MHT CET 2020 PCB Oct 6 Shift 1

Question Paper

Conducted by the State Common Entrance Test Cell, Maharashtra

Time Allowed: 180 Minutes **PCB Group** **Maximum Marks: 200**

General Instructions

(i) This is a **memory-based version** of the **MHT CET 2020 PCB Oct 6 Shift 1** (PCB group), conducted by the **State Common Entrance Test Cell, Maharashtra**. The questions were recalled by candidates who appeared in the exam.

(ii) This edition includes **197 of 200 questions**: **50 Physics**, **48 Chemistry**, **99 Biology**. Original subject question numbers are retained; Chemistry questions 36, 45; Biology Q60 are unavailable.

(iii) The full PCB exam has **200 questions** and **200 marks**: Section 1 - **Physics and Chemistry** (50 questions each, 100 marks), followed by Section 2 - **Biology** (100 questions, 100 marks). Each section lasts **90 minutes**.

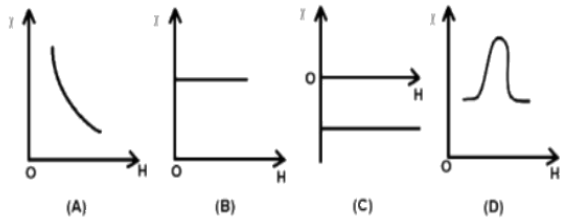
(iv) Candidates cannot switch between sections. Section 1 closes automatically after its 90 minutes, and Section 2 follows.

(v) All questions in the exam are compulsory. Each multiple choice question offers **four options**, of which **exactly one is correct**.

(vi) Each correct answer earns **1 mark**. There is **no negative marking**; unanswered questions carry 0 marks.

(vii) Use rough sheets for calculations and rough work. Calculators, log tables and electronic gadgets are not allowed.

1. Which graph shows the variation of magnetic susceptibility (χ) with magnetising field (H) for a paramagnetic substance?

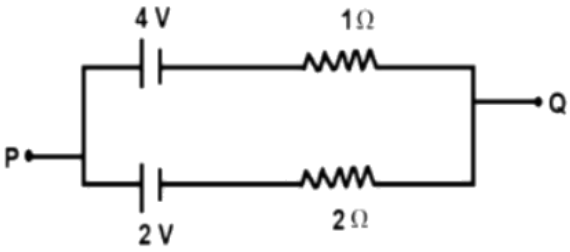


(A) (A) (B) (B)
(C) (C) (D) (D)

2. A block of mass 'm' moving on a frictionless surface at speed 'V' collides elastically with a block of same mass, initially at rest. Now the first block moves at an angle 'θ' with its initial direction and has speed 'V_1'. The speed of the second block after collision is

(A) $\sqrt{V^2 + V_1^2}$ (B) $\sqrt{V - V_1}$
(C) $\sqrt{V^2 - V_1^2}$ (D) $\sqrt{V_1^2 - V^2}$

3. In the following circuit, what is the voltage across PQ?

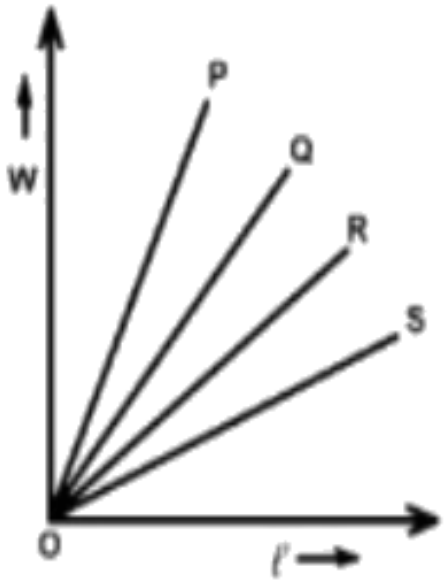


(A) $\frac{5}{3}$ V (B) $\frac{14}{3}$ V
(C) $\frac{8}{3}$ V (D) $\frac{11}{3}$ V

4. A charge 'q' is circulating with constant speed 'V' in a semi-circular loop of wire of radius 'R'. The magnetic moment of this loop is

(A) $\frac{qV\pi R}{2(\pi+2)}$ (B) qVR
(C) $\frac{qVR}{\pi+2}$ (D) $\frac{qVR}{\pi}$

5. Following graph shows the variation of load (w) versus elongation (ℓ) for four wires of the same length and material represented by lines OP, OQ, OR and OS. Which line represents the thickest wire?



(A) line OQ (B) line OP
(C) line OR (D) line OS

6. The bob of a simple pendulum is released at time $t = 0$ from a position of small angular displacement. Its linear displacement is (ℓ = length of simple pendulum and g = acceleration due to gravity, A = amplitude of S.H.M.)

(A) $A \sin\left(\sqrt{\frac{\ell}{g}}\right) t$ (B) $A \cos\left(\sqrt{\frac{g}{\ell}}\right) t$
(C) $A \cos\left(\sqrt{\frac{\ell}{g}}\right) t$ (D) $A \sin\left(\sqrt{\frac{g}{\ell}}\right) t$

7. The sensitivity of a milliammeter of range 0 to 50 mA is $x \frac{\text{div}}{\text{mA}}$. If it is converted into an ammeter of range 500 mA by using a suitable shunt then the sensitivity will be

(A) $\frac{x}{20} \frac{\text{div}}{\text{mA}}$ (B) $\frac{x}{5} \frac{\text{div}}{\text{mA}}$
(C) $\frac{x}{15} \frac{\text{div}}{\text{mA}}$ (D) $\frac{x}{10} \frac{\text{div}}{\text{mA}}$

8. Let the physical quantity be $x = \frac{a^2b^2}{c}$. If the percentage error in the measurement of a, b and c is 2%, 3% and 4% respectively then percentage error in the measurement of 'x' is

(A) 14% (B) 7%

(C) 28% (D) 21%

9. The phase difference between the voltage and the current in an a.c. circuit is $\frac{\pi}{4}$. If the frequency is 50 Hz then the phase difference is equivalent to a time of

(A) 4.5×10^{-3} s (B) 1.5×10^{-3} s

(C) 3.5×10^{-3} s (D) 2.5×10^{-3} s

10. A particle of mass 4 gram moves along a circle of radius $\frac{10^2}{2\pi}$ cm with constant tangential acceleration. After beginning of the motion, by the end of second revolution, the kinetic energy of the particle becomes 18×10^{-5} J. Magnitude of tangential acceleration is

(A) 2.25×10^{-6} m/s^2 (B) 2.25×10^{-5} m/s^2

(C) 2.25×10^{-4} m/s^2 (D) 2.25×10^{-3} m/s^2

11. In a series LCR circuit at resonance, the applied e.m.f. of the source and current in the circuit are

(A) out of phase. (B) differ in phase by $\frac{\pi}{2}$ rad.

