

5, Central Road, 1st Floor, Jadavpur Kolkata-700 032.

 : 9836325839/9836255656,  : (033) 24833019



: aimhigh.platform@gmail.com  : facebook.com/platformedu

Website : www.platformedu.org

MOCK TEST

Duration : 3 Hours

Max. Marks : 720

IMPORTANT INSTRUCTIONS

1. The test is of **3 hours** duration and Test Booklet contains **180** questions. 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**.
2. Use **Blue/Black Ball Point Pen only** for writing particulars on this page/marking responses.
3. Rough work is to be done on the space provided for this purpose in the Test Booklet only.
4. **On completion of the test, the candidate must handover the Answer Sheet to the invigilator in the Room/Hall. The candidates are allowed to take away this Test Booklet with them.**
5. 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.
6. Use of white fluid for correction is **NOT** permissible on the Answer Sheet.
7. Each candidate must show on demand his/her Admission Card to the Invigilator.
8. No candidate, without special permission of the Superintendent or Invigilator, would leave his/her seat.
9. The candidates should not leave the Examination Hall without handing over their Answer Sheet to the Invigilator on duty and sign the Attendance Sheet twice. Cases where a candidate has not signed the Attendance Sheet the second time will be deemed not to have handed over Answer Sheet and dealt with as an unfair means case.
10. Use of Electronic/Manual Calculator is prohibited.
11. No part of the Test Booklet and Answer Sheet shall be detached under any circumstances.
12. The candidates will write the Correct Test Booklet Code as given in the Test Booklet/Answer Sheet in the Attendance Sheet.

Name of the Candidate (in Capital letters) : _____

Roll Number :

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Batch No. :

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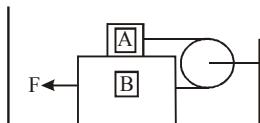
Name of Examination Centre (in Capital letters) : _____

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

PHYSICS

1. A bus is moving with a velocity of 10m/s on a straight road. A scooterist wishes to overtake the bus in 100 seconds. If the bus is at a distance of 1 km from the scooterist, at what velocity should the scooterist chase the bus?
- (1) 50 m/sec (2) 40 m/sec
 (3) 30 m/sec (4) 20 m/sec

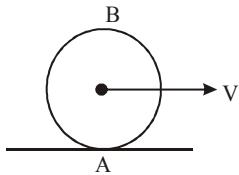
2. The masses of the blocks A and B are 0.5 kg and 1 kg respectively. These are arranged as shown in the figure and are connected by a massless string. The coefficient of friction between all contact surfaces is 0.4. The force, necessary to move the block B with constant velocity, will be ($g = 10 \text{ m/s}^2$)



- (1) 5N (2) 10N
 (3) 15N (4) 20N

3. A rod of length L is placed on x – axis between $x = 0$ and $x = L$. The linear density i.e., mass per unit length denoted by ρ , of this rod, varies as, $\rho = a + bx$. What should be the dimensions of b?
- (1) $M^2L^1T^0$ (2) $M^1L^{-2}T^0$
 (3) $M^{-1}L^3T^1$ (4) $M^{-1}L^2T^3$

4. A wheel is rolling on a plane road. The linear velocity of centre of mass is v. Then velocities of the points A and B on circumference of wheel relative to road will be



- (1) $v_A = v, v_B = 0$ (2) $v_A = v_B = 0$
 (3) $v_A = 0, v_B = v$ (4) $v_A = 0, v_B = 2v$

5. For hydrogen gas $C_p - C_v = a$ and for oxygen gas $C_p - C_v = b$. So, the relation between a and b is given by

- (1) $a = 16b$ (2) $16a = b$
 (3) $a = 4b$ (4) $a = b$

6. A non-conducting partition divides a container into two equal compartments. One is filled with helium gas at 200 K and the other is filled with oxygen gas at 400 K. The number of molecules in each gas is the same. If the partition is removed to allow the gases to mix, the final temperature will be

- (1) 350 K (2) 325 K
 (3) 300 K (4) 275 K

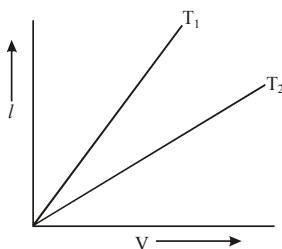
7. A bucket full of hot water is kept in a room and it cools from 75°C to 70°C in T_1 minutes, from 70°C to 65°C in T_2 minutes and from 65°C to 60°C in T_3 minutes. Then

- (1) $T_1 = T_2 = T_3$ (2) $T_1 < T_2 < T_3$
 (3) $T_1 > T_2 > T_3$ (4) $T_1 < T_3 < T_2$

8. A capacitance of $2 \mu\text{F}$ is required in an electrical circuit across a potential difference of 1.0 kV. A large number of $1 \mu\text{F}$ capacitors are available which can withstand a potential difference of not more than 300 V. The minimum number of capacitors required to achieve this is

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

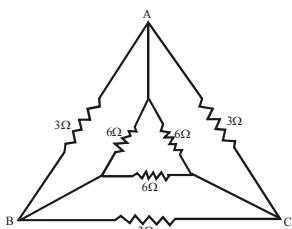
9. The current I vs voltage V graphs for a given metallic wire at two different temperatures T_1 and T_2 are shown in the figure.



