MHT CET 2020 PCB Oct 1 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 1 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 **194 of 200 questions**: **46 Physics**, **50 Chemistry**, **98 Biology**. Original subject question numbers are retained; Physics questions 2, 14, 30, 45; Biology questions 87, 89 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. For a transistor $\frac{1}{\alpha_{dc}} - \frac{1}{\beta_{dc}}$ is (α_{dc} and β_{dc} are current gains)

(A) Zero
(B) -1
(C) 1
(D) 2

3. When a ray of light is incident normally on one refracting surface of an equilateral prism of refractive index 1.5, the emerging ray $[\sin^{-1}(\frac{1}{1.5}) = 41.8^\circ]$

(A) just grazes the second refracting surface.
(B) is deviated by 20°.
(C) is deviated by 30°.
(D) undergoes total internal reflection at second refracting surface.

4. The mutual inductance between two coplanar concentric rings A and B of radii 'R_1' and 'R_2' placed in air when a current 'I' flows through ring A is ($R_1 >> R_2$) (μ_0 = permeability of free space)

(A) $\frac{\mu_0 \pi R_2}{R_1}$
(B) $\frac{\mu_0 \pi R_1}{R_2}$
(C) $\frac{\mu_0 \pi R_2^2}{2R_1}$
(D) $\frac{\mu_0 \pi R_1^2}{2R_2}$

5. A particle of mass 'm' is rotating in a circle of radius 'r' having angular momentum 'L'. Then the centripetal force will be

(A) $\frac{L^2}{mr}$
(B) $\frac{L^2 m}{r}$
(C) $\frac{L^2}{mr^3}$
(D) $\frac{L^2}{mr^2}$

6. If $|\vec{A_1}| = 3$, $|\vec{A_2}| = 4$ and $|\vec{A_1} + \vec{A_2}| = 4$ the value of $(2\vec{A_1} + \vec{A_2}) \cdot (\vec{A_1} - \vec{A_2})$ is

(A) 4.5
(B) 5.5
(C) 6.5
(D) 2.5

7. The effective length of a magnet is 31.4 cm and its pole strength is 0.8 A m. The magnetic moment, if it is bent in the form of a semicircle is

(A) 0.12 A m^2
(B) 0.16 A m^2
(C) 1.2 A m^2
(D) 1.6 A m^2

8. A force $F = (10 + 0.5x)$ N acts on a particle in the x-direction. The work done by the force in displacing the particle from $x = 0$ to $x = 2$ metre is

(A) 63 J
(B) 42 J
(C) 31.5 J
(D) 21 J

9. A stone of mass 2kg attached at one end of a 2m long string is whirled in horizontal circle. The string makes an angle of 45° with the vertical then the centripetal force acting on the stone is ($g = 10$ m/s^2, $\tan 45^\circ = 1$)

(A) 30 N
(B) 40 N
(C) 20 N
(D) 10 N

10. The moment of inertia of a ring about an axis passing through its centre and perpendicular to its plane is 'I'. It is rotating with angular velocity 'ω'. Another identical ring is gently placed on it so that their centres coincide. If both the rings are rotating about the same axis, then loss in kinetic energy is

(A) $I\omega^2/3$
(B) $I\omega^2/2$
(C) $I\omega^2/4$
(D) $I\omega^2$

11. Assuming the earth to be a sphere of uniform density, the ratio of acceleration due to gravity on the earth's surface to its value at halfway towards the centre of the earth, will be

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

12. The Young's double-slit experiment is performed with the light of blue colour (λ_b = 4350 Å) and then with green colour (λ_g = 5450 Å). Without changing experimental setup, if the distance of the sixth fringe from the centre is determined for both the colours as X_{blue} and X_{green}, then $X_{blue} : X_{green}$ is nearly

(A) 0.2
(B) 1.2
(C) 0.8
(D) 1.5

13. A proton moving in perpendicular magnetic field possess energy 'E'. The magnetic field is increased four times. But the proton is constrained to move in the path of same radius. The kinetic energy will increase

(A) 16 times.
(B) 8 times.
(C) 2 times.
(D) 4 times.

15. Water rises in a capillary tube to a certain height such that the upward force due to surface tension is balanced by 63×10^{-4} N force due to the weight of the water. The surface tension of water is 7×10^{-2} N/m. The inner diameter of the capillary tube is nearly ($\pi = 22/7$)

(A) 6.3×10^{-1} m (B) 3×10^{-2} m
(C) 7×10^{-2} m (D) 9×10^{-2} m

16. If $\vec{A} = a_1\hat{i} + a_2\hat{j} + a_3\hat{k}$, then $\hat{i} \times (\hat{i} \times \vec{A})$ is

(A) $a_2\hat{j} - a_3\hat{k}$ (B) $a_1\hat{j} + a_3\hat{k}$
(C) $-a_2\hat{j} - a_3\hat{k}$ (D) $a_3\hat{j} - a_2\hat{k}$

17. A solenoid having 250 turns/metre with a core of a material with relative permeability 500. What is approximate value of the magnetisation of the core material, if a current of 2A is passed through it?

