in reverse bias, when used as a voltage regulator.
(B) The potential barrier of p-n junction lies between 0.1 V to 0.3 V.
(1) (A) and (B) both are correct. **(2)** (A) and (B) both are incorrect.
(3) (A) is correct and (B) is incorrect. **(4)** (A) is incorrect but (B) is correct.

26. A screw gauge gives the following readings when used to measure the diameter of a wire
Main scale reading: 0 mm
Circular scale reading: 52 divisions
Given that 1 mm on main scale corresponds to 100 divisions on the circular scale. The diameter of the wire from the above data is:
(1) 0.52 cm **(2)** 0.026 cm **(3)** 0.26 cm **(4)** 0.052 cm

27. An inductor of inductance L, a capacitor of capacitance C and a resistor of resistance 'R' are connected in series to an ac source of potential difference 'V volts as shown in figure.
Potential difference across L, C and R is 40 V, 10 V and 40 V, respectively. The amplitude of current flowing through LCR series circuit is $10\sqrt{2}$ A. The impedance of the circuit is:



(1) $4\sqrt{2}\,\Omega$ **(2)** $5/\sqrt{2}\,\Omega$ **(3)** 4Ω **(4)** 5Ω

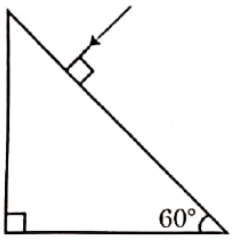
28. A parallel plate capacitor has a uniform electric field '$\vec{E}$' in the space between the plates. If the distance between the plates is 'd' and the area of each plate is 'A', the energy stored in the capacitor is: (ε_0 = permittivity of free space)

(1) $\frac{1}{2}\varepsilon_0 E^2$ **(2)** $\varepsilon_0 EAd$ **(3)** $\frac{1}{2}\varepsilon_0 E^2 Ad$ **(4)** $\frac{E^2 Ad}{\varepsilon_0}$

29. An electromagnetic wave of wavelength 'λ' is incident on a photosensitive surface of negligible work function. If 'm' mass is of photoelectron emitted from the surface has de-Broglie wavelength λ_d, then:

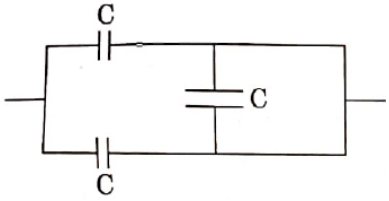
(1) $\lambda = \left(\frac{2m}{hc}\right)\lambda_d{}^2$ **(2)** $\lambda_d = \left(\frac{2mc}{h}\right)\lambda^2$ **(3)** $\lambda = \left(\frac{2mc}{h}\right)\lambda_d{}^2$ **(4)** $\lambda = \left(\frac{2h}{mc}\right)\lambda_d{}^2$

30. Find the value of the angle of emergence from the prism. Refractive index of the glass is $\sqrt{3}$.



(1) 60° **(2)** 30° **(3)** 45° **(4)** 90°

31. The equivalent capacitance of the combination shown in the figure is:



(1) 3C **(2)** 2C **(3)** C/2 **(4)** 3C/2

32. If force [F], acceleration [A] and time [T] are chosen as the fundamental physical quantities. Find the dimensions of energy.

(1) [F] [A] [T] **(2)** [F] [A] [T^2] **(3)** [F] [A] [T^{-1}] **(4)** [F] [A^{-1}] [T]

33. A cup of coffee cools from 90°C to 80°C in t minutes, when the room temperature is 20°C. The time taken by a similar cup of coffee to cool from 80°C to 60°C at a room temperature same at 20°C is:

(1) $\frac{13}{10}t$ **(2)** $\frac{13}{5}t$ **(3)** $\frac{10}{13}t$ **(4)** $\frac{5}{13}t$

34. The effective resistance of a parallel connection that consists of four wires of equal length, equal area of cross-section and same material is $0.25\ \Omega$. What will be the effective resistance if they are connected in series?

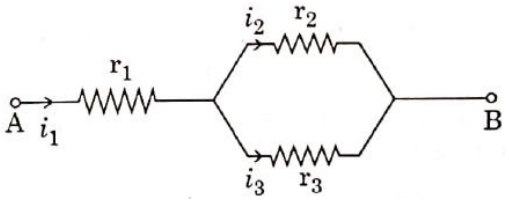
(1) 0.25Ω **(2)** 0.5Ω **(3)** 1Ω **(4)** 4Ω

35. The number of photons per second on an average emitted by the source of monochromatic light of wavelength 600 nm, when it delivers the power of 3.3×10^{-3} watt will be :($h = 6.6\times10^{-34}$ Js)

(1) 10^{18} **(2)** 10^{17} **(3)** 10^{16} **(4)** 10^{15}

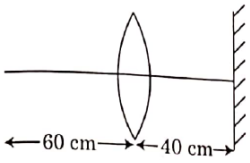
SECTION - B (PHYSICS)

36. Three resistors having resistances r_1, r_2 and r_3 are connected as shown in the given circuit. The ratio $\frac{i_3}{i_1}$ of currents in terms of resistances used in the circuit is:



(1) $\frac{r_1}{r_2 + r_3}$ **(2)** $\frac{r_2}{r_2 + r_3}$ **(3)** $\frac{r_1}{r_1 + r_2}$ **(4)** $\frac{r_2}{r_1 + r_3}$

37. A point object is placed at a distance of 60 cm from a convex lends of focal length 30 cm. If a plane mirror were put perpendicular to the principal axis of the lens and at a distance of 40 cm from it, the final image would be formed at a distance of:



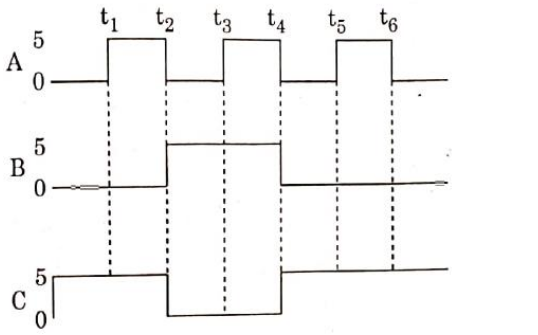
(1) 20 cm from the lens, it would be a real image.

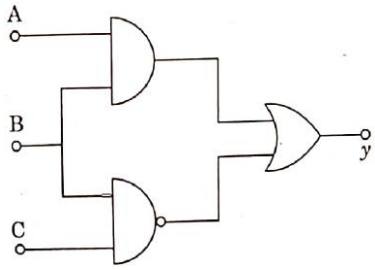
(2) 30 cm from the lens, it would be a real image.

(3) 30 cm from- the plane mirror, it would be a virtual image.

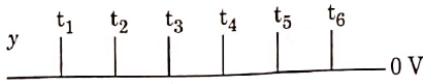
(4) 20 cm from the plane mirror, it would be a virtual image.

38. For the given circuit, the input digital signals are applied at the terminals A, B and C. What would be the output at the terminal y?





(1)



(2)

(3)

(4)

39. A step down transformer connected to an ac mains supply of 220 V is made to operate at 11 V, 44 W lamp. Ignoring power losses in the transformer, what is the current in the primary circuit?

(1) 0.2 A **(2)** 0.4 A **(3)** 2 A **(4)** 4A

40. A uniform conducting wire of length 12a and resistance 'R' is wound up as a current carrying coil in the shape of,

(i) an equilateral triangle of side 'a'. (ii) a square of side 'a'.

The magnetic dipole moments of the coil in each case respectively are:

(1) $\sqrt{3}Ia^2$ and $3Ia^2$ **(2)** $3Ia^2$ and Ia^2 **(3)** $3Ia^2$ and $4Ia^2$ **(4)** $4Ia^2$ and $3Ia^2$

41. In the product $\vec{F} = q(\vec{v} \times \vec{B}) = q\vec{v}(B\hat{i} + \vec{B}\hat{j} + B_0\hat{k})$ For q = 1and $\vec{v} = 2\hat{i} + 4\hat{j} + 6\hat{k}$ and $\vec{F} = 4\hat{i} - 20\hat{j} + 12\hat{k}$

What will be the complete expression for $\vec{B}$?