- (1) $T_1 > T_2$ (2) $T_1 < T_2$
 (3) $T_1 = T_2$ (4) $T_1 = 2T_2$

SPACE FOR ROUGH WORK

10. In the circuit shown the effective resistance between B and C is



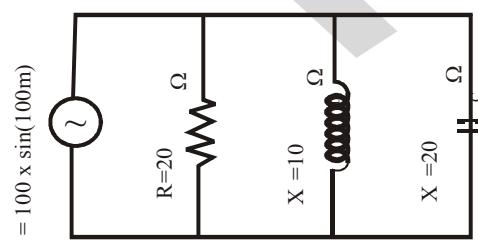
- (1) 3Ω (2) 4Ω
 (3) $\frac{4}{3}\Omega$ (4) $\frac{3}{4}\Omega$

11. A satellite is moving with a constant speed 'V' in a circular orbit about the earth. An object of mass 'm' is ejected from the satellite such that it just escapes from the gravitational pull of the earth. At the time of this ejection, the kinetic energy of the object is

- (1) $\frac{1}{2}mV^2$ (2) mV^2
 (3) $\frac{3}{2}mV^2$ (4) $2mV^2$

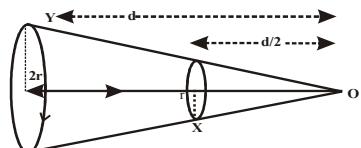
12. A transformer is used to light a 140 W, 24 V bulb from a 240 V a.c. mains. The current in the main cable is 0.7A. The efficiency of the transformer is
- (1) 63.8% (2) 83.3%
 (3) 16.7% (4) 36.2%

13. In the given circuit, the current drawn from the source is



- (1) 20A (2) 10A
 (3) 5A (4) $5\sqrt{2}$ A

14. Two circular coils X and Y, having equal number of turns, carry equal currents in the same sense and subtend same solid angle at point O. If the smaller coil X is midway between O and Y, then if we represent the magnetic induction due to bigger coil Y and O as B_Y and due to smaller coil X at O as B_X then



- (1) $\frac{B_Y}{B_X} = 1$ (2) $\frac{B_Y}{B_X} = 2$
 (3) $\frac{B_Y}{B_X} = \frac{1}{2}$ (4) $\frac{B_Y}{B_X} = \frac{1}{4}$

15. A glass slab has the left half of refractive index n_1 , and the right half of $n_2 = 3n_1$. The effective refractive index of the whole slab is

- (1) $\frac{n_1}{2}$ (2) $2n_1$
 (3) $\frac{3n_1}{2}$ (4) $\frac{2n_1}{3}$

16. What is the ratio of the circumference of the first Bohr orbit for the electron in the hydrogen atom to the de Broglie wavelength of electrons having the same velocity as the electron in the first Bohr orbit of the hydrogen atom?

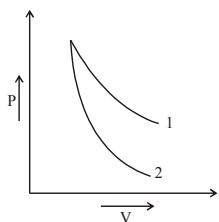
- (1) 1 : 1 (2) 1 : 2
 (3) 1 : 4 (4) 2 : 1

17. The length of a potentiometer wire is 1200 cm and it carries a current of 60 mA. For a cell of emf 5V and internal resistance of 20 Ω the null point on it is found to be at 1000 cm. The resistance of whole wire is:

- (1) 60 Ω (2) 120 Ω
 (3) 80 Ω (4) 100 Ω

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19. P – V plots for two gases during adiabatic processes are shown in the figure. Plots 1 and 2 should correspond respectively to



- (1) He and Ar (2) He and O₂
(3) O₂ and N₂ (4) O₂ and He

20. The ratio of the coefficient of volume expansion of a glass container to that of a viscous liquid kept inside the container is 1 : 4. What fraction of the inner volume of the container should the liquid occupy so that the volume of the remaining vacant space will be same at all temperatures?

22. A gramophone record is revolving with an angular velocity ω . A coin is placed at a distance r from the center of the record. The static coefficient of friction is μ . The coin will revolve with the record if

- (1) $r < \frac{\mu g}{\omega^2}$ only (2) $r > \frac{\mu g}{\omega^2}$ only
 (3) $r = \frac{\mu g}{\omega^2}$ only (4) $r \leq \frac{\mu g}{\omega^2}$ only

23. A pendulum consists of a wooden bob of mass m and length ' l '. A bullet of mass m_1 is fired towards the pendulum with a speed v_1 . The bullet emerges out of the bob with a speed $v_1/3$, and the bob just completes motion along a vertical circle. Then v_1 is

$$(1) \left(\frac{m}{m_1} \right) \sqrt{5gl} \quad (2) \frac{3}{2} \left(\frac{m}{m_1} \right) \sqrt{5gl}$$

$$(3) \frac{2}{3} \left(\frac{m_1}{m} \right) \sqrt{5gl} \quad (4) \left(\frac{m_1}{m} \right) \sqrt{gl}$$

24. A particle of mass m_1 collides head-on with another stationary particle of mass m_2 ($m_2 > m_1$). The collision is perfectly inelastic. The fraction of kinetic energy which is converted into heat in this collision is

$$(1) \ m_2/(m_1 + m_2) \quad (2) \ m_1/(m_1 + m_2)$$

$$(3) m_1(m_1 - m_2) \quad (4) m_2/(m_1 - m_2)$$

25. A beaker containing a liquid of density ρ moves up with an acceleration a . The pressure due to the liquid at a depth h below the free surface of the liquid is

(1) $h \rho g$ (2) $h \rho (g - a)$

$$(3) h \rho (g + a) \quad (4) 2h \rho g \left(\frac{g+a}{g-a} \right)$$

26. A wooden block of volume 1000 cc is suspended from a spring balance. It weighs 12 N in air. It is then held suspended in water with half of it inside water. What would be the reading in spring balance now?