(A) 2×10^5 A/m (B) 1.5×10^5 A/m
(C) 2.5×10^5 A/m (D) 1×10^5 A/m

18. If λ_1 and λ_2 are the wavelengths of the first spectral line of the Lyman and Paschen series respectively, then $\lambda_1 : \lambda_2$ is

(A) 1 : 3 (B) 7 : 50
(C) 1 : 30 (D) 7 : 108

19. A string of length 'L' and linear density 'm' has a fundamental frequency 'n' when stretched by tension 'T'. The fundamental frequency of another string having double the length and double linear density, when same tension is applied is

(A) $\frac{n}{2\sqrt{2}}$ (B) 2 n
(C) $\frac{n}{2}$ (D) $\frac{\sqrt{n}}{2}$

20. A plano-convex lens is made from glass of refractive index 1.5. The radius of curvature of its curved surface is 'R'. Its focal length is

(A) 1.5 R (B) 2 R
(C) R (D) R/2

21. The period of oscillation of a mass 'M' suspended from a spring of negligible mass is 'T'. If along with it another mass M is also suspended, the period of oscillation now will be

(A) T (B) 2 T
(C) $\frac{T}{\sqrt{2}}$ (D) $\sqrt{2}$ T

22. For a photocell, the work function is 'ϕ' and the stopping potential is 'V_s'. The wavelength of the incident radiation is

(A) $\frac{hc}{\phi + eV_s}$ (B) $\frac{\phi + eV_s}{hc}$
(C) $\frac{\phi - eV_s}{hc}$ (D) $\frac{hc}{\phi - eV_s}$

23. The fundamental frequency of a string stretched with a weight 'M' kg is 'n' hertz. Keeping the vibrating length constant, the weight required to produce its octave is

(A) M (B) 8 M
(C) 2 M (D) 4 M

24. A mass 'm' suspended from a spring stretches it by 5cm when on the surface of the earth. The mass is then taken on to a height of 1600 km above earth's surface and again suspended from the same spring. At this altitude the extension of the spring is (Radius of earth = 6400 km)

(A) 6.4 cm (B) 1.6 cm
(C) 3.2 cm (D) 0.8 cm

25. The electron in the hydrogen atom is moving with a speed of 2×10^6 m/s in an orbit of radius 0.5 Å. The magnetic moment of the revolving electron is

(A) 15×10^{-24} Am^2 (B) 11×10^{-24} Am^2
(C) 6×10^{-24} Am^2 (D) 8×10^{-24} Am^2

26. In resonance tube, the first and second resonance are heard when water level is 24.1 cm and 74.1 cm respectively, below the open end of the tube. The inner diameter of the tube is

(A) 5 cm (B) 3 cm
(C) 4 cm (D) 2 cm

27. A ring and a disc roll on horizontal surface without slipping with same linear velocity. If both have same mass and total kinetic energy of the ring is 4 J then total kinetic energy of the disc is

(A) 2 J (B) 6 J
(C) 8 J (D) 3 J

28. A positively charged particle (q) travelling at 30° with respect to the direction of magnetic field of strength 2.4×10^{-6} T experiences a force of 4.8×10^{-19} N. The speed of charged particle will be [$q = 1.6 \times 10^{-19}$ C, $\sin 30° = \frac{1}{2}$, $\cos 30° = \sqrt{3}/2$]

(A) 5×10^6 m/s (B) 2.5×10^6 m/s
(C) 2×10^6 m/s (D) 7.5×10^6 m/s

29. In suspended type of moving coil galvanometer

(A) coil is stationary.
(B) magnet is stationary.
(C) magnet and coil are stationary.
(D) magnet and coil are moving.

31. The relation between force 'F' and density 'd' is $F \propto x/\sqrt{d}$. The dimensions of 'x' are

(A) $[L^{-1/2}M^{3/2}T^{-2}]$
(B) $[L^{-2}M^{3/2}T^{1/2}]$
(C) $[L^{2}M^{1/2}T^{3/2}]$
(D) $[L^{1/2}M^{3/2}T^{-2}]$

32. In balanced metre bridge 5 Ω is connected in the left gap and R Ω in the right gap. When R Ω is shunted with an equal resistance, the new balance point is at $1.6\ell_1$ where 'ℓ_1' is the earlier balancing length. The value of 'ℓ_1' is

(A) 25 cm
(B) 40 cm
(C) 35 cm
(D) 30 cm

33. Electric field intensity at a point outside uniformly charged thin infinite plane sheet is 'E_1'. The electric field intensity at a point near and outside the surface of a positively charged conductor of any shape is 'E_2'. The relation between magnitude of E_1 and E_2 is (assume air as the medium)

(A) $E_1 = E_2$
(B) $2E_1 = E_2$
(C) $E_1 = 2E_2$
(D) $E_1 = 4E_2$

34. In communication with the help of antenna, the range covered (for the line of sight propagation) is initially 'd'. If the height of antenna is doubled, the range covered would become

(A) 3 d
(B) $\sqrt{2}$ d
(C) 4 d
(D) 2 d

35. A body of mass 'm' is moving along a circle of radius 'r' with linear speed 'V'. Now, to change the linear speed to $\frac{V}{2}$ and to move it along the circle of radius '4r', required change in the centripetal force of the body is

(A) decrease by $\frac{15}{16}$
(B) increase by $\frac{11}{16}$
(C) increase by $\frac{9}{16}$
(D) decrease by $\frac{5}{16}$

36. Pascal's law is not applied in

(A) a hydraulic jack.
(B) hydraulic breaks.
(C) a hydraulic press.
(D) an autuomiser.

37. A small mass 'm' is suspended at the end of a wire having (negligible mass) length 'L' and cross-sectional area 'A'. The frequency of oscillation for the S.H.M. along the vertical line is [Y = Young's modulus of material of the wire]

(A) $\frac{1}{2\pi}\left[\frac{YAL}{m}\right]^{1/2}$
(B) $\frac{1}{2\pi}\left[\frac{YA}{mL}\right]^{1/2}$
(C) $\frac{1}{2\pi}\left[\frac{mA}{YL}\right]^{1/2}$
(D) $\frac{1}{2\pi}\left[\frac{YL}{mA}\right]^{1/2}$

38. A uniform wire has length 'L' and weight 'W'. One end of the wire is attached rigidly to a point in the roof and weight 'W_1' is suspended from its lower end. If 'A' is the cross-sectional area of the wire then the stress in the wire at a height $\frac{3L}{4}$ from its lower end is

(A) $\frac{4W_1+3W}{4A}$
(B) $\frac{3W_1-4W}{2A}$
(C) $\frac{3W_1+4W}{2A}$
(D) $\frac{4W_1-3W}{4A}$

39. For an ideal gas, if the ratio of Molar specific heats $\gamma = 1.4$, then the specific heat at constant pressure C_p, specific heat at constant volume C_v and corresponding molecule are respectively

(A) $\frac{5}{2}R$, $\frac{3}{2}R$, monoatomic.
(B) $\frac{9}{2}R$, $\frac{7}{2}R$, polyatomic.
(C) $\frac{7}{2}R$, $\frac{5}{2}R$, non-rigid diatomic.
(D) $\frac{7}{2}R$, $\frac{5}{2}R$, rigid diatomic.