(1) $-8\hat{i} - 8\hat{j} - 6\hat{k}$ **(2)** $-6\hat{i} - 6\hat{j} - 8\hat{k}$ **(3)** $8\hat{i} + 8\hat{j} - 6\hat{k}$ **(4)** $6\hat{i} + 6\hat{j} - 8\hat{k}$

42. A particle moving in a circle of radius It with a uniform speed takes a time T to complete one revolution. If this particle were projected with the same speed at an angle ' θ ' to the horizontal, the maximum height attained by it equals 4R. The angle of projection. θ, is then given by:

(1) $\theta = \cos^{-1}\left(\frac{gT^2}{\pi^2 R}\right)^{1/2}$ **(2)** $\theta = \cos^{-1}\left(\frac{\pi^2 R}{gT^2}\right)^{1/2}$

(3) $\theta = \sin^{-1}\left(\frac{\pi^2 R}{gT^2}\right)^{1/2}$ **(4)** $\theta = \sin^{-1}\left(\frac{2gT^2}{\pi^2 R}\right)^{1/2}$

43. A series LCR circuit containing 5.0 H inductor, 80 μF capacitor and 40 ft resistor is connected to 230 V variable frequency ac source. The angular frequencies of the source at which power transferred to the circuit is half the power at the resonant angular frequency are likely to be:

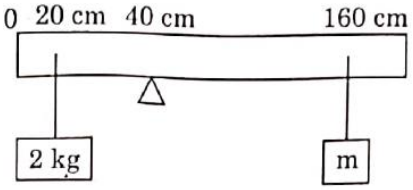
(1) 25 rad/s and 75 rad/s **(2)** 50 rad/s and 25 rad/s

(3) 46 rad/s and 54 rad/s **(4)** 42 rad/s and 58 rad/s

44. From a circular ring of mass 'M' and radius 'R' an arc corresponding to a 90° sector is removed. The moment of inertia of the remaining part of the ring about an axis passing through the centre of the ring and perpendicular to the plane of the ring is 'K' times 'MR^2'. Then the value of 'K' is:

(1) $\frac{3}{4}$ **(2)** $\frac{7}{8}$ **(3)** $\frac{1}{4}$ **(4)** $\frac{1}{8}$

45. A uniform rod of length 200 cm and mass 500 g balanced on a wedge placed at 40 cm maru8ls mass of 2 kg is suspended from the rod at 20 A and another unknown mass 'm' is suspended the rod at 160 cm mark as shown in the Find the value of 'm' such that the rod is in equilibrium. ($g = 10\ m/s^2$)



(1) $\frac{1}{2}$kg **(2)** $\frac{1}{3}$kg **(3)** $\frac{1}{6}$kg **(4)** $\frac{1}{12}$kg

46. Twenty seven drops of same size are charged at 220 V each. They combine to form a bigger drop. Calculate the potential of the bigger drop.

(1) 660 V **(2)** 1320 V **(3)** 1520 V **(4)** 1980 V

47. A car starts from rest and accelerates at 5 m/s^2. At t = 4 s, a ball is dropped out of a window by a person sitting in the car. What is the velocity and acceleration of the ball at t = 6 s? (Take $g = 10\ m/s^2$)

(1) 20 m/s, 5 m/s^2 **(2)** 20 m/s, 0 **(3)** $20\sqrt{2}$ m/s, 0 **(4)** $20\sqrt{2}$ m/s, 10 m/s^2

48. A particle of mass 'm' is projected with a velocity $v = kV_e (k < 1)$ from the surface of the earth.

(V_e = escape velocity)

The maximum height above the surface reached by the particle is:

(1) $R\left(\frac{k}{1-k}\right)^2$ **(2)** $R\left(\frac{k}{1+k}\right)^2$ **(3)** $\frac{R^2k}{1+k}$ **(4)** $\frac{Rk^2}{1-k^2}$

49. A ball of mass 0.15 kg is dropped from a height. 10 m, strikes the ground and rehounds to the same height. The magnitude of impulse imparted to the ball is ($g = 10 m/s^2$) nearly:

(1) 0 kg m/s **(2)** 4.2 kg m/s **(3)** 2.1 kg m/s **(4)** 1.4 kg m/s

50. Two conducting circular loops of radii R_1 and R_2 are placed in the same plane with their centres coinciding. If $R_1 >> R_2$, the mutual inductance M between them will be directly proportional to:

(1) $\frac{R_1}{R_2}$ **(2)** $\frac{R_2}{R_1}$ **(3)** $\frac{R_1^2}{R_2}$ **(4)** $\frac{R_2^2}{R_1}$

SECTION - A (CHEMISTRY)

51. Right option for the number of tetrahedral and octahedral voids in hexagonal primitive unit cell are :

(1) 8, 4 **(2)** 6, 12 **(3)** 2, 1 **(4)** 12, 6

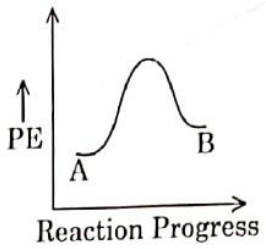
52. Zr(Z = 40) and Hf (Z = 72) have similar atomic and ionic radii because of :

(1) belonging to same group **(2)** diagonal relationship

(3) lanthanoid contraction **(4)** having similar chemical properties

53. For a reaction $A \rightarrow B$, enthalpy of reaction is $-4.2\ kJ\ mol^{-1}$ and enthalpy of activation is $9.6\ kJ\ mol^{-1}$. The correct potential energy profile for the reaction is shown in option.

(1)



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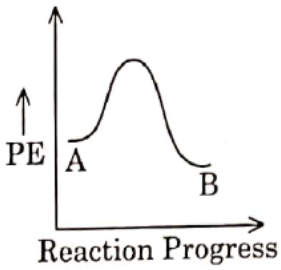

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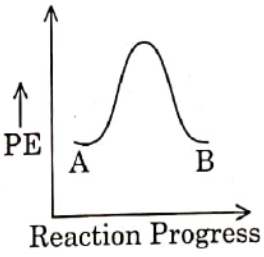

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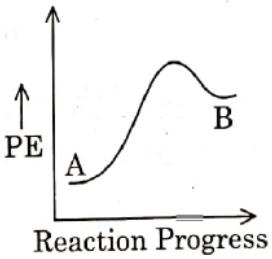


54. Tritium, a radioactive isotope of hydrogen, emits which of the following particles?

(1) Beta (β^-) **(2)** Alpha (α) **(3)** Gamma (γ) **(4)** Neutron (n)

55. The RBC deficiency is deficiency disease of :

(1) Vitamin B_{12} **(2)** Vitamin B_6 **(3)** Vitamin B_1 **(4)** Vitamin B_2

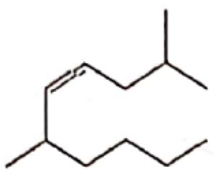
56. The molar conductance of NaCl, HCl and CH_3COONa at infinite dilution are 126.45, 426.16 and 91.0 $cm^2\ mol^{-1}$ respectively. The molar conductance of CH_3COOH at infinite dilution is. Choose the right option for your answer.