27. A square wire frame of size L is dropped in a liquid. On taking out, a membrane is formed. If the surface tension of the liquid is T , force acting on the frame will be

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- 28.** In a cubical vessel are enclosed n molecules of a gas each having a mass m and an average speed v . If l is the length of each edge of the cube, the pressure exerted by the gas will be
- $\frac{nmv^2}{l^3}$
 - $\frac{nm^2v}{2l^3}$
 - $\frac{mnv^2}{3l^3}$
 - $\frac{nnv}{2l}$
- 29.** A man is watching two trains, one leaving and the other coming in with equal speed of 4 m/s . If they sound their whistles, each of frequency 240 Hz , the number of beats heard by the man (velocity of sound in air = 320 m/s) will be equal to
- 6
 - 3
 - 0
 - 12
- 30.** A sphere, a cube and a thin circular plate all made of the same material and having the same mass, are initially heated to a temperature of 200°C . Which of these objects will cool slowest when left in air at room temperature?
- the sphere
 - the cube
 - the circular plate
 - all will cool at same rate
- 31.** In stationary waves, antinodes are the points where there is
- Minimum displacement and minimum pressure change
 - Minimum displacement and maximum pressure change
 - Maximum displacement and maximum pressure change
 - Maximum displacement and minimum pressure change
- 32.** In a uniform magnetic field of induction B a wire in the form of a semicircle of radius r rotates about the diameter of the circle with an angular frequency ω . The axis of rotation is perpendicular to the field. If the total resistance of the circuit is R , the mean power generated per period of rotation is
- $\frac{(B\pi r\omega)^2}{2R}$
 - $\frac{(B\pi r^2\omega)^2}{8R}$
 - $\frac{B\pi r^2\omega}{2R}$
 - $\frac{(B\pi r\omega^2)^2}{8R}$
- 33.** A proton, a deuteron and an α particle accelerated through the same potential difference enter a region of uniform magnetic field, moving at right angles to B . What is the ratio of their K.E.?
- $1 : 2 : 2$
 - $2 : 2 : 1$
 - $1 : 2 : 1$
 - $1 : 1 : 2$
- 34.** The light reflected by a plane mirror may form a real image
- If the rays incident on the mirror are diverging
 - If the rays incident on the mirror are converging
 - If the object is placed very close to the mirror
 - Under no circumstances
- 35.** Two periodic waves of intensities I_1 and I_2 pass through a region at the same time in the same direction. The sum of the maximum and minimum intensities is
- $2(I_1 + I_2)$
 - $I_1 + I_2$
 - $(\sqrt{I_1} + \sqrt{I_2})^2$
 - $(\sqrt{I_1} - \sqrt{I_2})^2$
- 36.** If the focal lengths of objective and eye lens of a microscope are 1.2 cm and 3 cm respectively and the object is put 1.25 cm away from the objective lens and the final image is formed at infinity, then magnifying power of the microscope is
- 150
 - 200
 - 250
 - 400
- 37.** In Millikan oil drop experiment, a charged drop of mass $1.8 \times 10^{-14} \text{ kg}$ is stationary between its plates. The distance between its plates is 0.90 cm and potential difference is 2.0 kilovolts . The number of electrons on the drop is
- 500
 - 50
 - 5
 - 0
- 38.** An object at 2.4 m in front of a lens forms a sharp image on a film 12 cm behind the lens. A glass plate 1 cm thick, of refractive index 1.50 is interposed between lens and film with its plane faces parallel to film. At what distance (from lens) should object be shifted to be in sharp focus of film?
- 7.2 m
 - 2.4 m
 - 3.2 m
 - 5.6 m

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- 39.** When a particle moves with variable velocity which of the following statements are not correct.
- Average speed = Average velocity
 - Instantaneous speed = Instantaneous velocity
 - Distance covered = Magnitude of displacement
- (1) A, B, C (2) A, B
 (3) B, C (4) A, C
- 40.** Yellow light is used in a single slit diffraction experiment with a slit of 0.6 mm . If yellow light is replaced by x -rays, than the observed pattern will reveal
- That the central maxima is narrower
 - More number of fringes
 - Less number of fringes
 - No diffraction pattern
- 41.** If a bar magnet of magnetic moment 80 units be cut into two halves of equal lengths, the magnetic moment of each half will be
- 80 units (2) 40 units
 - 160 units (4) 20 units
- 42.** When light of 3000 \AA is incident on sodium chloride, the stopping potential is 1.85 volt and when light of 4000 \AA is incident, then the stopping potential becomes 0.82 volt. The threshold wavelength for sodium is : ($h = 6.6 \times 10^{-34}\text{ J-sec.}$)
- 5451 \AA (2) 5154 \AA
 - 5320 \AA (4) 5211 \AA
- 43.** A silicon specimen is made into a *P*-type semiconductor by doping, on an average, one Indium atom per 5×10^7 silicon atoms. If the number density of atoms in the silicon specimen is $5 \times 10^{28}\text{ atoms}/\text{m}^3$, then the number of acceptor atoms in silicon will be
- $2.5 \times 10^{30}\text{ atoms}/\text{cm}^3$ (2) $1.0 \times 10^{13}\text{ atoms}/\text{cm}^3$
 - $1.0 \times 10^{15}\text{ atoms}/\text{cm}^3$ (4) $2.5 \times 10^{36}\text{ atoms}/\text{cm}^3$
- 44.** The most common isotope used in diagnostic work is Technicium. It is furnished from a generator or 'cow' in which the negative beta decay of Molybdenum-99 produces the desirable metastable isotope of Technicium according to the following decay scheme :
- $${}_{42}^{\text{Mo}} \rightarrow {}_z^{\text{Tc}} + {}_{-1}^{\text{e}} \nu$$
- What are the atomic number, Z , and mass number, A , of the Tc isotope?
- 41, 99 (2) 42, 99
 - 43, 98 (4) 43, 99
- 45.** The amplitude of a particle executing SHM is 4 cm. At the mean position the speed of the particle is 16 cm/sec. The distance of the particle from the mean position at which the speed of the particle becomes $8\sqrt{3}$ cm/s, will be
- $2\sqrt{3}$ cm (2) $\sqrt{3}$ cm
 - 1 cm (4) 2 cm