40. The depth of an ocean is 2000m. The compressibility of water is 45×10^{-11} m^2/N and density of water is 10^3 kg/m^3. At the bottom of the ocean, the fractional compression of water will be ($g = 10$ m/s^2)

(A) 6×10^{-3}
(B) 2×10^{-3}
(C) 9×10^{-3}
(D) 3×10^{-3}

41. An ideal gas occupies a volume 'V' at a pressure 'P' and absolute temperature T. The mass of each molecule is 'm'. If 'K_B' is the Boltzmann's constant, then the density of gas is given by expression

(A) $\frac{K_B \cdot T}{P \cdot m}$
(B) $\frac{3K_B \cdot T}{2P \cdot m}$
(C) $\frac{P \cdot m}{2K_B \cdot T}$
(D) $\frac{P \cdot m}{K_B \cdot T}$

42. A body performs S.H.M. due to force 'F_1' with time period 0.8 s. If force is changed to 'F_2', it executes S.H.M. with time period 0.6 s. Now both the forces act simultaneously in the same direction on the same body. New periodic time is

(A) 0.48 s
(B) 0.24 s
(C) 0.12 s
(D) 0.36 s

43. A smooth sphere of mass 'M' moving with velocity 'u' directly collides elastically with another sphere of mass 'm' at rest. After collision, their final velocities are V' and V respectively. The value of V is given by

(A) $\frac{2u}{1+\frac{M}{m}}$ (B) $\frac{2um}{M}$

(C) $\frac{2u}{1+\frac{m}{M}}$ (D) $\frac{2uM}{m}$

44. What is the stopping potential, when a metal surface with work function 1.2 eV is illuminated with light of energy 3 eV?

(A) 2.0 V (B) 1.2 V

(C) 1.4 V (D) 1.8 V

46. When a beam of unpolarised monochromatic light is incident on a plane glass plate at a polarising angle, then which one of the following statements is correct?

(A) Reflected and refracted rays are completely polarised with their planes of polarisation perpendicular to each other.

(B) Reflected light is partially polarised but refracted light is plane polarised.

(C) Reflected and refracted rays are completely polarised with their planes of polarisation parallel to each other.

(D) Reflected light is plane polarised light but transmitted light is partially polarised.

47. A note produces 4 beat/s with a tuning fork of frequency 510 Hz and 6 beat/s with a fork of frequency 512 Hz. The frequency of the note is

(A) 506 Hz (B) 514 Hz

(C) 518 Hz (D) 510 Hz

48. According to Bohr's postulate, the centripetal force (F) necessary for the electron of mass 'm' in a hydrogen atom to revolve in n^{th} circular orbit round the nucleus, as the centre, is given by [e = charge on electron, h = Planck's constant, ϵ_0 = permittivity of free space]

(A) $\frac{\pi m^2 e^6}{4\epsilon_0^3 h^4 n^2}$ (B) $\frac{\pi m^2 e^6}{4\epsilon_0^3 h^4 n^4}$

(C) $\frac{\pi m^2 e^4}{4\epsilon_0^2 h^4 n^4}$ (D) $\frac{\pi m e^4}{8\epsilon_0^2 h^2 n^2}$

49. A fix number of spherical drops of a liquid of radius 'r' coalesce to form a large drop of radius 'R' and volume 'V'. If 'T' is the surface tension then energy

(A) is neither released nor absorbed.

(B) $3VT(\frac{1}{r}-\frac{1}{R})$ is released.

(C) $4VT(\frac{1}{r}-\frac{1}{R})$ is released.

(D) $3VT(\frac{1}{r}-\frac{1}{R})$ is absorbed.

50. A microscope will have maximum resolving power, if to illuminate the specimen, it uses light of

(A) red colour. (B) green colour.

(C) yellow colour. (D) blue colour.

Section 1 · Chemistry · 50 available questions

1. Which of the following metals reacts with dilute H_2SO_4?

(A) Fe (B) Bi
(C) Cu (D) Hg

2. Which of the following is NOT a tranquilizer?

(A) Iproniazid (B) Serotonin
(C) Veronal (D) Prontosil

3. Which of the following elements is refined by zone refining?

(A) Gallium (B) Bismuth
(C) Copper (D) Zinc

4. Which of the following equations shows the relationship between heat of reaction at constant pressure and heat of reaction at constant volume if the temperature is not constant?

(A) $\Delta H - \Delta n = \Delta URT$
(B) $\Delta H - \Delta U = \Delta nRT$
(C) $\Delta H = \Delta nRT$
(D) $\Delta H = \Delta U - RT$

5. The rate of first order reaction $A \rightarrow B$ is 6.3×10^{-6} Ms^{-1}, if $|A| = 0.3$ M, what is the rate constant of the reaction?

(A) 2.1×10^{-5} s^{-1} (B) 1.2×10^{-5} s^{-1}
(C) 1.3×10^{-5} s^{-1} (D) 1.6×10^{-5} s^{-1}

6. Which among the following oxides of nitrogen, the nitrogen atom contains one unpaired electron?

(A) N_2O_4 (B) NO_2
(C) N_2O_5 (D) N_2O_3

7. Which among the following compounds is obtained when benzene is treated with CO and HCl in presence of catalyst anhydrous $AlCl_3$ and Cu_2Cl_2 under high pressure?