(1) $201.28\ S\ cm^2\ mol^{-1}$ **(2)** $390.71\ S\ cm^2\ mol^{-1}$

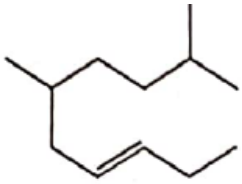
(3) $698.28\ S\ cm^2\ mol^{-1}$ **(4)** $540.48\ S\ cm^2\ mol^{-1}$

57. The correct structure of 2, 6-Dimethyl-dec-4-ene is :

(1)



(2)



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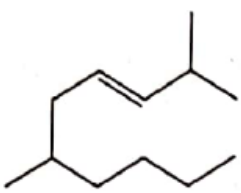

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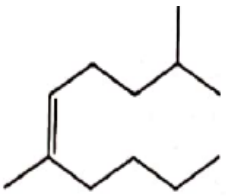
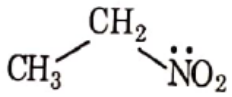
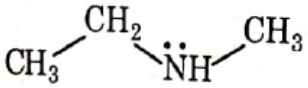


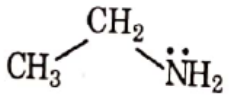
58. The maximum temperature that can be achieved in blast furnace is :

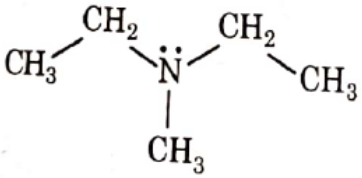
(1) upto 1200 K **(2)** upto 2200 K **(3)** upto 1900 K **(4)** upto 5000 K

59. Identify the compound that will react with Hingsberg's reagent to give a solid which dissolves in alkali.

(1) 

(2) 

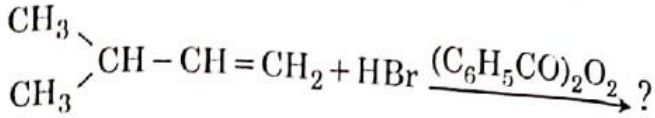
(3) 

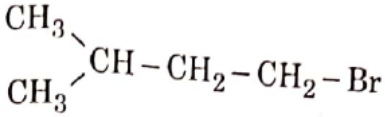
(4) 

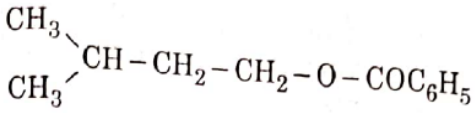
60. The following solutions were prepared by dissolving 10 g of glucose $(C_6H_{12}O_6)$ in 250 ml of water (P_1), 10 g of urea (CH_4N_2O) in 250 ml of water (P_2) and 10 g of sucrose $(C_{12}H_{22}O_{11})$ in 250 ml of water (P_3). The right option for the decreasing order of osmotic pressure of these solutions is :

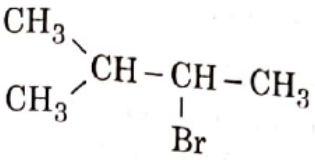
(1) $P_2 > P_1 > P_3$ **(2)** $P_1 > P_2 > P_3$ **(3)** $P_2 > P_3 > P_1$ **(4)** $P_3 > P_1 > P_2$

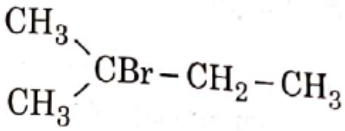
61. The major product of the following chemical reaction is :



(1) 

(2) 

(3) 

(4) 

62. Given below are two statements :

Statement I : Aspirin and Paracetamol belong to the class of narcotic analgesics.

Statement II : Morphine and Heroin are non-narcotic analgesics.

In the right of the above statements, choose the correct answer from the options given below.

(1) Both Statement I and Statement II are true

(2) Both Statement I and Statement II are false

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

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

63. The correct sequence of bond enthalpy of `C-X' bond is :

(1) $CH_3-F < CH_3-Cl < CH_3-Br < CH_3-I$

(2) $CH_3-F > CH_3-Cl > CH_3-Br > CH_3-I$

(3) $CH_3-F < CH_3-Cl > CH_3-Br > CH_3-I$

(4) $CH_3-Cl > CH_3-F > CH_3-Br > CH_3-I$

64. BF_3 is planar and electron deficient compound. Hybridization and number of electrons around the central atom, respectively are :

(1) sp^3 and 4 **(2)** sp^3 and 6 **(3)** sp^2 and 6 **(4)** sp^2 and 8

65. Which one among the following is the correct option for right relationship between C_P and C_V for one mole of ideal gas?

(1) $C_P + C_V = R$ **(2)** $C_P - C_V = R$ **(3)** $C_P = RC_V$ **(4)** $C_V = RC_P$

66. Among the following alkaline earth metal halides, one which is covalent and soluble in organic solvents is :

(1) Calcium chloride **(2)** Strontium chloride

(3) Magnesium chloride **(4)** Beryllium chloride

67. An organic compound contains 78% (b wt.) carbon and remaining percentage of hydrogen. The right option for the empirical formula of this compound is : [Atomic wt. of C is 12, H is 1]

(1) CH **(2)** CH_2 **(3)** CH_3 **(4)** CH_4

68. The major product formed in dehydrohalogenation reaction of 2-Bromo pentane is Pent-2-ene. This product formation is based on?

(1) Saytzeff's Rule **(2)** Hund's Rule

(3) Hofmann Rule **(4)** Huckel's Rule

69. What is the IUPAC name of the organic compound formed in the following chemical reaction?

Acetone $\xrightarrow[(ii)\ H_2O,\ H^+]{(i)\ C_2H_5MgBr,\ dr\ Ether}$ Product

(1) 2-methyl propan-2-ol **(2)** pentan-2-ol

(3) pentan-3-ol **(4)** 2-methyl butan-2-ol

70. Noble gases are named because of their inertness towards reactivity. Identify an incorrect statement about them.

(1) Noble gases are sparingly soluble in water

(2) Noble gases have very high melting and boiling points

(3) Noble gases have weak dispersion forces

(4) Noble gases have large positive values of electron gain enthalpy

71. The pK_b of dimethylamine and pK_a of acetic acid are 3.27 and 4.77 respectively at T (K). The correct option for the pH of dimethylammonium acetate solution is :

(1) 8.50 **(2)** 5.50 **(3)** 7.75 **(4)** 6.25

72. The right option for the statement "Tyndall effect is exhibited by", is :

(1) NaCl solution **(2)** Glucose solution **(3)** Starch solution **(4)** Urea solution

73. **Statement I :** Acid strength increases in the order given as HF << HCl << HBr << HI

Statement II : As the size of the elements F, Cl Br, I increases down the group, the bond strength of HF, HCl, HBr and HI decreases and so the acid strength increases.

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

(1) Both Statement I and Statement II are true

(2) Both Statement I and Statement II are false

(3) Statement I is correct Statement II is false

(4) Statement I is incorrect but Statement II is true.

74. Ethylene diaminetetraacetate (EDTA) ion is :

(1) Hexadentate ligand with four "O" and two "N" donor atoms

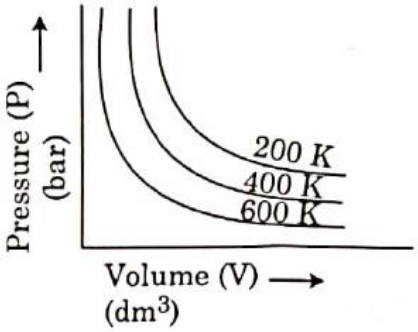
(2) Unidentate ligand

(3) Bidentate ligand with two "N" donor atoms

(4) Tridentate ligand with three "N" donor atoms

75. Choose the correct option for graphical representation of Boyle's law, which shows a graph of pressure vs. volume of a gas at different temperatures :

(1)



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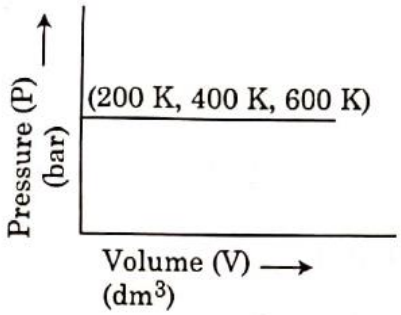