CHEMISTRY

- 46.** How many unit cells are present in a cube-shaped ideal crystal of NaCl of mass 1.00 g?
 [Atomic masses : Na = 23, Cl = 35.5]
- 5.14×10^{21} unit cells
 - 1.28×10^{21} unit cells
 - 1.71×10^{21} unit cells
 - 2.57×10^{21} unit cells
- 47.** Which of the following structure does not contain any chiral C atom but represent the chirality in the structure.
- 2-Ethyl-3-hexene (2) 2, 3-Pentadiene
 - 1, 3-Butadiene (4) Pent-3-en-1-yne
- 48.** The root mean square speed of gas molecules at 25K & $1.5 \times 10^5\text{ Nm}^{-2}$ is 100.5 ms^{-1} . If the temperature is raised to 100K & pressure to $6.0 \times 10^5\text{ Nm}^{-2}$, the root mean square speed becomes.
- 100.5 ms^{-1} (2) 201.0 ms^{-1}
 - 402 ms^{-1} (4) 1608 ms^{-1}

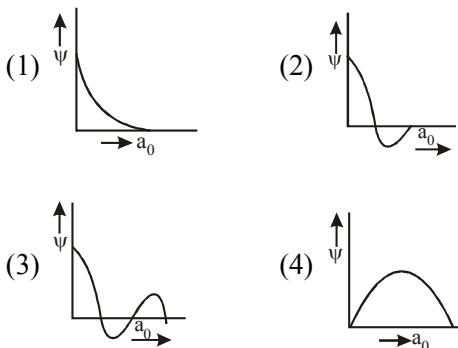
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- 49.** Reduction with aluminium isopropoxide in excess of isopropyl alcohol is called Meerwein Ponndorff-Verley reduction (MPV). What will be the final product when cyclohex-2-enone is selectively reduced in MPV reaction?
- Cyclohexanol
 - Cyclohex-2-enol
 - Cyclohexanone
 - Benzene
- 50.** N_2 and O_2 are converted to mono cations N_2^+ and O_2^+ respectively, which of the following is wrong?
- In N_2^+ , the N–N bond weakens
 - In O_2^+ the O–O bond order increases
 - In O_2^+ , paramagnetism decreases
 - N_2^+ becomes diamagnetic
- 51.** The reaction in which hydrogen peroxide acts as a reducing agent is
- $PbS + 4H_2O_2 \rightarrow PbSO_4 + 4H_2O$
 - $2KI + H_2O_2 \rightarrow 2KOH + I_2$
 - $2FeSO_4 + H_2SO_4 + H_2O_2 \rightarrow Fe_2(SO_4)_3 + 2H_2O$
 - $Ag_2O + H_2O_2 \rightarrow 2Ag + H_2O + O_2$
- 52.** Reaction of $\begin{array}{c} CH_2-CH_2 \\ | \\ O \end{array}$ with $RMgX$ leads to formation of
- $RCHOHR$
 - $RCHOHCH_3$
 - RCH_2CH_2OH
 - $\begin{array}{c} R \\ | \\ R-C=CH_2OH \end{array}$
- 53.** Which reaction will not yield an amide?
- $C_2H_5-\overset{\text{O}}{\underset{\parallel}{\text{C}}}-Cl + NH_3$
 - $C_2H_5-\overset{\text{O}}{\underset{\parallel}{\text{C}}}-O + \overset{\text{O}}{\underset{\parallel}{\text{C}}}-Cl + CH_3NH_2$
 - $CH_3-\overset{\text{O}}{\underset{\parallel}{\text{C}}}-Cl + (CH_3)_3N$
 - $CH_3-\overset{\text{O}}{\underset{\parallel}{\text{C}}}-O-\overset{\text{O}}{\underset{\parallel}{\text{C}}}-CH_3 + CH_3NH-CH_2-CH_3$
- 54.** The rocket fuel among the following is :
- hydrazine
 - urea
 - helium
 - thiourea
- 55.** When tert-butyl chloride is made to react with sodium methoxide, the major product is
- dimethyl ether
 - di-tert-butyl ether
 - tert-butylmethyl ether
 - isobutylene
- 56.** If s_0 , s_1 , s_2 and s_3 are the solubilities of $AgCl$ in water, 0.01 M $CaCl_2$, 0.01 M $NaCl$ and 0.05 M $AgNO_3$ solutions, respectively, then
- $s_0 > s_1 > s_2 > s_3$
 - $s_0 > s_2 > s_1 > s_3$
 - $s_0 > s_2 > s_3 > s_1$
 - $s_0 > s_1 = s_2 > s_3$
- 57.** Which of the following compounds exhibit tautomerism?
- Chloroethane
 - Ethanol
 - Ethoxyethane
 - Nitroethane
- 58.** An organic compound is treated with $NaNO_2$ and dil. HCl at $0^\circ C$. The resulting solution is added to an alkaline solution of β -naphthol where by a brilliant red dye is produced. It shows the presence of
- $-NO_2$ group
 - aromatic – NH_2 group
 - $-CONH_2$ group
 - aliphatic – NH_2 group
- 59.** The vapour pressure of benzene at a certain temperature is 640 mm of Hg. A non volatile and non electrolyte solid weighing 2.175 g is added to 39.08 g of benzene. If the vapour pressure of the solution is 600 mm of Hg, what is the molecular weight of solid substance?
- 49.50
 - 59.60
 - 69.60
 - 79.87