(A) Toluene (B) Benzoic acid
(C) Benzaldehyde (D) Acetophenone

8. Which among the following is a first oxidation product of butan-2-ol?

(A) Butanal (B) Butanoic acid
(C) Propanoic acid and CO_2 (D) Butan-2-one

9. Which among the following polymers is an example of addition polymer?

(A) Dacron (B) Ureaformaldehyde polymer
(C) Nylon-6 (D) Polythene

10. Which of the following compounds is obtained when $C_2H_5NH_2$ is treated with excess $(CH_3CO)_2O$ in presence of pyridine?

(A) $C_2H_5N(COCH_3)_2$ (B) $(C_2H_5)_2NH$
(C) C_2H_5COOH (D) $C_2H_5NHCOCH_3$

11. Dumas method is used for estimation of

(A) nitrogen (B) sulphur
(C) oxygen (D) carbon

12. Which of the following is NOT correct in hybridisation?

(A) There should be very little difference in energy of involving orbitals (B) The shape of hybrid orbitals is same as that of atomic orbitals
(C) The number of hybrid orbitals formed is equal to number of atomic orbitals involved in hybridisation (D) Orbitals of an atom only undergo hybridisation

13. An element crystallises in bcc structure. The number of unit cells in 4 g of it is (given at mass = 40)

(A) $\frac{0.1 \times N_A}{2}$ (B) $2 \times 0.1N_A$
(C) $0.1N_A$ (D) $2 \times N_A$

14. In Merck's method, H_2O_2 is obtained from

(A) $BaO_2 + H_2SO_4$
(B) $Na_2O_2 + H_2SO_4$
(C) $BaO_2 + H_3PO_4$
(D) $BaO_2 + H_2O + CO_2$

15. What is the melting point of zinc?

(A) 473 K (B) 1193 K

(C) 423 K (D) 692 K

16. van't Hoff factor (i) for centimolal solution of $K_3[Fe(CN)_6]$ is 3.333. What is it's percentage dissociation?

(A) 80 % (B) 70 %

(C) 33.33 % (D) 77.7 %

17. The H-H bond energy is 430 kJ mol^{-1} and Cl-Cl bond energy is 240 kJ mol^{-1}. $\Delta_f H$ for HCl is -90 kJ. Then H-Cl bond energy is

(A) 360 kJ mol^{-1} (B) 213 kJ mol^{-1}

(C) 180 kJ mol^{-1} (D) 425 kJ mol^{-1}

18. Which of the following compounds is used to avoid oxidation in food?

(A) O- hydroxy benzoic acid (B) Acetyl salicylic acid

(C) Ethyl Salicylate (D) Butylated Hydroxy Anisole

19. The volume of 400 cm^3 chlorine gas at 400 mm of Hg is decreased to 200 cm^3 at constant temperature. What is the new pressure of gas?

(A) 800 mm of Hg (B) 200 mm of Hg

(C) 1600 mm of Hg (D) 600 mm of Hg

20. Identify the polymer from following, that contains amide linkage

(A) Terylene (B) PHBV

(C) Nylon-6,6 (D) Dextron

21. Which of the following solution will have highest freezing point depression?

(A) 1 M glucose (B) 1 M sucrose

(C) 1 M urea (D) 1 M KCl

22. What is the bond length of C - H bond in alkanes?

(A) 154 pm (B) 120 pm

(C) 133 pm (D) 112 pm

23. What is molecular formula of allyl bromide?

(A) C_2H_4Br (B) C_2H_3Br

(C) C_3H_5Br (D) C_3H_6Br

24. Which of following reagents is used to avoid further oxidation of aldehydes?

(A) $C_5H_5NH^+CrO_3Cl^-$ (B) $K_2Cr_2O_7$/dil. H_2SO_4

(C) dil. HNO_3 (D) CrO_3

25. Copper crystallises as face centered cubic lattice, with edge length of unit cell 361 pm. Calculate the radius of copper atom.

(A) 108.6 pm (B) 127.65 pm

(C) 181.6 pm (D) 157.6 pm

26. Which of the following statements is NOT true for glyceraldehyde?

(A) It is a sugar molecule. (B) It is optically active.

(C) It contains two asymmetric carbon atoms. (D) It has carbonyl and hydroxyl group.

27. Aniline reacts with bromine water at room temperature to give

(A) 3- Bromoaniline (B) 2- Bromoaniline

(C) 4- Bromoaniline (D) 2,4,6 - tribromoaniline

28. Which among the following electrical properties has SI unit siemens per meter?

(A) Conductance (B) Conductivity

(C) Resistance (D) Resistivity

29. Identify the product 'B' in following reaction. [Insert Reaction Scheme: 2,2-Dichloropropane $\xrightarrow{aq.KOH,\Delta}$ A $\xrightarrow{i)Mg,Benzene,ii)H^+}$ B]

(A) Propanal (B) Propanone

(C) Isopropyl magnesium chloride (D) Pinacol

30. Which of the following is the strongest reducing agent?

(A) Na (B) Mg

(C) Li (D) Ca

31. Which of the following elements has six unpaired electrons in observed electronic configuration?

(A) Fe (Z=26) (B) Cr (Z=24)

(C) Cu (Z=29) (D) Mn (Z=25)

32. Aluminium crystallises in face centred cubic structure, having atomic radius 125 pm. The edge length of the unit cell of aluminium is

(A) 253.5 pm (B) 353.5 pm
(C) 465.0 pm (D) 250.0 pm

33. Which of the following statements is true for pyran?

(A) It is saturated aliphatic compound (B) It is homocyclic compound
(C) It is heterocyclic with oxygen atom in ring (D) Molecular formula of pyran is C_5H_5S

34. Which of the following is NOT found in hybridization?

(A) Formation of σ bonds (B) Mixing and recasting of atomic orbitals
(C) Excitation of electrons (D) Loss and gain of electron

35. When slaked lime is passed through excess CO_2, it forms

(A) $CaCO_3$ (B) $CaCl_2$
(C) $Ca(HCO_3)_2$ (D) Ca_2HCO_3

36. What is the number of moles of silver chloride precipitated when excess of aqueous silver nitrate is treated with $[Co(NH_3)_4Cl_2]Cl$?