(C) in phase. (D) differ in phase by $\frac{\pi}{4}$ rad.

12. The length of antenna required to transmit the signals of frequency 1.5×10^8 Hz is [velocity of light in air, $c = 3 \times 10^8$ m/s]

(A) 50 cm (B) 40 cm

(C) 50 m (D) 20 cm

13. When a ray of light is refracted from one medium to another, then the wavelength changes from 6000 Å to 4000 Å. The critical angle for the interface will be

(A) $\cos^{-1}\left(\frac{2}{3}\right)$ (B) $\sin^{-1}\left(\frac{2}{3}\right)$

(C) $\cos^{-1}\left(\frac{1}{\sqrt{3}}\right)$ (D) $\sin^{-1}\left(\frac{1}{\sqrt{3}}\right)$

14. If 'I' is the moment of inertia, 'L' is angular momentum of a rotating body, then $\frac{L^2}{2I}$ is its

(A) linear momentum (B) torque

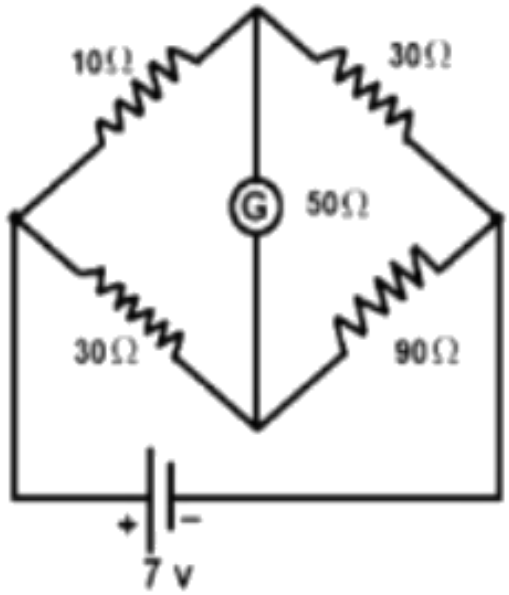
(C) translational kinetic energy (D) rotational kinetic energy

15. If the frequency of oscillation of a simple pendulum in simple harmonic motion is 'n', then frequency of oscillation of simple pendulum when length is 4 times is

(A) 4 n (B) 2 n

(C) n (D) $\frac{n}{2}$

16. In the following circuit, the internal resistance of the cell is 5Ω, the current drawn from the cell will be



(A) 0.4 A (B) 0.1 A

(C) 0.2 A (D) 0.3 A

17. The third overtone of a closed pipe is in unison with the second overtone of an open pipe. Hence the ratio of the length of the closed pipe to that of the open pipe is

(A) 1 : 2 (B) 6 : 7

(C) 7 : 6 (D) 3 : 2

18. Two rings of radii R and nR made from the same wire have the ratio of moments of inertia about an axis passing through their centre and perpendicular to the plane of the rings is 1 : 8. The value of n is

(A) $\frac{1}{2}$ (B) $2\sqrt{2}$

(C) 2 (D) 4

19. The angle of polarisation for a medium is 60° . The critical angle for this will be ($\tan 60° = \sqrt{3}$)

(A) $\cos^{-1}(\sqrt{3})$ (B) $\tan^{-1}(\sqrt{3})$

(C) $\sin^{-1}(\sqrt{3})$ (D) $\sin^{-1}\left(\frac{1}{\sqrt{3}}\right)$

20. A particle of mass 'm' is rotating in a horizontal circle of radius 'r' with uniform velocity $\vec{V}$. The change in its momentum at two diametrically opposite points will be

(A) $m\vec{V}$ (B) $3m\vec{V}$

(C) $-2m\vec{V}$ (D) $-m\vec{V}$

21. In hydrogen atom, during the transition of electron from n^{th} outer orbit to first Bohr orbit, a photon of wavelength 'λ' is emitted. The value of 'n' is [R = Rydberg's constant]

(A) $\sqrt{\frac{\lambda R}{\lambda R-1}}$ (B) $\sqrt{\frac{\lambda R-1}{\lambda R}}$

(C) $\sqrt{\lambda R(\lambda R-1)}$ (D) $\sqrt{\lambda(R-1)}$

22. Two identical wires of same length are vibrating in unison with a tuning fork, under same tension. The length of one wire is decreased by 1 cm and it produces 3 beats per second with the tuning fork. The length of other wire is increased by 1 cm and it produces 2 beats per second with the tuning fork. If the original length of wire is 67 cm, the frequency of the tuning fork is

(A) 167 Hz (B) 166 Hz

(C) 165 Hz (D) 168 Hz

23. The surface density of charge on the surface of a charged conductor in air is 0.885 $\frac{\mu C}{m^2}$. The outward force per unit area of charged conductor is ($\epsilon_o = 8.85 \times 10^{-12} \frac{C^2}{N\text{-}m^2}$)

(A) $5 \times 10^{-3} \frac{N}{m^2}$ (B) $4.425 \times 10^{-2} \frac{N}{m^2}$

(C) $5 \times 10^{-2} \frac{N}{m^2}$ (D) $8.85 \times 10^{-2} \frac{N}{m^2}$

24. An electron moving with initial velocity $\vec{V} = V_o\hat{i}$ is moving in a magnetic field $\vec{B} = B_o\hat{j}$ then its de-Broglie wavelength

(A) increases with time. (B) first increases and then decreases.

(C) decreases with time. (D) remains constant.

25. The r.m.s. velocity of hydrogen molecules at temperature T is seven times the r.m.s. velocity of nitrogen molecules at 300 K. This temperature T is (Molecular weights of hydrogen and nitrogen are 2 and 28 respectively)

(A) 1050 K (B) 1700 K

(C) 1350 K (D) 2100 K

26. Light of frequency 2 times the threshold frequency is incident on a photo sensitive material. If the frequency is made $\frac{1}{3}^{\text{rd}}$ and intensity is doubled then the photocurrent will

(A) be doubled (B) be zero

(C) be $\frac{1}{3}^{\text{rd}}$ (D) be tripled

27. A circular disc 'X' of radius 'R' made from iron plate of thickness 't' has moment of inertia 'I_x' about an axis passing through the centre of disc and perpendicular to its plane. Another disc 'Y' of radius '3R' made from an iron plate of thickness $\left(\frac{t}{3}\right)$ has moment of inertia 'I_y' about the axis same as that of disc X. The relation between I_x and I_y is