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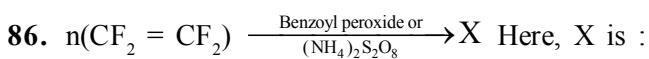
- 60.** Point out the incorrect statement among the following
- The oxidation state of oxygen is +2 in OF_2
 - Acidic character follows the order $\text{H}_2\text{O} < \text{H}_2\text{S} < \text{H}_2\text{Se} < \text{H}_2\text{Te}$.
 - The tendency to form multiple bonds increases in moving down the group from sulphur to tellurium (towards C and N)
 - Sulphur has a strong tendency to catenate while oxygen shows this tendency to a limited extent.
- 61.** Removal of Fe, Cu, W from Sn metal after smelting is by _____ because _____.
 (1) Poling; of more affinity towards oxygen for impurities
 (2) Selective oxidation; of more affinity towards oxygen for impurities.
 (3) Electrolytic refining; impurities undissolved in electrolyte
 (4) Liquation; Sn having low melting point compared to impurities.
- 62.** Among KO_2 , AlO_2^- , BaO_2 and NO_2^+ , unpaired electron is present in
 (1) NO_2^+ and BaO_2 (2) KO_2 and AlO_2^-
 (3) KO_2 only (4) BaO_2 only
- 63.** If a 0.1 M solution of glucose (Mol. wt 180) and 0.1 molar solution of urea (Mol. wt. 60) are placed on two sided semipermeable membrane to equal heights, then it will be correct to say that
 (1) there will be no net movement across the membrane
 (2) glucose will flow across the membrane into urea solution
 (3) urea will flow across the membrane into glucose solution
 (4) water will flow from urea solution to glucose solution
- 64** When pink $(\text{Co}(\text{H}_2\text{O})_6)^{2+}$ is dehydrated the colour changes to blue. The correct explanation for the change is :
 (1) The octahedral complex becomes square planar
 (2) A tetrahedral complex is formed
 (3) Distorted octahedral structure is obtained
 (4) Dehydration results in the formation of polymeric species
- 65.** When CO_2 dissolves in water, the following equilibrium is established

$$\text{CO}_2 + 2\text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{HCO}_3^-$$
, for which the equilibrium constant is 3.8×10^{-6} equilibrium constant is 3.8×10^{-6} and $\text{pH} = 6.0$. What would be the ratio of concentration of bicarbonate ion to carbon dioxide?
 (1) 3.8×10^{-12} (2) 3.8
 (3) 6 (4) 13.4
- 66.** Among the following the compound that is both paramagnetic and coloured is
 (1) $\text{K}_2\text{Cr}_2\text{O}_7$ (2) $(\text{NH}_4)_2[\text{TiCl}_6]$
 (3) CoSO_4 (4) $\text{K}_3[\text{Cu}(\text{CN})_4]$
- 67.** The correct statement among the following is :
 (1) The alkali metals when strongly heated in oxygen from superoxides
 (2) Caesium is used in photoelectric cells
 (3) NaHCO_3 is more soluble in water than KHCO_3
 (4) The size of hydrated ions of alkali metals increases from top to bottom.
- 68.** Which of the following graph correspond to one node



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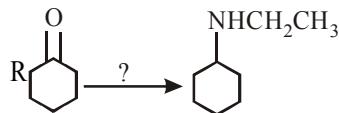
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- (1) RMMA (2) PVC
 (3) PAN (4) None of these

87. Concentration of NH_4Cl and NH_4OH in a buffer solution is in the ratio of 1 : 1, K_b for NH_4OH is 10^{-10} . The pH of the buffer is

88. Reagents capable of converting cyclohexanone to N-ethyl cyclohexylamine is



- (1) $\text{CH}_3\text{CH}_2\text{Br}$ and NH_3
 - (2) $\text{CH}_3\text{CH}_2\text{NH}_2$ and H_2/Pt
 - (3) $\text{CH}_3\text{CH} = \text{O}$ and NH_3
 - (4) LiAlH_4 followed by H_2O and then $\text{CH}_3\text{CH}_2\text{Br}$

- 89.** Phospholipids are esters of glycerol with

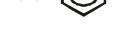
- (1) two carboxylic acid residues and one phosphate group
 - (2) one carboxylic acid residue and two phosphate groups
 - (3) three phosphate groups
 - (4) three carboxylic acid residues