(A) 1.0 mole (B) 3.0 mole
(C) 2.0 mole (D) 4.0 mole

37. What is oxidation state of iron in potassium ferrate?

(A) +3 (B) +4
(C) +6 (D) +2

38. Which among the following is NOT an octahedral complex?

(A) $[Ir(C_2O_4)_2Cl_2]^{3-}$ (B) $[CoCl_2(en)_2]^{+}$
(C) $[Co(en)_2(NO_3)_2]^{+}$ (D) $[Pt(NH_3)_2Cl_2]$

39. What is the number of hydroxyl groups present in lactic acid?

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

40. Which of the following alcohols is NOT having $C_{sp^3} - OH$ bond?

(A) Phenylmethanol (B) 2 - Methyl propan - 2 - ol
(C) Propan - 2 - ol (D) Vinyl alcohol

41. 0.0210 M solution of N_2O_5 is allowed to decompose at $43^{\circ}C$. How long will it take to reduce to 0.0150 M? (Given $k = 6.0 \times 10^{-4}$ sec^{-1})

(A) 5600 sec (B) 360.0 sec
(C) 560.0 sec (D) 3364 sec

42. How many tertiary carbon atoms and primary carbon atoms respectively are present in 2-iodo-3, 3- dimethyl pentane?

(A) 2, 4 (B) 0, 4
(C) 2, 3 (D) 1, 3

43. What is the standard emf of following cell?
$Ni_{(s)}|Ni^{2+}_{(aq)}(1M)||Au^{3+}_{(aq)}(1M)|Au_{(s)}$
if $E^{\circ}_{Ni} = -0.25$ V, $E^{\circ}_{Au} = 1.50$ V

(A) -1.25 V (B) 1.75 V
(C) 1.25 V (D) -1.75 V

44. What is the quantity of gold chloride obtained when 4.5 g gold and 2.1 g chlorine when sealed in a tube and heated at 150° C? (At.masses of Au = 196.97, Cl = 35.45 u)

(A) 4.5 g (B) 4.8 g
(C) 6.07 g (D) 20.7 g

45. Identify the product B in following conversion.
Chlorobenzene + $H_2O \xrightarrow{Cu,673K,Pressure}$ A $\xrightarrow{conc.H_2SO_4,373K}$ B

(A) 4 - Hydroxybenzene sulphonic acid (B) Benzene sulphonic acid
(C) 3 - Hydroxybenzene sulphonic acid (D) 2 - Hydroxybenzene sulphonic acid

46. If $C_{(s)} + O_{2(g)} \rightarrow CO_{2(g)}$, $\Delta H = -396$ kJ mol^{-1}, calculate heat liberated during formation of 0.154 kg of CO_2?

(A) 1386.0 kJ (B) 346.5 kJ
(C) 693.0 kJ (D) 1039.5 kJ

47. What products are expected from the disproportionation reaction of orthophosphorus acid?

(A) $H_3PO_3 + PH_3$ (B) $H_3PO_4 + PH_3$
(C) $PH_3 + P_2O_5$ (D) $H_3PO_3 + P_2O_5$

48. 6.022×10^{20} molecules of urea are present in 100 mL of it's solution. The concentration of solution is

(A) 0.10 M
(B) 0.02 M
(C) 0.01 M
(D) 0.001 M

49. Pumice stone is an example of

(A) Solid sol
(B) Emulsion
(C) Aerosol
(D) Solid foam

50. Which of the following nitroalkane does not react with nitrous acid?

(A) 2- Methyl - 2 - nitropropane
(B) 2- Nitropropane
(C) Nitroethane
(D) 1- Nitropropane

1. Match the Column- I with Column-II and select the correct option.
Column - I | Column - II
A. Fibrinogen | i) contractions in female reproductive tract
B. Fructose | ii) prevent fungal infection
C. Prostaglandins | iii) coagulation of semen
D. Lactobacilli in vagina | iv) source of energy

(A) A- (ii), B- (iii), C- (iv), D-(i)
(B) A- (i), B- (ii), C- (iii), D-(iv)
(C) A- (iii), B- (iv), C- (i), D-(ii)
(D) A- (iv), B- (i), C- (ii), D-(iii)

2. Which one of the following molecule is NOT needed during translation in protein synthesis?

(A) m- RNA
(B) DNA
(C) r- RNA
(D) t- RNA

3. The process of non-cyclic photophosphorylation occurs in ____.

(A) aerobic conditions, high CO_2 conc. and low light intensity.
(B) anaerobic conditions, high CO_2 conc. and enough light intensity.
(C) aerobic conditions, high CO_2 conc. and enough light intensity.
(D) aerobic conditions, low CO_2 conc. and enough light intensity.

4. Renin is secreted by the cells of ____.

(A) JG apparatus
(B) collecting tubule
(C) collecting duct
(D) PCT

5. A molecule of chlorophyll which acts as reaction centre in pigment system - II is ____.

(A) P - 650
(B) P - 700
(C) P - 673
(D) P - 680

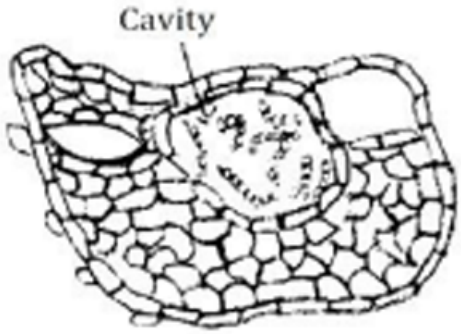
6. How many base pairs are present in a segment of m-RNA having 100 nucleotides?