(A) $I_y = 9\ I_x$ (B) $I_y = I_x$

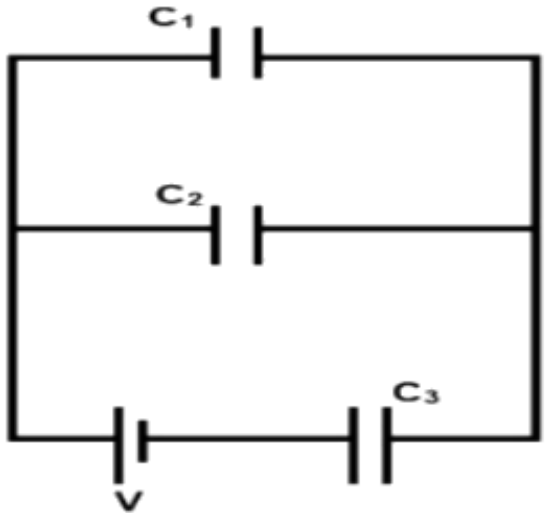
(C) $I_y = 27\ I_x$ (D) $I_y = 3\ I_x$

28. A wooden block is placed on a rough horizontal surface. It is given a velocity 'u' m/s and coefficient of friction between the block and the surface is 'μ'. The distance covered by the block before coming to rest is (g = acceleration due to gravity)

(A) $\frac{u^2}{\mu g}$ (B) $\frac{u^2}{2\mu g}$

(C) $\frac{u}{\mu g}$ (D) $\frac{u}{\mu^2 g}$

29. In the figure shown, the voltage across C_3 will be



(A) $\frac{C_1V}{C_1+C_2+C_3}$ (B) $\frac{C_3V}{C_1+C_2+C_3}$

(C) $\frac{C_2V}{C_1+C_2+C_3}$ (D) $\frac{(C_1+C_2)V}{C_1+C_2+C_3}$

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30. To what depth must a rubber ball be taken in deep sea so that its volume is decreased by 0.2%. The bulk modulus of rubber is $9.8 \times 10^8\ \mathrm{N/m^2}$ and the density of sea water is $10^3\ \mathrm{kg/m^3}$? (g = 9.8 $\mathrm{m/s^2}$)

(A) 200 m (B) 100 m
(C) 50 m (D) 25 m

31. Two wires carrying currents I and 2I (in opposite directions) are parallel to each other. Third wire carrying current I is placed midway between the two wires and anti-parallel to a wire carrying current I. Force due to magnetic field on third wire will be

(A) towards a wire carrying current I. (B) perpendicular to plane of currents.
(C) zero. (D) towards a wire carrying current 2I.

32. Length of an organ pipe open at both ends is 34 cm. If velocity of sound is 340 m/s, then the frequency of 2^{nd} overtone is

(A) 2400 Hz (B) 1000 Hz
(C) 1500 Hz (D) 2000 Hz

33. If number of turns in moving coil galvanometer becomes half, then the deflection for the same current will become

(A) half. (B) double.
(C) four times. (D) same.

34. A particle starting from mean position oscillates simple harmonically with period 4 s. After what time will its kinetic energy be 75% of the total energy? ($\cos 30^\circ = \frac{\sqrt{3}}{2}$)

(A) $\frac{1}{3}$ S (B) $\frac{1}{2}$ S
(C) $\frac{1}{5}$ S (D) $\frac{1}{4}$ S

35. In a semiconductor diode, the barrier potential offers opposition to only

(A) majority carriers in both regions. (B) holes in the p-region.
(C) minority carriers in both regions. (D) free electrons in the n-region.

36. A block of mass 'm' collides with another stationary block of mass '2m'. The lighter block comes to rest after collision. If the velocity of first block is 'u', then the value of coefficient of restitution is

(A) 0.4 (B) 0.8
(C) 0.5 (D) 0.6

37. A large number of liquid drops each of radius 'r' coalesce to form a big drop of radius 'R'. The energy released in the process is converted into kinetic energy of the big drop. The speed of the big drop is (T = surface tension of liquid, ρ = density of liquid)

(A) $\left[\frac{6T}{\rho}\left(\frac{1}{r}+\frac{1}{R}\right)\right]^{\frac{1}{2}}$ (B) $\left[\frac{3T}{\rho}\left(\frac{1}{r}+\frac{1}{R}\right)\right]^{\frac{1}{2}}$
(C) $\left[\frac{6T}{\rho}\left(\frac{1}{r}-\frac{1}{R}\right)\right]^{\frac{1}{2}}$ (D) $\left[\frac{3T}{\rho}\left(\frac{1}{r}-\frac{1}{R}\right)\right]^{\frac{1}{2}}$

38. A thin lens of glass of refractive index 1.5 has focal length 24 cm in air. It is now immersed in a liquid of refractive index $\frac{9}{8}$. Its new focal length is

(A) 72 cm (B) 54 cm
(C) 36 cm (D) 18 cm

39. A vector $\vec{P}$ has components along X and Y axis having magnitude 2 units and 4 units respectively. A vector along negative X - axis, $\vec{Q}$ has magnitude 6 units. Then vector $(\vec{P}-\vec{Q})$ is

(A) $4(2\hat{i}+\hat{j})$ (B) $-4(2\hat{i}-\hat{j})$
(C) $4(2\hat{i}-\hat{j})$ (D) $-4(2\hat{i}+\hat{j})$

40. In a biprism experiment, red light of wavelength 6500 Å was used. It was then replaced by green light of wavelength 5200 Å. The value of n for which $(n+1)^{\text{th}}$ green bright band would coincide with n^{th} red bright band for the same setting is

(A) n = 5 (B) n = 3
(C) n = 4 (D) n = 2

41. The wave described by $y = 0.35\sin(2\pi t - 10\pi x)$, where x and y are in metre and t in second, is a wave travelling along the

(A) negative x-direction with amplitude 0.35 m and wavelength $\lambda = 0.5$ m (B) negative x-direction with frequency π Hz and wavelength $\lambda = 0.5$ m
(C) positive x-direction with frequency 1 Hz and amplitude 3.5 m (D) positive x-direction with frequency 1 Hz and wavelength $\lambda = 0.2$ m

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42. The excess pressure inside a soap bubble of volume 'V' is three times the excess pressure inside a second soap bubble of volume 'V_1'. The value of $\left(\frac{V_1}{V}\right)$ is

(A) 1 : 3 (B) 9 : 1

(C) 1 : 9 (D) 3 : 1

43. The gravitational potential energy of a rocket of mass 200 kg at a distance 10^6 m from the centre of the earth is 3×10^8 J. The weight of the rocket at a distance 10^8 m from the centre of the earth is

(A) 1.5×10^{-2} N (B) 3×10^{-2} N

(C) 6×10^{-2} N (D) 4.5×10^{-2} N

44. A transistor is connected in C-E mode. If collector current is 72×10^{-5} A and $\alpha = 0.96$, then base current will be

(A) 30 μ A (B) 26 μ A

(C) 28 μ A (D) 24 μ A

45. The radiations of energies 1eV and 2.5 eV are incident on a metal surface having work function 0.5 eV. The ratio of the maximum velocities of the emitted photo-electrons is