- (1) 

(2) 

(3) 

(4) 

SPACE FOR ROUGH WORK

BIOLOGY

- 91.** Linnaeus system of plant classification is based on
(1) morphological and anatomical characters
(2) evolutionary trends
(3) floral characters
(4) None of the above

92. One of the major components of cell wall of most fungi is
(1) Cellulose (2) Hemicellulose
(3) Chitin (4) Peptidoglycan

93. Visuses have
(1) DNA enclosed in a protein coat
(2) Prokaryotic nucleus
(3) Single chromosome
(4) Both DNA and RNA

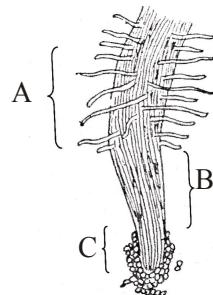
94. Brown algae is characterised by the presence of
(1) phycocyanin (2) phycoerythrin
(3) fucoxanthin (4) haematochrome

95. An advanced character of angiosperm is
(1) fruit formation
(2) single fertilisation
(3) pollen tube
(4) motile gametes

96. Animal group with pseudocoelom is
(1) Echinoderms (2) Molluscs
(3) Aschelminthes (4) Annelids

97. Insects have blood which
(1) resembles human blood in colour
(2) circulates through arteries and veins
(3) circulates through an open system
(4) has haemoglobin in the cells

- 98.** Which of the following region of the root is responsible for absorption?



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104. Epithelial tissue serves as

- (1) protective covering
- (2) reproductive structures
- (3) corpuscles
- (4) nerve cells

105. Alary muscle is associated with

- (1) heart and circulation
- (2) malpighian tubules and excretion
- (3) trachea and respiration
- (4) none of these

106. Match the type of tissue in Column I along with their functions given in Column II.

	Column I	Column II
(1)	Epithelial tissue	Protection
(2)	Muscular tissue	Conduction of nerve impulse
(3)	Nervous tissue	Binding together different tissues
(4)	Connective tissue	Movement and locomotion

107. The main difference between plant and animal cell is

- (1) animal cells lack cell wall
- (2) plant cell has no cell wall
- (3) animal cell has a rigid cell wall
- (4) plant cells lack cell membrane

108. Which one of the following structure between two adjacent cells is an effective transport pathway?

- (1) Plasmodesmata
- (2) Plastoquinones
- (3) Endoplasmic reticulum
- (4) Plasmalemma

109. Two membrane envelope is found in

- (1) mitochondria, golgi apparatus and chloroplast
- (2) mitochondria, nucleus and chloroplast
- (3) nucleus, golgi apparatus and endoplasmic reticulum
- (4) nucleus, ribosome and chloroplast

110. The secondary structure of a protein refers to

- (1) α -helical backbone
- (2) hydrophobic interactions
- (3) sequence of α -amino acids
- (4) fixed configuration of the polypeptide backbone

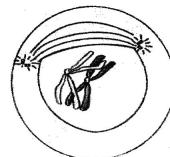
111. Which one of the following biomolecule is correctly characterised?

- (1) Alanine amino acid - contains an amino group and an acidic group anywhere in the molecule.
- (2) Lecithin - a phosphorylated glyceride found in cell membrane.
- (3) Palmitic acid - an unsaturated fatty acid with 18 carbon atoms.
- (4) Adenylic acid - adenosine with a glucose phosphate molecule.

112. In mitosis, the movement of chromosomes requires

- (1) presence of centromere
- (2) plasmalemma
- (3) spindle fibres
- (4) nucleotides

113. The following figure shows a stage of Prophase I of meiosis. Identify the stage.



- (1) Diakinesis
- (2) Leptotene
- (3) Pachytene
- (4) diplotene

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- 114.** The process of mitosis can be studied in
(1) onion root tip (2) garlic root tip
(3) tendril tip (4) all of the above

115. Which of the following statements does not apply to reverse osmosis?
(1) It is used for water purification.
(2) In this technique, pressure greater than osmotic pressure is applied to the system.
(3) It is a passive process.
(4) It is an active process.

116. The chief role of transpiration in plants is to cause _____.
(1) loss of surplus water
(2) cooling of the plant
(3) rapid ascent of sap
(4) rapid rise of minerals

117. Photosynthetic photolysis of water takes place in presence of
(1) Mn (2) Cl
(3) both (1) and (2) (4) none of the above

118. Nitrates are converted to nitrogen by
(1) Nitrogen fixing bacteria
(2) Ammonification bacteria
(3) Denitrifying bacteria
(4) Nitrifying bacteria

119. In photosynthesis, light energy is utilized in
(1) Converting ATP into ADP
(2) Changing CO_2 into carbohydrate
(3) Converting ADP into ATP
(4) All of the above

120. Given are statements regarding special features of C_4 plants.
Identify the incorrect statement.
(1) C_4 plants can tolerate high temperatures
(2) C_4 plants show specialized leaf anatomy
(3) C_4 plants undergo photorespiration
(4) C_4 plants respond to higher intensities of light thereby having greater productivity of biomass.