(A) 100
(B) 50
(C) 00
(D) 25

7. Following are prokaryotic cells EXCEPT ____.

(A) Anabaena
(B) Streptococcus
(C) Nostoc
(D) Paramoecium

8. The figure given below is T.S. of Azolla leaf, the filaments present in the cavity of the leaf are of ____.



T.S of Azolla leaf

(A) Nostoc
(B) Tolypothrix
(C) Anabaena
(D) Oscillatoria

9. The average life span of blood platelets is ____ days.

(A) 3 - 4
(B) 1 - 3
(C) 11 - 15
(D) 5 - 10

10. What will be the genotype of a carrier individual who shows sickle cell anaemic trait?

(A) $Hb^B Hb^B$
(B) $Hb^A Hb^S$
(C) $Hb^S Hb^S$
(D) $Hb^A Hb^A$

11. Specialized cells that are sensitive to vibration, pain and tension are called ____.

(A) Proprioceptors
(B) Baroreceptors
(C) statoacoustic receptors
(D) frigidoreceptors

12. Fructose is contributed to the semen by ____.

(A) seminal vesicles
(B) testis
(C) prostate gland
(D) Cowper's gland

13. What is true about C_4 plants ____.

(A) C_3 pathway reactions take place in bundle sheath chloroplast and C_4 pathway reactions in mesophyll chloroplast.
(B) Both reactions occur in mesophyll chloroplast.
(C) Both reactions occur in bundle sheath chloroplast.
(D) C_4 pathway reaction take place in mesophyll chloroplast and C_4 pathway reactions in bundle sheath chloroplast.

14. Proteins attached with a prosthetic group are called ____ proteins.

(A) structural
(B) simple
(C) contractile
(D) conjugated

15. The shortest phase of cardiac cycle is ____.

(A) joint cardiac diastole
(B) ventricular systole
(C) atrial diastole
(D) atrial systole

16. Match the Column - I with Column-II and select the correct option
Column - I | Column - II
a) Female banded Krait | i) Humulin
b) Pancreas from dog | ii) DNA sample
c) Hair root of human | iii) Insulin extracted and purified
d) E. coli | iv) DNA probe

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

17. Which one of the following is NOT characteristics of plasmid?

(A) Help bacteria survive and reproduce under unfavourable conditions
(B) Double stranded
(C) Self-replicating
(D) Heredity material of bacterium

18. The subaerial branch which creeps horizontally on soil and helps in vegetative propagation is called ____.

(A) runner
(B) offset
(C) stolon
(D) sucker

19. Who postulated three laws that are known as Mendel's Law of Inheritance based on Mendel's findings?

(A) Hugo De Vries
(B) Karl Correns
(C) Johannsen
(D) Erich Tschermak

20. In angiospermic flowers, the filament of stamen is attached to the anther by ____.

(A) placenta
(B) hilum
(C) funicle
(D) connective

21. The dead leucocytes are destroyed in the following organs / fluid EXCEPT ____.

(A) spleen
(B) lymph node
(C) blood
(D) liver

22. A 22 year old girl is about to face interview. She is sweating and her heart beats have increased. These symptoms are due to increased secretion mainly of ____.

(A) thymosins
(B) catecholamines
(C) aldosterone
(D) androgens

23. Water present in the form of hydrated oxides of silicon and aluminium in soil is called ____ water.

(A) gravitational
(B) capillary
(C) hygroscopic
(D) combined

24. With reference to agricultural crop, which of the following are considered as critical elements?

(A) Mg, Fe, Zn
(B) C, H, O
(C) N, P, K
(D) Mn, Cl, Ca

25. Lemurs are found in ____.

(A) Central America
(B) East Indies
(C) Madagascar
(D) South Africa

26. Match the correct phenotype and genotype of Drosophila for their wing sizes.
Phenotype | Genotype
i) Normal wings | c) Vg^{+}
ii) Nicked wings | e) vg^{ni}
iii) Notched wings | a) vg^{no}
iv) Strap wings | d) vg^{st}
v) Vestigeal wing | b) vg

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

27. Cretaceous, Jurassic and Triassic periods are included in the ____ era.

(A) Palaeozoic (B) Mesozoic
(C) Proterozoic (D) Cenozoic

28. Gargi constructed m-RNA in laboratory. Which of the following codons will she have as initiating and terminating the m-RNA respectively.

(A) AUG-UAG (B) GUG-UAC
(C) UAC-AUG (D) AUG-UCA

29. With reference to human beings, find out the mis-match pair.

(A) Insemination — Discharge of semen into the vagina of a female.
(B) Implantation — Setting of zygote in the endometrium uterus.
(C) Menopause —Total arrest of menstrual cycle forever.
(D) Menarche— Begining of menstrual cycle for the first time in life.

30. Which of the following is NOT involved in glycolysis?

(A) Release of water (B) Utilization of ATP
(C) Formation of ATP (D) Release of CO_2

31. In a population of an organism, allele 'A' has the frequency of 0.7 and allele 'a' has the frequency of 0.3. What is the frequency of homozygous dominant allele?

(A) 0.49 (B) 0.14
(C) 1.4 (D) 4.9

32. Mortality of a region is assessed by ____ of individuals per unit area per unit time.

(A) births (B) immigration
(C) emigration (D) deaths

33. In ornithophilous plants, flowers lack ____.

(A) sticky pollen grains (B) nectar
(C) bright colour (D) fragrance

34. Match the process in Column - I with its explanation in Column-II and select the correct option.

Column - I | Column - II
i) Symport | a) shrinking of protoplasm in a plant cell when placed in hypertonic solution.
ii) Facilitated diffusion | b) transport of two types of molecules in same direction across cell membrane.
iii) Antiport | c) selective transport of molecules across the membrane through proteins.
iv) Plasmolysis | d) transport of two types of molecules in opposite direction across cell membrane

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

35. Hydra and yeast reproduce asexually by ____.

(A) binary fission (B) budding
(C) zoospores (D) conidia

36. Taq polymerase isolated from Thermus aquaticus can withstand temperature up to ____.

(A) 84°C (B) 91°C
(C) 94°C (D) 60°C

37. Internal valves are present in the ____.

(A) arterioles (B) lymphatic vessels
(C) vascular capillaries (D) lymph capillaries

38. Select the INCORRECT statement.

(A) Female bird is heterogametic.
(B) Holandric genes are present on non-homologous region of Y chromosome.
(C) Queen bee and worker bees have haploid number of chromosomes.
(D) Father is responsible for sex of the child in human beings.