(A) 1 : 1 (B) 1 : 2

(C) 1 : 3 (D) 1 : 4

46. In Young's double slit experiment, for wavelength λ_1 the n^{th} bright fringe is obtained at a point P on the screen. Keeping the same setting, source of light is replaced by wavelength λ_2 and now $(n+1)^{th}$ bright fringe is obtained at the same point P on the screen. The value of n is

(A) $\frac{\lambda_1-\lambda_2}{\lambda_2}$ (B) $\frac{\lambda_1}{\lambda_1-\lambda_2}$

(C) $\frac{\lambda_1-\lambda_2}{\lambda_1}$ (D) $\frac{\lambda_2}{\lambda_1-\lambda_2}$

47. Magnetic induction at a point along the axis of a bar magnet is equal to magnetic induction at a point along the equator. Ratio of the distance along the axis to distance along equator is

(A) $\sqrt{2}:1$ (B) 2 : 1

(C) $\sqrt[3]{2}:1$ (D) $1:\sqrt{2}$

48. Two vessels separately contain two ideal gases A and B at the same temperature. The pressure of A is twice that of B. Under such conditions, the density of A is found to be 1.5 times the density of B. The ratio of molecular weights of A and B is

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

(C) $\frac{1}{2}$ (D) $\frac{2}{3}$

49. Which one of the following is a unit vector ?

(A) $(\cos\theta)\hat{i} + (\sin\theta)\hat{j}$ (B) $\frac{1}{\sqrt{3}}(\hat{i}+\hat{j})$

(C) $2\hat{i} - 3\hat{j}$ (D) $(\sin\theta)\hat{i} - (2\cos\theta)\hat{j}$

50. The length of the seconds pendulum is 1 m on the earth. If the mass and diameter of the planet is half that of the earth then the length of the seconds pendulum on the planet will be

(A) 0.5 m (B) 1 m

(C) 1.5 m (D) 2 m

Section 1 · Chemistry · 48 available questions

1. Which among the following changes occurs at 900 K in blast furnace for extraction of iron?

(A) Reduction of ore by C
(B) Reduction of ore by CO
(C) Ore loses moisture
(D) Limestone decomposes

2. Which among the following is a tear gas ?

(A) $COCl_2$
(B) CCl_2F_2
(C) ClC_2H_4-S-C_2H_4Cl
(D) CCl_3NO_2

3. Identify the product obtained when 3, 5 - dinitrobenzoic acid is heated with thionyl chloride ?

(A) 3, 5 - Dinitrobenzyl chloride
(B) 3, 5 - Dichlorobenzyl chloride
(C) 3, 5 - Dinitrobenzoyl chloride
(D) 3 - Chloro - 5 - nitrobenzoic acid

4. Which of the following compounds is obtained as valuable byproduct in preparation of phenol from cumene ?

(A) Propanal
(B) Propan - 1-ol
(C) Propan - 2-ol
(D) Propanone

5. The number of moles of ammonia present in 5.6 dm^3 of it's volume at S.T.P. is ?

(A) 0.75
(B) 1.0
(C) 0.50
(D) 0.25

6. Heat of formation of H_2O is -270 kJ mol^{-1}. How much water can be decomposed by 675 kJ of heat ?

(A) 45 g
(B) 40 g
(C) 27 g
(D) 33 g

7. Aniline on reaction with Bromine water at room temperature gives

(A) p - bromoaniline
(B) 2, 4, 6 - Tribromoaniline
(C) m - bromoaniline
(D) o - bromoaniline

8. What is the value of dipole moment for HCl molecule ?

(A) 1.91 D
(B) 1.03 D
(C) 1.85 D
(D) 3.33 D

9. The volume of given mass of a gas at 'x' K is 2 dm^3. What is the new volume of gas at constant pressure, if temperature is increased to 10 x K ?

(A) 20 dm^3
(B) (1/4) dm^3
(C) 4 dm^3
(D) (1/20) dm^3

10. Which of the following is a property of co ordination compound and not of double salt ?

(A) These dissociate into their constituent ions when dissolved in water.
(B) These show entirely different properties from their constituent ions.
(C) These lose their identity in aqueous solution.
(D) Aqueous solution of these gives the tests of all constituent ions.

11. Which of the following compounds forms a colloidal solution when dissolved in water ?

(A) Glucose
(B) Ammonium chloride
(C) Common salt
(D) Starch

12. What is the symbol of an element having atomic number 113 ?

(A) Uut
(B) Uup
(C) Uub
(D) Uuu

13. Which of the following polymers is used to obtain adhesives ?

(A) Neoprene rubber
(B) Buna - N
(C) Buna - S
(D) Melamine

14. How many donor groups are present in dimethyl glyoximato ?

(A) Three
(B) Two
(C) Four
(D) One

15. A metallic element has a cubic lattice with edge length of unit cell 2Å. Calculate the number of unit cells in 200 g of the metal, if density of metal is 2.5 g cm^{-3} ?

(A) 6.25×10^{25}
(B) 6.40×10^{25}
(C) 1.0×10^{25}
(D) 10.0×10^{25}

16. The conductivity of 0.01 M salt solution is 1.061×10^{-4} S cm^{-1}. What is molar conductivity of the solution ?

(A) $1.061 \times 10^{-4}\ \Omega^{-1}\ cm^2\ mol^{-1}$

(B) $1.061\ \Omega^{-1}\ cm^2\ mol^{-1}$

(C) $106.1\ \Omega^{-1}\ cm^2\ mol^{-1}$

(D) $10.61\ \Omega^{-1}\ cm^2\ mol^{-1}$

17. What is the highest oxidation state possessed by chlorine in it's oxyacids ?

(A) +1 (B) +3

(C) +5 (D) +7

18. What is the number of carbon atoms present in the alkanes found in nature as coatings of green leaves ?

(A) C_{29} to C_{31} (B) C_{15} to C_{18}

(C) C_{11} (D) C_6 to C_8

19. Which of the following is NOT having any food value ?

(A) Saccharin (B) Cane Sugar

(C) Fructose (D) Glucose

20. Identify the number of carbon atoms and number of oxygen atoms respectively present in pyran molecule

(A) 5 and 2 (B) 6 and 1

(C) 4 and 2 (D) 5 and 1

21. An element crystallises with bcc structure with atomic radius 17.32 nm. What is the edge length of unit cell ?

(A) 29 nm (B) 33 nm

(C) 64 nm (D) 40 nm

22. What is freezing point of a solution containing 1.8 g glucose dissolved in 1000 g of water (K_f of water = 1.86 K Kg mol^{-1} and at. mass C=12, H=1, O=16)

(A) 0.0186° C (B) -0.0093° C

(C) -0.0186° C (D) -0.0372° C

23. Which type of overlap is involved in formation of C-H bond in ethene molecule ?

(A) $sp^2 - p$ (B) $sp - s$

(C) $sp^3 - s$ (D) $sp^2 - s$

24. Which of the following aromatic acids has less acidic strength than benzoic acid ?

(A) o - nitrobenzoic acid (B) p - methoxy benzoic acid

(C) m - nitrobenzoic acid (D) o - chloro benzoic acid

25. 6.022×10^{21} molecules of glucose are present in 100 mL of it's aqueous solution, what is the concentration of this solution ?