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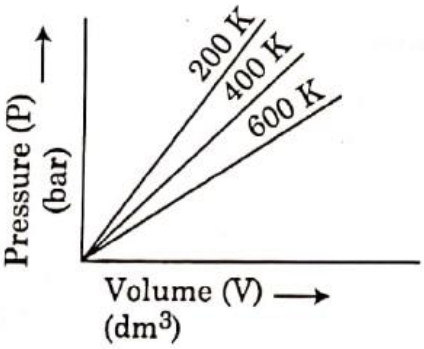

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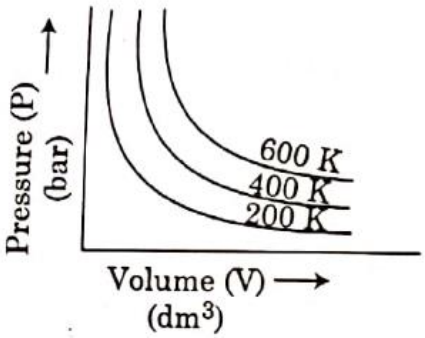


76. The structures of beryllium chloride in solid state and vapour phase, are :

(1) Chain and dimer, respectively **(2)** Linear in both

(3) Dimer and Linear, respectively **(4)** Chain in both

77. Which one of the following methods can be used to obtain highly pure metal which is liquid at room temperature?

(1) Electrolysis **(2)** Chromatography

(3) Distillation **(4)** Zone refining

78. The compound which shows metamerism is :

(1) C_2H_{12} **(2)** C_3H_8O **(3)** C_3H_6O **(4)** $C_4H_{10}O$

79. The correct option for the number of body centred unit cells in all 14 types of Bravais lattice unit cell is:

(1) 7 **(2)** 5 **(3)** 2 **(4)** 3

80. Which one of the following polymers is prepared by addition polymerization?

(1) Teflon **(2)** Nylon-66 **(3)** Novolac **(4)** Dacron

81. A particular station of all India of all Radio, New Delhi, broadcasts on a frequency of 1,368*kHz* (kilohertz). The wavelength of the electromagnetic radiation emitted by the transmitter is :

[Speed of light, $c = 3.0 \times 10^8 ms^{-1}$]

(1) 219.3 m **(2)** 219.2 m **(3)** 2192 m **(4)** 21.92 cm

82. Which of the following reactions is the metal displacement reaction? Choose the right option.

(1) $2KClO_3 \xrightarrow{\Delta} 2KCl + 3O_2$ **(2)** $Cr_2O_3 + 2Al \xrightarrow{\Delta} Al_2O_3 + 2Cr$

(3) $Fe + 2HCl \longrightarrow FeCl_2 + H_2\uparrow$ **(4)** $2Pb(NO_3)_2 \longrightarrow 2PbO + 4NO_2 + O_2\uparrow$

83. The incorrect statement among the following is :

(1) Actinoid contraction is greater for element to element than Lanthanoid contraction.

(2) Most of the trivalent Lanthanoid ions are colorless in the solid state.

(3) Lanthanoids are good conductors of heat and electricity

(4) Actinoids are highly reactive metals, especially when finely divided.

84. Dihedral angle of least stable conformer of ethane is :

(1) 120° **(2)** 180° **(3)** 60° **(4)** 0°

85. Match List-I with List-II.

	List-I		List-II
(a)	PCl_5	**(i)**	Square pyramidal
(b)	SF_6	**(ii)**	Trigonal planar
(c)	BrF_5	**(iii)**	Octahedral
(d)	BF_3	**(iv)**	Trigonal bipyramidal

Choose the correct answer from the options given below.

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

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

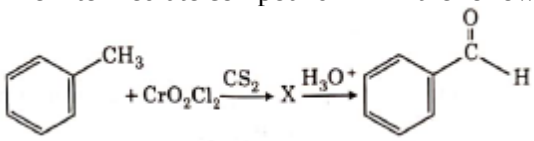
SECTION - B (CHEMISTRY)

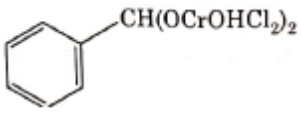
86. $CH_3CH_2COO^-Na^+ \xrightarrow[\text{Heat}]{NaOH, +\ ?} CH_3CH_3 + Na_2CO_3$

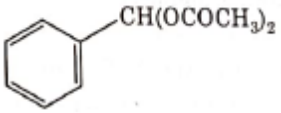
Consider the above reaction and identify the missing reagent/chemical.

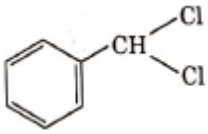
(1) B_2H_6 **(2)** Red Phosphorus **(3)** CaO **(4)** DIBAL-H

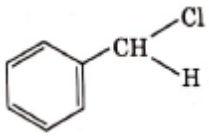
87. The intermediate compound 'X' in the following chemical reactions is:



(1) 

(2) 

(3) 

(4) 

88. Match List – I with List – II

	List – I		List – II
(a)	$2SO_2(g) + O_2(g) \rightarrow 2SO_3(g)$	**(i)**	Acid rain
(b)	$HOCl(g) \xrightarrow{h\nu} \dot{O}H + \dot{C}l$	**(ii)**	Smog
(c)	$CaCO_3 + H_2SO_4 \rightarrow CaSO_4 + H_2O + CO_2$	**(iii)**	Ozone depletion
(d)	$NO_2(g) \xrightarrow{h\nu} NO(g) + O(g)$	**(iv)**	Tropospheric pollution

Choose the correct answer from the options given below.

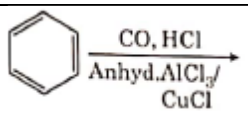
(1) (a) – (i), (b) – (ii), (c)-(iii), (d) – (iv)

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

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

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

89. Match List – I with List – II

	List – I		List – II
(a)		**(i)**	Hell-Volhard-Zelinsky reaction

(b)	$R-\overset{O}{\overset{\|}{C}}-CH_3 + NaOX \longrightarrow$	**(ii)**	Gattermann-Koch reaction
(c)	$R-CH_2-OH + R'COOH \xrightarrow{\text{Conc. } H_2SO_4}$	**(iii)**	Haloform reaction
(d)	$R-CH_2COOH \xrightarrow[\text{(ii) } H_2O]{\text{(i) } X_2/\text{Red P}}$	**(iv)**	Esterification

Choose the correct answer from the options given below.

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

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

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

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

90. Match List – I with List – II

List – I		**List – II**	
(a)	$[Fe(CN)_6]^{3-}$	**(i)**	5.92 BM
(b)	$[Fe(H_2O)_6]^{3+}$	**(ii)**	0 BM
(c)	$[Fe(CN)_6]^{4-}$	**(iii)**	4.90 BM
(d)	$[Fe(H_2O)_6]^{2+}$	**(iv)**	1.73 BM

Choose the correct answer from the options given below.

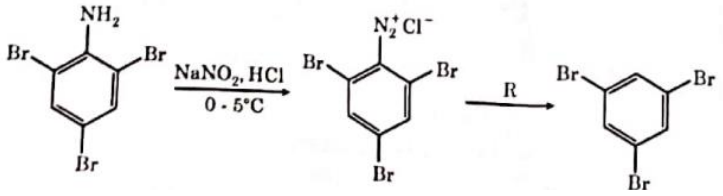
(1) (a) – (iv), (b) – (ii), (c)-(i), (d) – (iii)

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

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

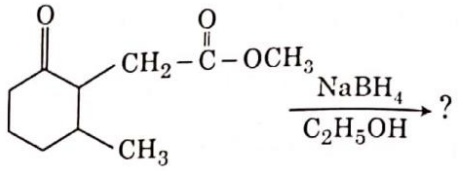
(4) (a) – (iv), (b) – (i), (c)-(ii), (d) – (iii)

91. The reagent 'R' in the given sequence of chemical reaction is:

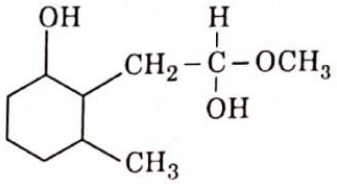


(1) H_2O **(2)** CH_3CH_2OH **(3)** HI **(4)** CuCN/KCN

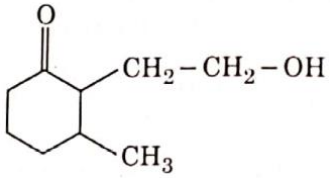
92. The product formed in the following chemical reaction is:



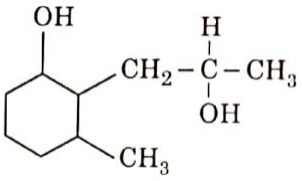
(1)



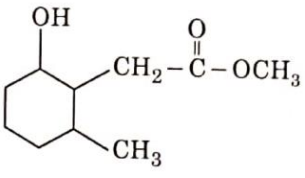
(2)



(3)



(4)



93. From the following pairs of ions which one is not an iso-electronic pair?

(1) O^{2-}, F^{-} **(2)** Na^{+}, Mg^{2+} **(3)** Mn^{2+}, Fe^{3+} **(4)** Fe^{2+}, Mn^{2+}

94. The molar conductivity of 0.007 M acetic acid is 20S $cm^2\,mol^{-1}$. What is the dissociation constant of acetic acid? Choose the correct option.

$$\left[\begin{array}{l}\wedge^{\circ}_{H^+} + 350\,S\,cm^2\,mol^{-1} \\ \wedge^{\circ}_{CH_3COO^-} = 50\,S\,cm^2\,mol^{-1}\end{array}\right]$$

(1) $1.75\times10^{-4}\,mol^{-1}$ **(2)** $2.50\times10^{-4}\,mol\,L^{-1}$

(3) $1.75\times10^{-5}\,mol\,L^{-1}$ **(4)** $2.50\times10^{-5}\,mol\,L^{-1}$

95. Choose the correction option for the total pressure (in atm.) in a mixture of $4g\,O_2$ and $2g\,H_2$ confined in a total volume of one litre at 0°C is:

(1) 2.518 **(2)** 2.602 **(3)** 25.18 **(4)** 26.02

96. The correct option for the value of vapour pressure of a solution at 45°C with benzene to octane in molar ratio 3 : 2 is:
[At 45°C vapour pressure of benzene is 280 mm Hg and that of octane is 420 mm Hg. Assume Ideal gas]

(1) 160 mm of Hg **(2)** 168 mm of Hg **(3)** 336 mm of Hg **(4)** 350 mm of Hg

97. For irreversible expansion of an ideal gas under isothermal condition, the correct option is:

(1) $\Delta U = 0, \Delta S_{total} = 0$ **(2)** $\Delta U \neq 0, \Delta S_{total} \neq 0$

(3) $\Delta U = 0, \Delta S_{total} \neq 0$ **(4)** $\Delta U \neq 0, \Delta S_{total} = 0$

98. Which of the following molecules is non-polar in nature?

(1) $POCl_3$ **(2)** CH_2O **(3)** $SbCl_5$ **(4)** NO_2

99. In which one of the following arrangements the given sequence is not strictly according to the properties indicated against it?

(1) $HF < HCl < HBr < HI$: Increasing acidic strength

(2) $H_2O < H_2S < H_2Se < H_2Te$: Increasing pK_a

(3) $NH_3 < PH_3 < AsH_3 < SbH_3$: Increasing acidic character

(4) $CO_2 < SiO_2 < SnO_2 < PbO_2$: Increasing oxidizing power

100. The slope of Arrhenius Plot $\left(\ln k\,v/s\,\frac{1}{T}\right)$ of first order reaction is $-5\times10^{3}K$. The value of E_a of the reaction is. Choose the correct option for your answer.
[Given $R = 8.314\,JK^{-1}\,mol^{-1}$]

(1) $41.5\,kJ\,mol^{-1}$ **(2)** $83.0\,kJ\,mol^{-1}$ **(3)** $166\,kJ\,mol^{-1}$ **(4)** $-83\,kJ\,mol^{-1}$

SECTION - A (BIOLOGY: BOTANY)

101. Mutations in plant cells can be induced by :

(1) Kinetin **(2)** Infrared rays **(3)** Gamma rays **(4)** Zeatin

102. Match List - I with List - II.

List-I		List - II	
(a)	Cells with active celldivision capacity	**(i)**	Vascular tissues
(b)	Tissue having all cellssimilar in structureand function	**(ii)**	Meristematic tissue
(c)	Tissue havingdifferent types of cells	**(iii)**	Sclereids

(d)	Dead cells with highly thickened walls andnarrow lumen	**(iv)**	Simple tissue

Select the correct answer from the options given below.

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

103. Which of the following is a correct sequence of steps in a PCR (Polymerase Chain Reaction) ?

(1) Denaturation, Annealing, Extension **(2)** Denaturation, Extension. Annealing

(3) Extension. Denaturation, Annealing **(4)** Annealing, Denaturation, Extension

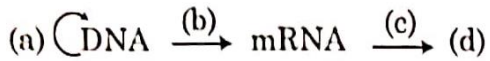
104. Match List - I with List - II.

List -1		List - II	
(a)	Lent ice Is	**(i)**	Phellogen
(b)	Cork cambium	**(ii)**	Suberin deposition
(c)	Secondary cortex	**(iii)**	Exchange of gases
(d)	Cork	**(iv)**	Phelloderm

Choose the correct answer from the options givenbelow.

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

105. Complete the flow chnrt on central dogma.



(1) (n)-Replication; (b)-Transcription;
(c)-Transduction; (d)-Protein

(2) (a)-Translation; (b)-Replication;
(c)-Transcription: (d)-Transduction

(3) (a)-Replication; (b)-Transcription;
(c)-Translation; (d)-Protein

(4) (a)-Transduction: (b)-Translation;
(c)-Replication; (d)-Protein

106. The term used for transfer of pollen grains fromanthers of one plant to stigma of a different plantwhich, during pollination, brings geneticallydifferent types of pollen grains to stigma, is :

(1) Xenogamy **(2)** Geitonogamy **(3)** Chasmogamy **(4)** Cleistogamy

107. DNA strands on a gel stained with ethidiumbromide when viewed under UV radiation, appearas:

(1) Yellow bands **(2)** Bright orange bands

(3) Dark red bands **(4)** Bright blue bands

108. Which of the following is an incorrectstatement ?

(1) Mature sieve tube elements possess aconspicuous nucleus and usual cytoplasmicorganelles.

(2) Microbodies are present both in plant andanimal cells.

(3) The perinuclear space forms a barrierbetween the materials present inside thenucleus and that of the cytoplasm.

(4) Nuclear pores act as passages for proteins and RNA molecules in both directionsbetween nucleus and cytoplasm

109. Inspite of interspecific competition in nature, which mechanism the competing species might have evolved for their survival?

(1) Resource partitioning **(2)** Competitive release

(3) Mutualism **(4)** Predation

110. Gemmae arc present in:

(1) Mosses **(2)** Pteridophytes

(3) Some Gymnosperms **(4)** Some Liverworts

111. Match List - I with List - II.

List – I		List – II	
(a)	Protoplast fusion	**(i)**	Totipotency
(b)	Plant tissue culture	**(ii)**	Pomato
(c)	Meristem culture	**(iii)**	Somaclones
(d)	Micropropagation	**(iv)**	Virus free plants

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

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

112. The production of gametes by the parents, formation of zygotes, the F_1 and F_2 plants, can be understood from a diagram called:

(1) Bullet square **(2)** Punch square **(3)** Punnett square **(4)** Net square

113. Genera like Selaginella and Salvinia produce two kinds of spores. Such plants are know as :

(1) Homosorus **(2)** Heterosorus **(3)** Homosporous **(4)** Heterosporous

114. The amount of nutrients, such as carbon, nitrogen, phosphorus and calcium present in the soil at any given time, is referred as:

(1) Climax **(2)** Climax community

(3) Standing state **(4)** Standing crop

115. Amensalism can be represented as :

(1) Species A (–) ; Species B (0) **(2)** Species A (+) ; Species B (+)