39. Excessive haemolysis of R.B.C.s with over production of bilirubin and abnormal function of ____ is observed in Jaundice.

(A) lungs (B) heart
(C) liver (D) stomach

40. Empirical formula of chlorophyll -a is ____.

(A) $C_{55}H_{72}O_4N_5Mg$ (B) $C_{72}H_{55}O_5N_4Mg$
(C) $C_{55}H_{70}O_5N_4Mg$ (D) $C_{55}H_{72}O_5N_4Mg$

41. Select the correct statement.

(A) The ovum secretes antifertilizin.
(B) The sperm secretes antifertilizin.
(C) The zygote secretes fertilizin.
(D) The sperm secretes fertilizin.

42. Breasts are the modified ____ glands.

(A) sebaceous
(B) ceruminous
(C) sweat
(D) vestibular

43. Proximal convoluted tubule differs from distal convoluted tubule being lined by ____.

(A) squamous cells with few microvilli
(B) squamous cells with many microvilli
(C) cuboidal cells with few microvilli
(D) cuboidal cells with many microvilli

44. Which one of the following is cause of inflammation of cornea, called snow blindness cataract?

(A) The gamma rays
(B) High dose of cosmic rays
(C) High dose of UV-B rays
(D) The infrared rays

45. Gaurav visited a zoo where he saw tiger, lion, camel, musk deer, red fox, one-horned rhinoceros, great Indian bustard and peacock. He wanted to report the endangered species from the above list. The number will be ____.

(A) 3
(B) 4
(C) 5
(D) 8

46. Which one of the following is a heteropolysaccharide?

(A) Cellulose
(B) Starch
(C) Glycogen
(D) Hyaluronic acid

47. Which one of the following animal has longer loop of Henle?

(A) Camel
(B) Rat
(C) Monkey
(D) Labeo

48. Wine and beer are produced without ____.

(A) distillation
(B) malting
(C) fermentation
(D) mashing

49. Which one of the following blood vessels carries oxygenated blood?

(A) coronary sinus
(B) coronary artery
(C) pulmonary artery
(D) coronary vein

50. Which one of the following lichens are used to obtain usnic acid?

(A) Usnea and Cladonia
(B) Evernia and Ramalina
(C) Rocella and Lassalia
(D) Usnea and Citraia

51. The ____ brings about dilation of blood vessels?

(A) histamine
(B) gastrin
(C) elastin
(D) heparin

52. Inflammation of alveoli, consolidation and exudation in lungs, are characteristics of ____ disease.

(A) Malaria
(B) Amoebiasis
(C) Filariasis
(D) Pneumonia

53. Select the correct statement with reference to AIDS.

(A) It spreads through casual contact with HIV infected person.
(B) It is easily curable.
(C) Patients called non-progressors develop AIDS very slowly or never at all.
(D) It is transmitted through insect bite.

54. Grafting is NOT possible in monocots because they do not possess ____.

(A) branches
(B) buds
(C) apical meristem
(D) cambium

55. Photosynthetic organisms which lack chlorophyll-a are ____.

(A) vascular plants
(B) algae
(C) photosynthetic bacteria
(D) bryophytes

56. Which one of the following heavy metals in water is responsible to cause haemolysis, diarrhoea, abdominal and chest pain in humans?

(A) Selenium
(B) Arsenic
(C) Mercury
(D) Lead

57. Match the Column-I with Column-II and select the correct option.
Column-I | Column-II
A. Tidal volume | i) 2500-3000 ml
B. Inspiratory reserve volume | ii) 1000 ml
C. Residual volume | iii) 4500 ml
D. Vital capacity | iv) 500 ml

(A) A- iii, B-iv, C-i, D-ii
(B) A- ii, B-iii, C-iv, D-i
(C) A- iv, B-i, C-ii, D-iii
(D) A- iv, B-ii, C-iii, D-i

58. In the process of digestion, lipids present in oily and fried foods are digested and split into ____ and ____.

(A) fatty acids and glycerol
(B) glucose and glycerol
(C) fatty acids and amino acids
(D) glucose and amino acids

59. High aspartic acid, low nitrogen and sugar content in maize variety makes it resistant to ____.

(A) leaf curl
(B) black rot
(C) stripe rust
(D) stem borer

60. Cartilage forming cells are called ____.

(A) osteoblasts
(B) chondroblasts
(C) adipocytes
(D) osteocytes

61. Which phytohormone promotes seed germination in cereals by synthesizing amylase enzyme?

(A) Gibberellin
(B) Abscisic acid
(C) Auxin
(D) Cytokinin

62. In recombinant DNA technology after the bacteriophage infects a bacterial cell, plaques are formed by the ____.

(A) new colonies of bacterial cells
(B) infecting bacteriophages
(C) lysed bacterial cells
(D) virions

63. The number of carbon atoms per molecule of citric acid, oxaloacetic acid and pyruvic acid respectively are ____.

(A) 4, 6 and 3
(B) 6, 4 and 3
(C) 6, 3 and 2
(D) 4, 4 and 3

64. Spinal cord is enclosed in ____ of vertebral column.

(A) neural canal
(B) Volkmann's canal
(C) inguinal canal
(D) central canal

65. Majority of kidney stones are formed by ____.

(A) uric acid
(B) urea
(C) calcium oxalate
(D) cystine

66. The product of syngamy in angiosperms is ____.

(A) egg
(B) PEN
(C) oosphere
(D) oospore

67. The vector phage lambda is commonly used for gene transfer in ____.

(A) plant cell
(B) yeast
(C) bacteria
(D) insect

68. What is the percentage of methane in biogas?

(A) 15-45
(B) 91-95
(C) 85-90
(D) 50-80

69. Select the INCORRECT statement.

(A) Hisardale is an example of cross-breeding experiment.
(B) Genetic mother in MOET technique serves for multiple ovulation.
(C) Apis mellifera and Apis florea are domesticated species of honey bee.
(D) Layers management includes processes like culling and debeaking.