(A) 1.0 M (B) 0.1 M

(C) 0.001 M (D) 0.01 M

26. When will be the reaction becomes spontaneous at all temperatures ?

(A) $\Delta H = -ve, \Delta S = +ve, \Delta G = -ve$

(B) $\Delta H = +ve$ or $-ve, \Delta S = 0, \Delta G = 0$

(C) $\Delta H = -ve, \Delta S = -ve, \Delta G = -ve$ or $+ve$

(D) $\Delta H = +ve, \Delta S = -ve, \Delta G = +ve$

27. Resistance of 0.1 M KCl solution in a conductivity cell is 300 ohm and conductivity is 0.013 S cm^{-1}. What is cell constant ?

(A) 4.5 cm^{-1} (B) 3.0 cm^{-1}

(C) 1.5 cm^{-1} (D) 3.9 cm^{-1}

28. In the laboratory hydrogen chloride is prepared by heating

(A) sodium chloride and concentrated sulphuric acid (B) bleaching powder and concentrated sulphuric acid

(C) potassium chlorate and concentrated sulphuric acid (D) bleaching powder and ammonia solution

29. What is the site of action of antihistamine ?

(A) Small intestine (B) Stomach wall

(C) Liver (D) Large intestine

30. What is the mass of solute (molar mass 39) in 156 g of benzene, if mole fraction of solute in benzene is 0.2 ? (at.wt C=12, H=1)

(A) 15.8 g (B) 19.5 g

(C) 22.4 g (D) 10 g

31. A sample of gas absorbs 4000 kJ of heat and surrounding does 2000 J of work on sample, what is the value of ΔU ?

(A) 4000 kJ (B) 2000 kJ

(C) 4002 kJ (D) 6000 kJ

32. Hydroxide of which alkali metal is used in manufacture of soft soap ?

(A) Lithium (B) Caesium
(C) Potassium (D) Sodium

33. Which of the following is NOT an electrophile ?

(A) H^+ (B) $AlCl_3$
(C) NO_2^+ (D) K^+

34. What is the colour of solution obtained when 2- Nitropropane react with nitrous acid ?

(A) yellow (B) red
(C) blue (D) green

35. Which of the following compounds is NOT isomeric with ethoxy ethane ?

(A) 1- Methoxy propane (B) 2- Methyl butan - 2-ol
(C) 2- Methoxy propane (D) 2- Methyl propan - 2-ol

37. The edge length of bcc type of unit cell of metal is 5 Å. What is the radius of metal atom if it's density is 2 g/cc ?

(A) 176.8 pm (B) 232.5 pm
(C) 216.5 pm (D) 246.5 pm

38. Which among the following is used as catalyst in Raschig method for preparation of phenol ?

(A) Calcium Sulphate (B) Calcium phosphate
(C) Calcium chloride (D) Calcium carbonate

39. Mg_3N_2 reacts with water to produce

(A) $Mg(OH)_2$ and NH_3 (B) $Mg(OH)_2$ and N_2O
(C) $MgO + NH_3$ (D) $MgO + NH_4OH$

40. The time required to decompose SO_2Cl_2 to half of it's initial amount is 60 minutes. Calculate rate constant for this first order reaction ?

(A) 1.551×10^{-2} min^{-1} (B) 4.158×10^{-2} min^{-1}
(C) 1.155×10^{-2} min^{-1} (D) 2.651×10^{-2} min^{-1}

41. Identify reducing agent in following reaction ? $CH_{4(g)} + O_{2(g)} \longrightarrow CO_{2(g)} + 2H_2O_{(\ell)}$

(A) $O_{2(g)}$ (B) $H_2O_{(\ell)}$
(C) $CH_{4(g)}$ (D) $CO_{2(g)}$

42. Which of the following compounds is NOT a carbonyl compound ?

(A) Propanamide (B) Ethoxy ethane
(C) Acetamide (D) Acetyl chloride

43. Which among the following statements is true for amylose ?

(A) Glucopyranose are linked by $1 \rightarrow 4\ \beta$ glycosidic bonds. (B) It has branching to large extent
(C) It constitute about 80 % starch (D) It is water soluble

44. Which among the following alkyl halides is optically active ?

(A) isobutyl chloride (B) tert. butyl bromide
(C) sec. butyl iodide (D) n butyl bromide

46. What is the temperature needed for decomposition of lime stone in blast furnace for extraction of iron ?

(A) 1500 K (B) 2000 K
(C) 1200 K (D) 500 K

47. The rate constant for the first order reaction is 1.15×10^{-3} s^{-1}. How long will 5 g of the reactant take to reduce to 3 g ?

(A) 424 sec (B) 414 sec
(C) 434 sec (D) 444 sec

48. Which of the following compounds is used to prepare orlon ?

(A) $CH_2 = C(CH_3)_2$
(B) HOOC-$(CH_2)_4$ - COOH
(C) $CH_2 = CH\text{-}CN$
(D) $H_2C = CH\text{-}CH = CH_2$

49. The common name of 1-bromo -3, 3-dimethyl butane is

(A) tert-pentyl bromide (B) isobutyl bromide
(C) neo hexyl bromide (D) n-hexyl bromide

50. Identify the formula of lanthanoid oxide formed when lanthanoid (Ln) is burnt in oxygen

(A) LnO (B) Ln_2O_3
(C) Ln_2O (D) LnO_2

1. Which one of the following groups of drugs is called cannabinoids?

(A) Marijuana, hashish, charas
(B) Morphine, heroin, LSD
(C) Heroin, hashish, cocaine
(D) Barbiturates, amphetamines, benzodiazepines

2. Which one of the following plants does NOT propagate by epiphyllous buds?

(A) Oxalis
(B) Kalanchoe
(C) Bryophyllum
(D) Begonia

3. Mendel collected 1064 seeds from a cross between tall and dwarf garden pea plants. From this 787 grew tall and 277 grew dwarf. This represents ____ cross.

(A) dihybrid
(B) trihybrid
(C) test
(D) monohybrid

4. Deficiency of which of the following hormones leads to infertility in male and female human beings?

(A) LTH
(B) FSH
(C) ACTH
(D) TSH

5. Which of the following statements is CORRECT?

(A) Louis Pasteur proved the theory of spontaneous generation.
(B) Theory of abiogenesis is the oldest theory.
(C) Theory of biogenesis satisfactorily explains the continuity of life.
(D) Panspermia theory is also called autobiogenesis.