(3) Species A (–) ; Species B (–) **(4)** Species A (+) ; Species B (0)

116. Match List - I with List - II .

List – I		List – II	
(a)	Cohesion	**(i)**	More attraction in liquid phase
(b)	Adhesion	**(ii)**	Mutual attraction among water molecule
(c)	Surface tension	**(iii)**	Water loss in liquid phase
(d)	Guttation	**(iv)**	Attraction towards polar surfaces

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

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

117. Which of the following is not an application of PCR (Polymerase Chain Reaction)?

(1) Molecular diagnosis **(2)** Gene amplification

(3) Purification of isolated protein **(4)** Detection of gene mutation

118. During the purification process for recombinant DNA technology, addition of chilled ethanol precipitates out :

(1) RNA **(2)** DNA **(3)** Histones **(4)** Polysaccharides

119. In the equation $GPP - R = NPP$

R represents:

(1) Radiant energy **(2)** Retardiation factor

(3) Environment factor **(4)** Respirantion losses

120. The first stable product of CO_2 fixation in sorghum is:

(1) Pyruvid acid **(2)** Oxaloacetic acid

(3) Succinic acid **(4)** Phospholyceric acid

121. Which of the following algae produce Carrageen?
(1) Green algae **(2)** Brown algae **(3)** Red algae **(4)** Blue-green algae

122. Which of the following statements is not correct?
(1) Pyramid of biomass in sea is generally inverted
(2) Pyramid of biomass in sea is generally upright
(3) Pyramid of energy is always upright
(4) Pyramid of numbers in a grassland ecosystem is upright

123. Match List - I with List - II .

List – I		**List – II**	
(a)	Cristae	**(i)**	Primary constriction in chromosome
(b)	Thylakoids	**(ii)**	Disc-shaped sacs in Golgi apparatus
(c)	Centromere	**(iii)**	Infoldings in mitochondria
(d)	Cisternae	**(iv)**	Flattened membranous sacs in stroma of plastids

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

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

124. Which of the following are **not** secondary metabolites in plants?
(1) Morphine, codeine **(2)** Amino acids, glucose
(3) Vinblastin, curcumin **(4)** Rubber, gums

125. Which of the following algae contains mannitol as reserve food material?
(1) Ectocarpus **(2)** Gracilaria **(3)** Volvox **(4)** Ulothrix

126. A typical angiosperm embryo sac at maturity is:
(1) 8-nucleate and 7-called **(2)** 7-nucleate and 8-called
(3) 7-nucleate and 7-called **(4)** 8-nucleate and 8-called

127. Diadelphous stamens are found in:
(1) China rose **(2)** Citrus
(3) Pea **(4)** China rose and citrus

128. When gene targeting involving gene amplification is attempted in an individual's tissue to treat disease, it is known as:
(1) Biospiracy **(2)** Gene therapy
(3) Molecular diagnosis **(4)** Safety testing

129. Which of the following stages of meiosis involves division of centromere?
(1) Metaphase I **(2)** Metaphase II **(3)** Anaphase II **(4)** Telophase II

130. Plants follow different pathways in response to environment or phases of life to from different kinds of structures. This ability is called :
(1) Elasticity **(2)** Flexibility **(3)** Plasticity **(4)** Maturity

131. Which of the following plants is monecious?
(1) Carica papaya **(2)** Chara
(3) Marchantia polymorpha **(4)** Cycas circinalis

132. When the centromere is situated in the middle of two equal arms of chromosomes, the chromosome is referred as:
(1) Metacentric **(2)** Telocentric
(3) Sub-metacentric **(4)** Acrocentric

133. The site of perception of light in plants during photoperiodism is:

(1) Shoot apex **(2)** Stem **(3)** Axillary bud **(4)** Leaf

134. The factor that leads of Founder effect in a population is:

(1) Natural selection **(2)** Genetic recombination
(3) Mutation **(4)** Genetic drift

135. The plant hormone used destroy weeds in a field is:

(1) IAA **(2)** NAA **(3)** 2, 4-D **(4)** IBA

SECTION - B (BIOLOGY: BOTANY)

136. Match List - I with List - II .

List – I		List – II	
(a)	Nitrococcus	**(i)**	Denitrification
(b)	Rhizobium	**(ii)**	Conversion of ammonia to nitrite
(c)	Thiobacillus	**(iii)**	Conversion of nitrite to nitrate
(d)	Nitrobacter	**(iv)**	Conversion of atmospheric nitrogen ammonia

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

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

137. Select the **Correct** pair :

(1)	Large colorless empty cells in the epidermis of grass lives	-	Subsidiary cells
(2)	In dicot leaves, vascular bundles are surrounded by large thick-walled cells	-	Conjunctive tissue
(3)	Cells of medullary rays that form part of cambial ring	-	Interfascicular cambium
(4)	Loose parenchyma cells rupturing the epidermis and forming a lens-shaped opening in bark	-	Spongy parenchyma

138. Which of the following statement is **correct?**

(1) Fusion of two cells is called Karyogamy
(2) Fusion of protoplasms between two motile on non-motile gametes is called plasmogamy
(3) Organisms that depend on living plants are called saprophytes
(4) Some of the organisms can fix atmospheric nitrogen in specialized cells called sheath calls

139. Identify the **Correct** statement.

(1) In capping, methyl guanosine triphosphate is added to the 3 end of hnRNA
(2) RNA polymeras binds with Rho factor to terminate the process of transcription in bacteria
(3) The coding strand in a transcription unit is copied to an mRNA
(4) Split gene arrangement is characteristic of prokaryotes

140. In the exponential growth equation

$N_t = N_0 e^{rt}$, e represents :

(1) The base of number logarithms **(2)** The base of exponential logarithms
(3) The base of natural logarithms **(4)** The base of geometric logarithms

141. Which of the following statements is incorrect ?

(1) During aerobic respiration, role of oxygen is limited to the terminal stage.
(2) In ETC (Electron Transport Chain), one molecule of NADH + H^+ gives rise to 2 ATP molecules, and one FADH2 gives rise to 3 ATP molecules.
(3) ATP is synthesized through complex V.
(4) Oxidation-reduction reactions produce proton gradient in respiration.

142. What is the role of RNA polymerase III in the process of transcription in eukaryotes ?

(1) Transcribes rRNAs (28S, 18S and 5.8S)

(2) Transcribes tRNA, 5s rRNA and snRNA

(3) Transcribes precursor of mRNA

(4) Transcribes only snRNAs

143. In some members of which of the following pairs of families, pollen grains retain their viability for months after release ?

(1) Poaceae; Rosaceae **(2)** Poaceae; Leguminosae

(3) Poaceae; Solanaceae **(4)** Rosaceae; Leguminosae

144. Match List-1 with List-II.

List -1		List - II	
(a)	S phase	**(i)**	Proteins are synthesized
(b)	G_2 phase	**(ii)**	Inactive phase
(c)	Quiescent stage	**(iii)**	Interval between mitosis and initiation of DNA replication
(d)	G_1 phase	**(iv)**	DNA replication

Choose the correct answer from the options given below.

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

145. Now a days it is possible to detect the mutated gene causing cancer by allowing radioactive probe to hybridise its complimentary DNA in a clone of cells, followed by its detection using autoradiography because:

(1) Mutated gene partially appears on a photographic film.

(2) Mutated gene completely and clearly appears on a photographic film.

(3) Mutated gene does not appear on a photographic film as the probe has no complimentarity with it.

(4) Mutated gene does not appear on Photographic film as the probe has complimentarity with it.

146. Plasmid pBR322 ha9 PstI restriction enzyme site within gene amp^R that confers ampicillin resistance. If this enzyme is used for inserting a gene for (β-galactoside production and the recombinant plasmid is inserted in an *E.coli* strain

(1) It will not be able to confer ampicillin resistance to the host cell.