121. Besides the net gain of 2 ATP molecules in glycolysis which other molecules are simultaneously formed
(1) FADH_2 (2) NADPH_2
(3) NADH_2 (4) FAMH_2

122. What is the other name of glycolysis
(1) EMP pathway (2) TCA pathway
(3) HMS pathway (4) None of the above

123. In plants, auxin synthesis occurs in
(1) cortex
(2) phloem cells
(3) root and shoot tips
(4) xylem cells

124. Which of the following is not naturally occurring plant hormone?
(1) 2, 4-D (2) GA_2
(3) Gibberellin (4) IAA

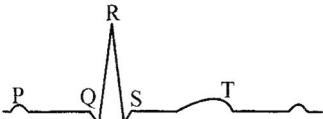
125. HCl is secreted by
(1) zymogen cells (2) oxyntic cells
(3) Kupffer cells (4) mucous cells

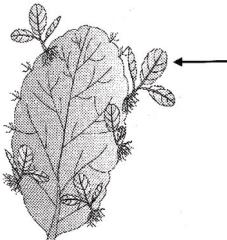
126. Fructose is absorbed into the blood through mucosa cells of intestine by the process called
(1) active transport
(2) facilitated transport
(3) simple diffusion
(4) co-transport mechanism

127. There is a membrane covering the lungs, called
(1) Peritoneum (2) Pleura
(3) Pericardium (4) Duramater

128. Body tissues obtain O_2 from oxyhaemoglobin because of its dissociation caused by
(1) high O_2 concentration
(2) low O_2 concentration
(3) low O_2 and high CO_2 concentration
(4) high CO_2 concentration

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- 129.** Which one of the following is correct?
- Plasma = Blood – Lymphocytes
 - Serum = Blood + Fibrinogen
 - Lymph = Plasma + RBC + WBC
 - Blood = Plasma + RBC + WBC + Platelets
- 130.** The diagram given here is the standard ECG of a normal person. The P-wave represents the
- 
- Concentration of both the atria
 - Initiation of the ventricular contraction
 - Beginning of the systole
 - End of systole
- 131.** Bowman's capsule and glomerulus together constitute
- nothing
 - a nephron
 - Malpighian corpuscles
 - nephric capsule
- 132.** Which of the following function is performed by collecting tubule of kidney?
- Maintenance of pH and ionic balance of blood by the secretion of H^+ and K^+ ions.
 - Maintenance of pH of blood and removal of Na^+ and K^+ ions
 - Absorption of glucose and ammonia from the blood
 - None of above
- 133.** Upon stimulation of skeletal muscles, calcium is immediately made available for binding to troponin from
- blood
 - lymph
 - sarcoplasmic reticulum
 - bone

- 134.** Joints are lubricated by
- epidermis
 - dermis
 - tympanic membrane
 - synovial fluid
- 135.** The nerve centres which control the body temperature and the urge for eating are contained in
- hypothalamus
 - pons
 - cerebellum
 - thalamus
- 136.** A gymnast is able to balance his body upside down even in the total darkness because of
- Cochlea
 - Vestibular apparatus
 - Tectorial membrane
 - Organ of corti
- 137.** A substance called ADH is
- a hormone that promotes glycogenesis in liver cells
 - an enzyme secreted by cell of intestinal wall; hydrolyses dipeptides into amino acids
 - a pituitary secretion which promotes reabsorption of water from glomerular filtrate
 - a high energy compound involved in muscle contraction
- 138.** Which is not gonadal hormone?
- Progesterone
 - Testosterone
 - Adrenalin
 - Estrogen
- 139.** Which vegetative propagule is shown by the arrows marked in the diagram given below
- 
- Adventitious buds
 - Offset
 - Bulbil
 - Rhizome

SPACE FOR ROUGH WORK

140. Fragmentation is a mode of asexual reproduction seen in

- (1) *Penicillium* (2) *Amoeba*
- (3) *Hydra* (4) *Paramecium*

141. Which of the following parts of the flower wither and fall off after fertilization?

- (1) Stamens (2) Petals
- (3) Pistil (4) Both (1) and (2)

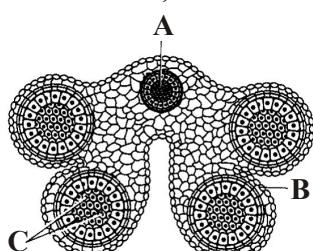
142. Seedless fruits in *Vitis* are formed due to

- (1) Sterility
- (2) Double fertilization
- (3) Syngamy
- (4) Parthenocarpy

143. Seed formation without fertilization in flowering plants involves process of

- (1) Somatic hybridization
- (2) Apomixis
- (3) Sporulation
- (4) Budding .+

144. The following is the diagram of TS of anther. Identify the parts labelled as A, B and C.



- (1) A—Connective, B – Endothecium,
C—Pollen grain
- (2) A—Endothecium, B—Connective,
C—Pollen grain
- (3) A—Pollen grain, B—Connective,
C – Endothecium
- (4) A—Endothecium, B—Pollen grain,
C—Connective

145. Apomictic embryos in *Citrus* arise from

- (1) synergids
- (2) maternal sporophytic tissue in ovule
- (3) antipodal cells
- (4) diploids egg

146. Forerunner of male gamete is

- (1) megasporangium
- (2) embryo sac
- (3) microspore mother cell
- (4) antipodal cell

147. Germ cells present in the seminiferous tubules undergo

- (1) oogenesis (2) spermatogenesis
- (3) parthenogenesis (4) both (2) and (3)

148. Oocyte is liberated from ovary under the influence of LH, after completing

- (1) meiosis and before liberating polar bodies
- (2) meiosis-I and before liberating polar bodies
- (3) meiosis
- (4) meiosis I after release of polar body