6. Formation of prothrombinase is initiated by ____.

(A) prothrombin
(B) thromboplastin
(C) fibrinogen
(D) heparin

7. Which of the following reactions cause the conversion of pyruvate into acetyl Co-A?

(A) Oxidative decarboxylation
(B) Oxidative dephosphorylation
(C) Oxidative phosphorylation
(D) Oxidative dehydration

8. During replication, the bacteriophage attaches to ____ of bacterial cell.

(A) flagellum
(B) receptors on cell wall
(C) genetic material
(D) plasmid

9. Which of the following tissues originate from all the three germ layers?

(A) Muscular
(B) Epithelial
(C) Nervous
(D) Connective

10. The acid which gets accumulated during night in CAM plants is ____.

(A) PEPA
(B) oxaloacetic
(C) pyruvic
(D) malic

11. In a fully turgid cell, the wall pressure is ____.

(A) inversely proportional to TP
(B) less than TP
(C) equal to TP
(D) greater than TP

12. Tehri dam project is located in ____.

(A) Kerala
(B) Madhya Pradesh
(C) Uttar Pradesh
(D) Maharashtra

13. Which one of the following organism brings about the fermentation of gram flour in the dhokla dough?

(A) Streptomyces erythreus
(B) Saccharomyces cerevisiae
(C) Rhizopus arrhizus
(D) Lactobacillus

14. The differences between parents and offspring, among offsprings of the same parents and individuals of the same species are called ____.

(A) heredity
(B) allelism
(C) variations
(D) homology

15. Degradation of haemoglobin occurs in the ____.

(A) liver
(B) heart
(C) bone marrow
(D) kidney

16. The correct sequence of developmental stages of embryo in angiosperms is ____.

(A) octant→globular→heart shaped→horse shoe shaped

(B) globular→octant→heart shaped→horse shoe shaped

(C) octant→heart shaped→horse shoe shaped→globular

(D) octant→horse shoe shaped→heart shaped→globular

17. Plants bearing small, inconspicuous flowers lacking fragrance, nectar and producing large number of smooth walled pollen grains, is characteristic of ____.

(A) chiropterophily (B) entomophily

(C) anemophily (D) ornithophily

18. Which one of the following is a tetrose sugar?

(A) Ribose (B) Glyceraldehyde

(C) Glucose (D) Erythrose

19. The pCO_2 of alveolar blood is ____ mmHg.

(A) 30 (B) 104

(C) 45 (D) 90

20. A person has lost his memory in an accident. The part of brain most likely to be injured is ____.

(A) Rhombencephalon (B) Rhinencephalon

(C) Telencephalon (D) Mesencephalon

21. Which one of the following genotype will show darkest kernel in wheat?

(A) AAbb (B) AABb

(C) AABB (D) AaBb

22. In anaerobic respiration, from one glucose molecule at how many steps ATP formation takes place?

(A) Two steps (B) Four steps

(C) Single step (D) Three steps

23. In complete photorespiration process, the cell organelles involved are ____.

(A) chloroplast, mitochondria (B) chloroplast, peroxisome

(C) ribosome, peroxisome, mitochondria (D) chloroplast, peroxisome, mitochondria

24. Multicellular heterotrophs are placed in how many kingdoms by R. H. Whittaker?

(A) 4 (B) 3

(C) 1 (D) 2

25. Tissue injury causing redness, swelling, pain and production of heat and fever are localized manifestations of ____ response.

(A) physiological (B) anatomical

(C) inflammatory (D) cellular

26. Malleus bone of ear is attached to ____.

(A) tympanic membrane (B) membranous labyrinth

(C) oval window of internal ear (D) Eustachian tube

27. Which one of the following food chain starts with dead decaying organic matter?

(A) Aquatic (B) Desert

(C) Grazing (D) Detritus

28. The bundle of nerve fibres is covered by ____ A ____ and several bundles are covered by ____ B ____ to form the nerve.

(A) A - endoneurium, B - perineurium (B) A - perineurium, B - epineurium

(C) A - endoneurium, B - epineurium (D) A - epineurium, B - perineurium

29. Select the CORRECT match of cell organelle and its function.

(A) Leucoplast – site for photosynthesis (B) Smooth endoplasmic reticulum – extracellular digestion

(C) Sphaerosome – storage and synthesis of proteins (D) Vacuole – osmoregulation and excretion

30. The hormone NOT secreted by pars distalis of pituitary gland is ____.

(A) vasopressin (B) somatotropin

(C) prolactin (D) corticotropin

31. Which one of the following pair does NOT show commensalism?

(A) Sea-anemones - crab (B) Shark - Remora fish

(C) Barnacles -whale (D) Cow-bacteria

32. One of the following is an example of complete sex linkage.

(A) Total colour blindness
(B) Retinitis pigmentosa
(C) Myopia
(D) Nephritis

33. On land, plants get carbon from ____.

(A) carbonate rocks in the surroundings
(B) supplements added to the soil
(C) the CO2 dissolved in soil water
(D) fixation of atmospheric CO2 during photosynthesis

34. Which one of the following characteristics is common between DNA and RNA?

(A) Pentose sugar
(B) Purines
(C) Non-genetic
(D) Pyrimidines

35. Methane, ammonia and hydrogen were respectively mixed in the ratio of ____ in Urey and Miller's experiment.

(A) 2 : 1 : 2
(B) 2 : 2 : 1
(C) 1 : 2 : 1
(D) 1 : 2 : 2

36. In human beings, during oogenesis, Meiosis-I results into ____.

(A) a haploid large-sized secondary oocyte and a haploid smaller polar body
(B) a haploid large-sized primary oocyte and a haploid smaller polar body.
(C) a diploid large-sized primary oocyte and a haploid small-sized polar body
(D) a haploid large-sized secondary oocyte and a diploid smaller polar body

37. Which of the following does NOT take place during inspiration?

(A) Intercostal muscles contract
(B) Muscles of diaphragm relax
(C) Ribs are pulled outward
(D) Volume of thoracic cavity increases

38. What is 'after birth'?

(A) Changes taking place in the reproductive system of mother after the delivery.
(B) Changes taking place in the ovary of female baby.
(C) Excessive bleeding taking place from mother's womb after the parturition.
(D) A collective mass of placenta, umbilical cord and foetal membranes.