(2) The transformed cells will have the ability to resist ampicillin as well as produce β-galactoside.

(3) It will lead to lysis of host cell.

(4) It will be able to produce a novel protein with dual ability.

147. Match Column -1 with Column - II.

Column-I Column-II

(a) $\%\male K_{(5)}C_{1+2+(2)}A_{(9)+1}\underline{G}_1$ **(i)** Brassicaceae

(b) $\oplus\male K_{(5)}\overbrace{C_{(5)}A_5}\underline{G}_2$ **(ii)** Liliaceae

(c) $\oplus\male\overset{\frown}{P_{(3+3)}A_{3+3}}\underline{G}_{(3)}$ **(iii)** Fabaceae

(d) $\oplus\male K_{2+2}C_4A_{2-4}\underline{G}_{(2)}$ **(iy)** Solanaceae

Select the correct answer from the options given below.

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

148. Which of the following statements is incorrect ?

(1) Both ATP and NADPH + H^+ are synthesized during non-cyclic photophosphorylation.

(2) Stroma lamellae have PS I only and lack NADP reductase.

(3) Grana lamellae have both PS I and PS II.

(4) Cyclic photophosphorylation involves both PS I and PS II

149. Match List-1 with List-II.

List -1		List - II	
(a)	Protein	**(i)**	C = C double bonds
(b)	Unsaturated fatty acid	**(ii)**	Phosphodiester bonds
(c)	Nucleic acid	**(iii)**	Glycosidic bonds
(d)	Polysaccharide	**(iv)**	Peptide bonds

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

150. DNA fingerprinting involves identifying differences in some specific regions in DNA sequence, called as :

(1) Satellite DNA **(2)** Repetitive DNA

(3) Single nucleotides **(4)** Polymorphic DNA

SECTION - A (BIOLOGY: ZOOLOGY)

151. Which of the following statements wrongly represents the nature of smooth muscle ?

(1) These muscle have no striations

(2) They are involuntary muscles

(3) Communication among the cells is performed by intercalated discs

(4) These muscles are present in the wall of blood vessels

152. The organelles that are included in the endomembrane system are:

(1) Endoplasmic reticulum, Mitochondria, Ribosomes and Lysosomes

(2) Endoplasmic reticulum, Golgi complex, Lysosomes and Vacuoles

(3) Golgi complex. Mitochondria, Ribosomes and Lysosomes

(4) Golgi complex, Endoplasmic reticulum, Mitochondria and Lysosomes

153. With regard to insulin choose correct options.

(a) C-peptide is not present in mature insulin.

(b) The insulin produced by rDNA technology has C-peptide.

(c) The pro-insulin has C-peptide.

(d) A-peptide and B-peptide of insulin are interconnected by disulphide bridges.

Choose the correct answer from the options given below.

(1) (b) and (d) only **(2)** (b) and (c) only

(3) (a), (c) and (d) only **(4)** (a) and (d) only

154. Veneral diseases can spread through:

(a) Using sterile needles

(b) Transfusion of blood from infected person

(c) Infected mother to foetus

(d) Kissing

(e) Inheritance

Choose the correct answer from the options given below.

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

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

155. Select the favourable conditions required for the formation of oxyhaemoglobin at the alveoli.

(1) High pO_2, less H^+, lower temperature

(2) Law pO_2, high pCO_2, more H^+, higher temperature

(3) High pO_2, high pCO_2, less H^+, higher temperature

(4) Low pO_2, low pCO_2, more H^+, higher temperature

156. Match List-1 with List-II.

List -1		List -II	
(a)	Physalia	**(i)**	Pearl oyster
(b)	Limulus	**(u)**	Portuguese Man of War
(c)	Ancylostoma	**(iii)**	Living fossil
(d)	Pinctada	**(iv)**	Hookworm

Choose the correct answer from the options given below.

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

157. In a cross between a male and female, both heterozygous for sickle cell anaemia gene, what percentage of the progeny will be diseased ?

(1) 50% **(2)** 75% **(3)** 25% **(4)** 100%

158. Match List-1 with List-II.

List - I		List-II	
(a)	Aspergillus niger	**(i)**	Acetic Acid
(b)	Acetobacter aceti	**(ii)**	Lactic Acid
(c)	Clostridium butylicum	**(iii)**	Citric Acid
(d)	Lactobacillus	**(iv)**	Butyric Acid

Choose the correct answer from the options given below.

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

159. Sphincter of oddi is present at:

(1) Ileo-caecal junction

(2) Junction of hepato-pancreatic duct and duodenum

(3) Gastro-oesophagealjunction

(4) Junction of jejunum and duodenum

160. Which of the following is not an objective of Biofortification in crops ?

(1) Improve protein content

(2) Improve resistance to diseases

(3) Improve vitamin content

(4) Improve micronutrient and mineral content

161. Erythropoietin hormone which stimulates R.B.C. formation is produced by:

(1) Alpha cells of pancreas **(2)** The cells of rostral adenohypophysis

(3) The cells of bone marrow **(4)** Juxtaglomerular cells of the kidney

162. Which one of the following organisms bears hollow and pneumatic long bones ?

(1) *Neophron* **(2)** *Hemidactylus*

(3) *Macropus* **(4)** *Ornithorhynchus*

163. The centriolc undergoes duplication during:

(1) S-phase **(2)** Prophase

(3) Metaphase **(4)** G_2 phase

164. Dobson unit are used to measure thickness of:

(1) CFCs **(2)** Stratosphere

(3) Ozone **(4)** Troposphere

165. Which one of the following belongs to the family Muscidae ?

(1) Fire fly **(2)** Grasshopper

(3) Cockroach **(4)** House fly

166. Read the following statements.

(a) Metagenesis is observed in Helminths.

(b) Echinoderms are triploblastic and coelomate animals.

(c) Round worms have organ-system level of body organization.

(d) Comb plates present in ctenophores help in digestion.

(e) Water vascular system is characteristic of Echinoderms.

Choose the correct answer from the options given below.

(1) (c), (d) and (e) are correct **(2)** (a), (b) and (c) are correct

(3) (a), (d) and (e) are correct **(4)** (b), (c) and (e) are correct

167. For effective treatment of the disease, early diagnosis and understanding its pathophysiology is very important. Which of the following molecular diagnostic techniques is very useful for early detection?

(1) Western Blotting Technique **(2)** Southern Blotting Technique

(3) EUSA Technique **(4)** Hybridization Technique

168. Receptors for sperm binding in mammals are present on:

(1) Corona radiate **(2)** Vitelline membrane

(3) Perivitelline space **(4)** Zona pellucida

169. Chronic auto immune disorder affecting neuro muscular junction leading to fatigue, weakening and paralysis of skeletal muscle is called as:

(1) Arthritis **(2)** Muscular dystrophy

(3) Myasthenia gravis **(4)** Gout

170. Which one of the following is an example of Hormone releasing IUD ?

(1) CuT **(2)** LNG20

(3) Cu 7 **(4)** Multiload 375

171. Match List-I with List-II

List - I		List – II	
(a)	Vaults	**(i)**	Entry of sperm through Cervix is blocked
(b)	IUDs	**(ii)**	Removal of Vas deferens
(c)	Vasectomy	**(iii)**	Phagocytosis of sperms within the Uterus
(d)	Tubectomy	**(iv)**	Removal of fallopian tube

Choose the correct answer from the options given

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

172. Match List-I with List-II

List - I		List – II	
(a)	Metamerism	**(i)**	Coelenterata
(b)	Canal system	**(ii)**	Ctenophora
(c)	Comb plates	**(iii)**	Annelida
(d)	Cnidoblasts	**(iv)**	Porifera

Choose the correct answer from the options given below.

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

173. The fruit fly has 8 chromosomes (2n) in each cell. During interphase of Mitosis if the number of chromosomes at G_1 phase is 8, what would be the number of chromosomes after S phase?

(1) 8 **(2)** 16 **(3)** 4 **(4)** 32

174. During the process of gene amplification using PCR, if very high temperature is not maintained in the beginning, then which of the following steps of PCR will be affected first?