149. Which one of the following is the most likely reason of not occurring regular menstruation cycle in females?

- (1) Fertilisation of the ovum
- (2) Maintenance of the hypertrophical endometrial lining
- (3) Maintenance of high concentration of sex-hormones in the blood stream
- (4) Retention of well-developed corpus luteum

150. In sexually reproducing animals, the union of male and female gamete forms a cell which is called

- (1) Ovarian cell (2) Oocyte
- (3) Zygote (4) Graafian follicle

SPACE FOR ROUGH WORK

- 151.** Which of the following is INCORRECT regarding vasectomy?
- Irreversible sterility
 - No sperm occurs in seminal fluid
 - No sperm occurs in epididymis
 - Vasa deferentia is cut and tied
- 152.** Embryo with more than 16 blastomeres formed due to in vitro fertilization is transferred into
- cervix
 - uterus
 - fallopian tube
 - fimbriae
- 153.** Which of the following technique is being misused in determination of sex of foetus?
- IVF
 - Amniocentesis
 - ZIFT
 - IUT
- 154.** F_1 generation means
- first flowering generation
 - first fertile generation
 - first filial generation
 - first seed generation
- 155.** If a F_1 dihybrid plant is crossed with a recessive plant, the ratio obtained will be
- $1 : 1 : 1 : 1$
 - $1 : 1 : 1 : 2$
 - $9 : 3 : 3 : 1$
 - $1 : 1$
- 156.** A given double stranded DNA molecule is 1,00,000 base pairs long. The length of this DNA molecule will be
- 10,000 nm
 - 3.4×10^4 nm
 - 10^4 nm
 - 2,00,000 nm
- 157.** The codons UUU and UUC codes for phenylalanine only. This feature of genetic code is called
- commaless
 - non-overlapping
 - degenerate
 - non-ambiguous
- 158.** Finding of Miller's experiment on origin of life has provided evidence for the
- theory of special creation
 - theory of organic evolution
 - theory of biogenesis
 - theory of abiogenesis
- 159.** Random genetic drift in a population results from
- highly genetically variable individual
 - interbreeding within the population
 - constant low mutation
 - large population
- 160.** Which one of the following is an air-borne disease?
- Typhoid
 - Ascariasis
 - Pneumonia
 - Amoebiasis
- 161.** The treatment of snake bite by antivenom is an example of
- Specific natural immunity
 - Naturally acquired passive immunity
 - Artificially acquired passive immunity
 - Artificially acquired active immunity
- 162.** Match Column I and Column II and choose the correct option
- | | Column I | | Column II |
|------|----------------------|----|----------------------|
| i. | Common acid | P. | Antiretroviral drugs |
| ii. | Rheumatoid arthritis | Q. | Droplet infection |
| iii. | Allergen | R. | Auto-immune disease |
| iv. | AIDS | S. | Animal dander |
- (i – P); (ii – Q) (iii – S); (iv – R)
 - (i – Q); (ii – S) (iii – P); (iv – R)
 - (i – Q); (ii – R) (iii – S); (iv – P)
 - (i – Q); (ii – P) (iii – R); (iv – S)
- 163.** Which one of the following variety is resistant to white rust disease?
- Pusa Komal*
 - Pusa Sem 2*
 - Pusa Swarnim*
 - Pusa Sawani*

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- 164.** Which of the following has nothing to do with tissue culture?

 - totipotency
 - chemiosmotic theory
 - pollen haploid
 - somatic hybrid

165. Which one of the following is not true for micro-organisms?

 - Microbes are the minor components of biological systems on earth.
 - Microbes also exist at sites where possibly no other life forms are present.
 - Microbes can survive in acidic environments.
 - Prions are proteinaceous infectious agents.

166. Organic farming is the technique of raising crops through use of

 - manures
 - resistant varieties
 - biofertilizers
 - All of these

167. Which one of the following statement is wrong with respect to separation of DNA fragments on gel electrophoresis?

 - The DNA fragments resolve according to their size.
 - The DNA fragments move towards anode under electric field through the matrix
 - The smaller DNA fragments separate first.
 - The commonly used matrix is agarose gel.

168. Antibiotic resistance gene in a vector usually helps in the selection of

 - competent cells
 - transformed cells
 - recombinant cells
 - none of the above

169. Match the column and opt for the appropriate answer

	Column – I		Column – II
a.	Gene gun	(i)	β -galactosidase
b.	Fungus	(ii)	Biolistics
c.	Chloramphenicol	(iii)	Chitinase
d.	Insertional inactivation	(iv)	Antibiotic

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

170. Insect pest resistant *Bt* cotton plant was developed using

 - somaclonal variation
 - microppropagation
 - somatic hybridisation
 - transgenic technology

171. Select the correct option for the given statements I, II and III

 - A transgenic cow, Rosie produced human protein-enriched milk, which was nutritionally more balanced product for human babies than natural cow milk.
 - Milk produced by transgenic cow, Rosie contain 2.4 gm protein/L.
 - In the above mentioned milk in II statement, alpha-lactalbumin is present.

Codes

 - Statements I, II, III are true and statement III does not give correct explanation of I
 - Statements I, II, III are true and statement III gives correct explanation for I
 - Statements I and II are true, Statement III is false
 - Statements I and II are false, Statement III is true

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PLATFORM

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