39. Study the Column-I, II and III select the CORRECT option by referring given code.

I	II	III
Neutrophils	a	phagocytic
Eosinophils	3%	b
C	25-33%	synthesis of antibodies
Basophils	0-5%	d

(A) a: 54-62%, b: Secrete antihistamine, c: Lymphocytes, d: Secrete heparin
(B) a: 30-38%, b: Phagocytic, c: Platelets, d: Non-phagocytic
(C) a: 20-25%, b: Non-phagocytic, c: Erythrocytes, d: Non-phagocytic
(D) a: 43-49%, b: Secrete histamine, c: Monocytes, d: Phagocytic

40. The best method to expose lethal genes is ____.

(A) outcrossing
(B) inducing mutation
(C) inbreeding
(D) inducing heterozygosity

41. The facultative absorption of water in the DCT and collecting duct takes place due to the secretion of ____.

(A) TCT
(B) ACTH
(C) PTH
(D) ADH

42. In biogas plant, the organic acids like acetic acid is converted to biogas by the enzymes of ____.

(A) Methanococcus and Methanobacillus
(B) Clostridium and Pseudomonas
(C) Azotobacter and Azospirillum
(D) Bacillus subtilis

43. Vernalization increases the resistance of plants for diseases caused by ____.

(A) Bacteria (B) Viroids
(C) Viruses (D) Fungi

44. Which one of the following is the functional unit of nature?

(A) Ecosystem (B) Food chain
(C) Ecology (D) Food web

45. Number of turns of Calvin cycle required for synthesis of one glucose molecule is ____.

(A) one (B) four
(C) two (D) six

46. Number of linkage groups in honey bees is ____.

(A) 8 (B) 32
(C) 24 (D) 16

47. Genetic markers of DNA fingerprinting technique are ____.

(A) RFLP (B) TGF-B
(C) TPA (D) VNTRs

48. Mycorrhiza shows symbiotic association between ____.

(A) coralloid roots of Cycas and cyanobacteria (B) roots of lower leguminous plants and fungi
(C) roots of grasses and bacteria (D) roots of higher plants and fungi

49. At the time of DNA replication, the initiator protein breaks ____ bonds.

(A) glycosidic (B) peptide
(C) phospho-di-ester (D) hydrogen

50. Cross bridges between peripheral microtubules of cilia and flagella are made up of motor protein ____.

(A) myosin (B) actin
(C) dynein (D) keratin

51. Identify the INCORRECT statement about water in the soil.

(A) Water present in the form of hydrated oxides of silicon and aluminium is called combined water. (B) The hygroscopic and combined water is available to the plants for absorption.
(C) Water held between small, non-colloidal soil particles is called capillary water. (D) Water which is held very tightly around soil particles by adhesive forces is called hygroscopic water.

52. Non-cyclic photophosphorylation involves unidirectional flow of electrons from ____.

(A) PS-II→cytochromes→PS-I→NADP→photolysed water
(B) PS-II→PS-I→NADP→photolysed water
(C) photolysed water→PS-II→cytochromes→PS-I→NADP
(D) photolysed water→PS-I→PS-II→NADP

53. A woman gave birth to a triplet. Of these, two are identical twins and third one is a female baby. How many ova would have been fertilized?

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

54. Chlorophyll-a is ____ in colour.

(A) yellow (B) blue green
(C) orange (D) yellow green

55. Which one of the following codons will NOT pair with anticodon of t-RNA?

(A) AUU (B) UAG
(C) UUU (D) CUC

56. Which phytohormone is called secondary hormone?

(A) Cytokinins (B) Auxins
(C) Gibberellins (D) Ethylene

57. The enzyme phosphofructokinase and the co-factor Mg++ are involved during which of the fol- lowing reactions of glycolysis?

(A) Phosphorylation-II (B) Cleavage
(C) Isomerisation (D) Phosphorylation-I

58. Primary lesions called chancre are formed at the site of infection by ____.

(A) Diplococcus pneumoniae
(B) Treponema pallidum
(C) Salmonella typhi
(D) Wuchereria bancrofti

59. In which of the following species of angiosperms, the process of double fertilization was discovered?

(A) Datura and Solanum
(B) Michelia and Papaya
(C) Lillium and Fritillaria
(D) Sida and Malva

61. Pioneers of vegetation on rocks are ____.

(A) Pteridophytes
(B) Bryophytes
(C) Gymnosperms
(D) Lichens

62. In conventional plant breeding, collection of germ plasm means

(A) collection of genes from a particular crop plant.
(B) gene library with collected genes of same variety of crop.
(C) gene library with genome of different varieties of crop plants.
(D) entire collection of plants/seeds with diverse alleles for all genes of a particular crop.

63. Which one of the following regions of human body does NOT have maximum lymph nodes?

(A) Neck
(B) Armpit
(C) Groin
(D) Abdomen

64. Column-I contains names of host plants while Column-II contains names of viral diseases. Find the correct option.
Column-I | Column-II
I) Banana | p) little leaf
II) Sugarcane | q) bunchy top
III) Papaya | r) leaf roll
IV) Potato | s) grassy shoot
V) Brinjal | t) leaf curl

(A) I)-q), II)-r), III)-s), IV)-t), V)-p)
(B) I)-q), II)-s), III)-r), IV)-t), V)-p)
(C) I)-q), II)-s), III)-t), IV)-r), V)-p)
(D) I)-q), II)-r), III)-p), IV)-s), V)-t)

65. Thebesian valve guards the opening of ____.

(A) coronary sinus
(B) superior vena cava
(C) coronary artery
(D) pulmonary vein

66. Which one of the following is INCORRECT about saturated fatty acids?

(A) They do not have double bond between carbon atoms.
(B) They are not fully saturated with hydrogen atoms.
(C) Palmitic acid and stearic acid are saturated fatty acids.
(D) They contain maximum possible hydrogen atoms.

67. Match the pollutant in Column-I with its source in Column-II and choose the correct option.
Column-I | Column-II
(i) High levels of Sulphur dioxide | (a) Natural pollutant
(ii) Endosulfan | (b) Agricultural practices
(iii) Pollen | (c) Automobile exhaust
(iv) Gaseous and particulate lead | (d) Electric power plants

(A) (i)-(d), (ii)-(a), (iii)-(b), (iv)-(c)
(B) (i)-(d), (ii)-(b), (iii)-(a), (iv)-(c)
(C) (i)-(d), (ii)-(c), (iii)-(a), (iv)-(b)
(D) (i)-(d), (ii)-(b), (iii)-(c), (iv)-(a)