70. The number of phenotypic and genotypic individuals produced during a typical Mendelian monohybrid cross will be ____ and ____ respectively.

(A) 2 and 2
(B) 3 and 2
(C) 2 and 3
(D) 3 and 3

71. Norman Borlaug developed semi-dwarf varieties of wheat in ____.

(A) Mexico
(B) USA
(C) Philippines
(D) India

72. Genetic material present in prokaryotes is ____.

(A) nucleosome
(B) nucleus
(C) nucleolus
(D) nucleoid

73. In plant breeding, biofortification is a method ____.

(A) to increase the nutritional value of crop plants.
(B) to make the crop plants disease resistant.
(C) to improve the yield of the crop plant.
(D) to make the crop plants pest resistant.

74. A man working in a furnace room suffered from asphyxiation. What should be the main reason?

(A) More O_2 level in the furnace room.
(B) CO poisoning due to high CO level in the furnace room.
(C) More O_2 as well as fumes in the furnace room.
(D) Less O_2 level in the furnace room.

75. In Morgan's experiment on Drosophila cross between yellow bodied, white eyed female with wild type male gives ____% of parental gene combination in F2 generation.

(A) 37.2 %
(B) 1.3 %
(C) 62.8 %
(D) 98.7 %

76. The size of genome of Methanococcus jannaschii is ____.

(A) 1830 kb
(B) 1660 kb
(C) 569 kb
(D) 12,500 kb

77. Damage to VI cranial nerve in human, may affect the movements of ____.

(A) neck
(B) jaw
(C) tongue
(D) eye

78. The enzymes needed for Krebs cycle are located in ____.

(A) oxysomes of mitochondria
(B) matrix of mitochondria
(C) cytoplasm of cell
(D) outer membrane of mitochondria

79. Sexual reproduction is absent in the members of ____.

(A) Deuteromycetes
(B) Phycomycetes
(C) Basidiomycetes
(D) Ascomycetes

80. Eukaryotic cells do NOT possess ____.
a) ribosomes
b) mesosomes
c) fimbriae
d) mitochondria

(A) only b
(B) b and c
(C) a and b
(D) only d

81. An individual produced during a cross between two pure plants differing in two pairs of contrasting characters is always ____.

(A) homozygous for the two selected traits.
(B) heterozygous for the two selected traits.
(C) heterozygous for none of the traits.
(D) homozygous for one trait and heterozygous for other trait.

82. Arrange the following events a,b,c,d of chemical evolution in correct sequence and select the option.
a) Transformation of heterotrophs into autotrophs.
b) Formation of amino acids, purines and pyrimidines.
c) Formation of protoproteins.
d) Heavy elements like iron and nickel form the solid core of earth.

(A) c, a, b, d
(B) d, b, c, a
(C) a, c, d, b
(D) b, d, a, c

83. The uterus of a woman is attached to her body wall by a double fold of peritoneum called ____.

(A) perimetrium
(B) Mesometrium
(C) mesosalpinx
(D) myometrium

84. Identify the set of plants bearing exalbuminous seeds.

(A) Castor, Bean, Pea, Sunflower
(B) Sunflower, Coconut, Maize, Wheat
(C) Pea, Bean, Gram, Castor
(D) Pea, Bean, Gram, Ground-nut

85. Net productivity is the rate of storage of organic matter which is not used by the consumer, it is expressed as ____.

(A) production of Carbon g/m^2/day
(B) Chl/g dry wt/unit area
(C) Chl/g/m^2/unit area
(D) CO_2 fixed /g Chl/ hour

86. The unfertilized human female gamete is usually about ____ in diameter.

(A) 60μ (B) 70μ
(C) 40μ (D) 100μ

88. Cerebral cortex is highly folded due to elevations and depressions on it. The elevations are called ____.

(A) funiculi (B) fovea
(C) gyri (D) sulci

90. DNAase is used to treat ____.

(A) cystic fibrosis (B) haemophilia
(C) pituitary dwarfism (D) burns

91. Syphilis is caused by ____.

(A) a spirochaete bacterium called Treponema pallidum (B) a spirochaete bacterium called Neisseria gonorrhoeae
(C) a diplococcus bacterium called Treponema pallidum (D) a diplococcus bacterium called Neisseria gonorrhoeae

92. Marijuana is obtained from ____ part of Cannabis sativa.

(A) latex (B) leaf
(C) inflorescence (D) root

93. Which of the following compounds/intermediates of Krebs cycle do NOT undergo either decar- boxylation or oxidation?

(A) Isocitric acid (B) α - ketoglutaric acid
(C) Fumaric acid (D) Malic acid

94. Viroids attack mainly ____.

(A) plants, animals and bacteria (B) animals only
(C) animals and plants (D) plants only

95. In DNA molecule, pairing between two complementary nucleotides takes place by ____ bonds.

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

96. The breed of ____ called Hisardale is developed in Punjab by cross -breeding technique.

(A) sheep (B) donkey
(C) horse (D) mule

97. The RQ of fats and proteins is ____ respectively.

(A) 0.7 and 0.9 (B) 0.7 and 1.0
(C) 0.9 and 0.7 (D) 1.0 and 0.7

98. The growth of lichens followed by mosses, herbs, shrubs and trees is an example of ____.

(A) zonation (B) xerarch succession
(C) stratification (D) hydrarch succession

99. The term " Grand period of growth" was given by ____.

(A) Gane (B) F.W.Went
(C) Sachs (D) Kurosawa

100. The layer of anther wall, which help in its dehiscence is ____.

(A) epidermis (B) endothecium
(C) tapetum (D) middle layers

- End of Question Paper -