(1) Annealing **(2)** Extension **(3)** Denaturation **(4)** Ligation

175. If Adenine makes 30% of the DNA molecule, what will be the percentage of Thymine, Guanine and Cytosine in it?

(1) T : 20; G : 30; C : 20 **(2)** T : 20; G : 20; C : 30

(3) T : 30; G : 20; C : 20 **(4)** T : 20; G : 25; C : 25

176. Which enzyme is responsible for the conversion of inactive fibrinogens to fibrins?

(1) Thrombin **(2)** Renin **(3)** Epinephrine **(4)** Thrombokinase

177. Succus entericus is referred to as:

(1) Pancreatic juice **(2)** Intestinal juice **(3)** Gastric juice **(4)** Chyme

178. Identify the incorrect pair.

(1) Alkaloids - Codeine
(2) Toxin - Abrin
(3) Lectins - Concanacalin A
(4) Drugs - Ricin

179. Which stage of meiotic prophase shows terminalization of chiasmata as its distinctive feature?

(1) Leptotene **(2)** Zygotene **(3)** Diakinesis **(4)** Pachytene

180. Persons with 'AB' blood group are called as "Universal recipients". This is due to:

(1) Absence of antigens A and B on the surface of RBCs
(2) Absence of antigens A and B in plasma
(3) Presence of antibodies, anti-A and anti-B, on RBCs
(4) Absence of antibodies, anti-A and anti-B in plasma

181. A specific recognition sequence identified by endonucleases to make cuts to specific positions within the DNA is:

(1) Degenerate primer sequence **(2)** Okazaki sequences
(3) Palindromic Nucleotide sequences **(4)** Poly(A) tail sequences

182. Which of the following characteristics is incorrect with respect to cockroach?

(1) A ring of gastric caeca is present at the junction of midgut and hind gut
(2) Hypopharynx lies within the cavity enclosed by the mouth parts
(3) In Females, 7^{th} to 9^{th} sterna together form a genital pouch
(4) 10^{th} abdominal segment in both sexes, bears a pair of anal cerci

183. Which of the following RNAs is not required for the synthesis of protein?

(1) mRNA **(2)** tRNA **(3)** rRNA **(4)** siRNA

184. Which is the "Only enzyme" that has "Capability" to catalyse initiation, Elongation and Termination in the process of transcription in prokaryotes?

(1) DNA dependent DNA polymerase **(2)** DNA dependent RNA polymerase
(3) DNA ligase **(4)** DNase

185. The partial pressure (in mm Hg) of oxygen (O_2) and carbon dioxide (CO_2) at alveoli (the site of diffusion) are:

(1) $pO_2 = 104$ and $pCO_2 = 40$ **(2)** $pO_2 = 40$ and $pCO_2 = 45$
(3) $pO_2 = 95$ and $pCO_2 = 40$ **(4)** $pO_2 = 159$ and $pCO_2 = 0.3$

SECTION - B (BIOLOGY: ZOOLOGY)

186. Which of the following is not a step in multiple ovulation embryo transfer technology (MOET)?

(1) Cow is administered hormone having LH like activity for super ovulation
(2) Cow yields about 6-8 eggs at a time
(3) Cow is fertilized by artificial insemination
(4) Fertilized eggs are transferred to surrogate mothers at 8-32 cell stage

187. Which of the following secretes the hormone, relaxin, during the later phase of pregnancy?

(1) Graafian follicle **(2)** Corpus luteum
(3) Foetus **(4)** Uterus

188. During muscular contraction which of the following events occur?

(a) 'H' zone disappears

(b) 'A' band widens

(c) 'I' band reduces in width

(d) Myosine hydrolyzes ATP, releasing the ADP and Pi

(e) Z-lines attached to actions are pulled inwards

Choose the correct answer from the options given below.

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

(3) (b), (c), (d), (e) only **(4)** (b), (d), (e), (a) only

189. Following are the statements with reference to 'lipids'.

(a) Lipids having only single bonds are called unsaturated fatty acids

(b) Lecithin is a phospholipid

(c) Thrihydroxy propane is glycerol

(d) Palmitic acid has 20 carbon atoms including carboxyl carbon.

(e) Arachidonic acid has 16 carbon atoms.

(1) (a) and (b) only **(2)** (c) and (d) only **(3)** (b) and (c) only **(4)** (b) and (e) only

190. Which one of the following statements about Histones is wrong?

(1) Histones are organized to form a unit of 8 molecules

(2) The pH of histones is slightly acidic

(3) Histones are rich in amino acids – Lysine and Arginine

(4) Histones carry positive charge in the side chain

191. Match List-I with List-II

List - I		**List – II**	
(a)	Adaptive radiation	**(i)**	Selection of resistant varieties due to excessive use of herbicides and pesticides
(b)	Convergent evolution	**(ii)**	Bones of forelimbs in Man and Whale
(c)	Divergent evolution	**(iii)**	Wings of Butterfly and Bird
(d)	Evolution by anthropogenic action	**(iv)**	Darwin finches

Choose the correct answer from the options given below.

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

192. Identify the types of cell junctions that help to stop leakage of the substances across a tissue and facilitation of substances across a tissue and facilitation of communication with neighbouring cells via rapid transfer of ions and molecules.

(1) Gap junctions and adhering junctions, respectively

(2) Tight junctions and Gap junctions, respectively

(3) Adhering junctions and Tight junctions, respectively

(4) Adhering junctions and Gap junctions, respectively

193. Following are the statements about prostomium of earthworm.

(a) It serves as a covering for mouth

(b) It helps to open cracks in the soil into which it can crawl

(c) It is one of the sensory structures

(d) It is the first body segment

Choose the correct answer from the options given below.

(1) (a), (b) and (c) are correct **(2)** (a), (b) and (d) are correct

(3) (a), (b) and (d) are correct **(4)** (b) and (c) are correct

194. The adenosine deaminase deficiency results into:

(1) Dysfunction of immune system **(2)** Parkinson's disease

(3) Digestive disorder **(4)** Addison's disease

195. Statement – I:

The codon 'AUG' codes for methionine and phenylalanine.

Statement – II:

'AAA' and 'AAG' both codons code for the amino lysine.

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

(1) Both statement I and statement II are true

(2) Both statement I and statement II are false

(3) Statement I is correct but statement II is false

(4) Statement I is incorrect but statement II is true

196. Assertion (A):

A person goes to high altitude and experiences 'altitude sickness' with symptoms like breathing difficulty and heat palpitation.

Reason (R)

Due to low atmospheric pressure at high altitude, the body does not get sufficient oxygen.

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

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

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

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

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

197. Match List-I with List-II

List - I		**List – II**	
(a)	Allen's Rule	**(i)**	Kangaroo rat
(b)	Physiological	**(ii)**	Desert lizard
(c)	Behavioural adaptation	**(iii)**	Marine fish at depth
(d)	Biochemical adaptation	**(iv)**	Polar seal

Choose the correct answer from the options given

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

198. Match List-I with List-II

List - I		List – II	
(a)	Filariasis	**(i)**	Haemophilus influenzoe
(b)	Amoebiasis	**(ii)**	Trichophyton
(c)	Pneumonia	**(iii)**	Wuchereria bancrofti
(d)	Ringworm	**(iv)**	Entamoeba histolytica

Choose the correct answer from the options given

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

199. Which of these is not an important components of initiation of parturition in humans?

(1) Increase in estrogen and progesterone ratio
(2) Synthesis of prostaglandins
(3) Release of Oxytocin
(4) Release of Prolactin

200. Match List-I with List-II

List - I		List – II	
(a)	Scapula	**(i)**	Cartilaginous joints
(b)	Cranium	**(ii)**	Flat bone
(c)	Sternum	**(iii)**	Fibrous joints
(d)	Vertebral column	**(iv)**	Triangular flat bone

Choose the correct answer from the options given

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