68. Mutation breeding was performed on moong beans to make it resistant to ____.

(A) powdery mildew
(B) black rot
(C) leaf curl
(D) curl blight

69. Which one of the following is enriched with calcium?

(A) Spinach
(B) Carrot
(C) Pumpkin
(D) Mustard

70. How many meiotic and mitotic divisions respectively are required to produce 960 male gametes in angiospermic plant?

(A) 120 and 480
(B) 120 and 960
(C) 240 and 480
(D) 240 and 960

71. Mark the CORRECT sequence of phase in menstrual cycle.

(A) Menstrual phase →Proliferative phase →Luteal phase →Ovulatory phase

(B) Menstrual phase →Proliferative phase →Ovulatory phase →Luteal phase

(C) Luteal phase →Ovulatory phase →Menstrual phase →Follicular phase

(D) Ovulation →Luteal phase →Follicular phase →Menstrual phase

72. Which among the following is NOT an artificial method of vegetative propagation in higher plants?

(A) Grafting

(B) Micropropagation

(C) Budding

(D) Fragmentation

73. Bile salts ____ fats in duodenum.

(A) assimilate

(B) absorb

(C) emulsify

(D) regurgitate

74. Mutation is ____.

(A) irreversible, gradual change in pre-existing form

(B) sudden change in genetic material

(C) non-inheritable gradual change

(D) small and continuous variations

75. In human beings, the oviduct is supported by a double fold of peritoneum called ____.

(A) mesovarium

(B) mesometrium

(C) tunica vaginalis

(D) mesosalpinx

76. Following are all fungal diseases of poultry EXCEPT ____.

(A) Aspergillosis

(B) Pullorum

(C) Thrush

(D) Favus

77. Helper T-lymphocytes perform following functions EXCEPT ____.

(A) Stimulation of B-lymphocytes

(B) Proliferation of other T-cells

(C) Attraction of macrophages

(D) Secretion of cell killing substances like perforins

78. Which of the following group of cranial nerves control eye movements?

(A) IV, V and VII

(B) V, VII and IX

(C) I, II and III

(D) III, IV and VI

79. Some seeds produce various structures like wings, pappus calyx, hooks etc. which help in their ____.

(A) protection

(B) dispersal

(C) attraction

(D) germination

80. In a heterozygous tall pea plant, the possibility of 't' gamete fertilizing 'T' gamete during its selfing is ____ %.

(A) 100

(B) 75

(C) 25

(D) 50

81. The variation in temperatures in the three steps of PCR cycle is ____, ____ and ____ respectively.

(A) 95°C, 62°C and 82°C

(B) 97°C, 60°C and 92°C

(C) 100°C, 75°C and 88°C

(D) 91°C, 55°C and 72°C

82. Presence of which hormone in urine confirms pregnancy?

(A) Oxytocin

(B) Progesterone

(C) HCG

(D) Estrogen

83. Water reaches to the top of trees of more than 100 feet against gravity, which one of the following is the main phenomenon responsible for this?

(A) Exudation

(B) Guttation

(C) Root pressure

(D) Transpiration pull

84. Genome of a cell can be manipulated by ____.

(A) cloning

(B) transcription

(C) r-DNA technology

(D) reverse transcription

85. Chromosomal mechanism of sex determination in human beings is called ____.

(A) heterogamesis

(B) haemopoiesis

(C) transgenesis

(D) parthenogenesis

86. A narrow dark line seen in Isotropic band of myofibril of a striated muscle fibre is called ____.

(A) M-line

(B) H- Zone

(C) Z-line

(D) A-band

87. Match Column-I and Column-II considering the inheritance pattern and ratio obtained in them.
Column-I | Column-II
a) Pleiotropy (sickle cell anaemia) | (i) 1:6:15:20:15:6:1
b) Polygenic inheritance (wheat kernel) | (ii) 1:2:1
c) Polygenic inheritance (human skin color) | (iii) 1:4:6:4:1
d) Co-dominance (coat colour in cattle) | (iv) 2:1

(A) a) - (iv), b) - (iii), c) - (i), d) - (ii)
(B) a) - (iv), b) - (ii), c) - (iii), d) - (i)
(C) a) - (iii), b) - (iv), c) - (ii), d) - (i)
(D) a) - (i), b) - (ii), c) - (iii), d) - (iv)

88. All of the following animals are uricotelic EXCEPT ____.

(A) crow
(B) mosquito
(C) scorpion
(D) cobra

89. Match the Column-I with Column-II and select the correct option.
Column-I | Column-II
a) DNA fragmentation | i) ssDNA gets embedded in nylon membrane
b) Electrophoresis | ii) sample DNA and probe DNA form double stranded DNA
c) Southern blotting | iii) DNA fragments move to positive pole
d) Hybridization | iv) fragments of DNA with variable length are formed

(A) a) - iv), b) - ii), c) - i), d) - iii)
(B) a) - iii), b) - ii), c) - iv), d) - i)
(C) a) - i), b) - ii), c) - iii), d) - iv)
(D) a) - iv), b) - iii), c) - i), d) - ii)

90. Blood pressure will be maximum in ____.

(A) efferent renal arteriole
(B) coronary sinus
(C) pulmonary trunk
(D) renal artery

91. During glycolysis, cleavage of fructose 1,6-diphosphate occurs in presence of enzyme ____.

(A) Hexokinase
(B) Aldolase
(C) Phosphoglycero mutase
(D) Phosphoglycero kinase

92. Griffith in his experiment with Diplococcus pneumoniae discovered ____.

(A) r-DNA
(B) transformation
(C) gene expression
(D) reverse transcription

93. Study of genes and genomes by DNA sequencing and its related analysis is called ____.

(A) Hydroponics
(B) Genomics
(C) Biofortification
(D) Systematics

94. The sum total of genes of all individuals of interbreeding population is called ____.

(A) gene frequency
(B) genome
(C) gene pool
(D) gene flow

95. Considering following chemical equation, guess what could be the nature of respiratory substrate?

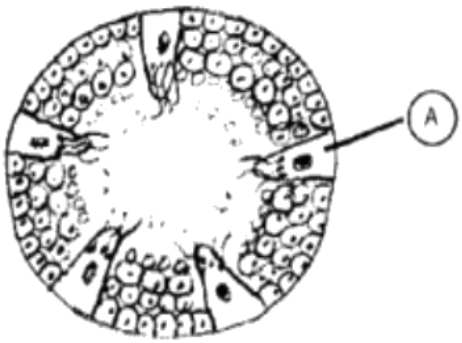
$2\,C_{51}H_{98}O_6 + 145\,O_2 \longrightarrow 102\,CO_2 + 98\,H_2O +$ Energy

(A) Carbohydrate as well as protein
(B) Fat
(C) Protein
(D) Carbohydrate

96. Kwashiorkor is caused due to prolonged deficiency mainly of in diet.

(A) proteins
(B) fats
(C) vitamins and minerals
(D) carbohydrates

97. In the following diagram, what is A and its function?



(A) Sertoli cell; secretion of Testosterone.
(B) Sertoli cell, nutrition of maturing sperms.
(C) Follicular cell; secretion of Thyroxine.
(D) Leydig cell; secretion of Testosterone.

98. Which one of the following is required for transmission of malarial parasite?

(A) Honey bee (B) Housefly
(C) Round worm (D) Mosquito

99. Tubular and multinucleated alga is .

(A) Rhizopus (B) Anabaena
(C) Parmelia (D) Vaucheria

100. On reaching the ovary, if pollen tube enters the ovule through integuments, then it is called ____.

(A) chalazogamy (B) mesogamy
(C) porogamy (D) siphonogamy

- End of Question Paper -