MHT CET 2020 PCB Oct 7 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 7 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 **192 of 200 questions**: **47 Physics**, **47 Chemistry**, **98 Biology**. Original subject question numbers are retained; Physics questions 8, 9, 21; Chemistry questions 13, 42, 44; Biology questions 73, 96 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. Two springs of equal length and equal area of cross-section are suspended from rigid support and loaded with same mass. Young's modulus of two springs is in the ratio 4:3. When the springs are stretched through some distance and released, they will oscillate with periods 'T_1' and 'T_2'. The ratio $T_1 : T_2$ is

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

2. Rate of radiation by a black body is 'R' at temperature 'T'. Another body has same area but emissivity is 0.2 and temperature '3T'. Its rate of radiation is

(A) (8.1) R (B) (16.2) R
(C) (24.3) R (D) (32.4) R

3. In an LCR circuit, inductive reactance is $30\,\Omega$ and capacitive reactance $30\,\Omega$. The resistance was found to be $40\,\Omega$. The probable impedance of the combination is

(A) $60\ \Omega$ (B) $20\ \Omega$
(C) $100\ \Omega$ (D) $40\ \Omega$

4. A metal surface is irradiated by radiations whose wavelength is 'λ'. If the work function of the metal surface is negligibly small, then the de-Broglie wavelength of emitted electrons will be
[c = velocity of light, m = mass of electron, h = Planck's constant]

(A) $\left[\frac{h\lambda}{2mc}\right]^{1/2}$ (B) $\left[\frac{h\lambda}{2mc}\right]^{1/3}$
(C) $\left[\frac{2hc}{\lambda}\right]^{1/2}$ (D) $\left[\frac{hc}{2m\lambda}\right]^{1/3}$

5. In a transistor, doping level in base is increased slightly, the collector current and base current respectively

(A) increases slightly, decreases slightly. (B) decreases slightly, increases slightly.
(C) increases slightly, increases slightly. (D) decreases slightly, decreases slightly.

6. When an unknown resistance 'X' is connected in the left gap of a meter bridge and a known resistance 'R' in the right gap, null point is obtained at 40 cm from left end. If a $2\,\Omega$ resistance is connected in series with 'X' the null point shifts towards right by 10 cm, with same resistance in right gap. The value of 'X' must be

(A) $1\ \Omega$ (B) $4\ \Omega$
(C) $2\ \Omega$ (D) $3\ \Omega$

7. A bullet of mass 20 gram is fired from a gun of mass 2.5 kg with a speed of 750 m/s. The magnitude of recoil velocity of the gun is

(A) 12 m/s (B) 3 m/s
(C) 6 m/s (D) 18 m/s

10. A stationary sound wave has a frequency of 165 Hz. If the speed of sound in air is 330 m/s, then the distance between a node and the adjacent antinode is

(A) 80 cm (B) 50 cm
(C) 2 cm (D) 20 cm

11. A particle is performing vertical circular motion. The difference in tension at lowest and highest point is

(A) 2 mg (B) 6 mg
(C) 8 mg (D) 4 mg

12. The relative magnetic permeability (μ_r) of a substance is related to its susceptibility (χ) as

(A) $\mu_r = 1 - \chi^2$ (B) $\mu_r = 1 + \chi^2$
(C) $\mu_r = 1 + \chi$ (D) $\mu_r = 1 - \chi$

13. A spring produces extension 'x' by applying a force 'F' N. A body of mass 'm' suspended from spring oscillates vertically with a period 'T'. The mass of the suspended body is (neglect mass of spring)

(A) $\frac{2T^2F}{\pi^2x}$ (B) $\frac{T^2F}{4\pi^2x}$
(C) $\frac{T^2F}{\pi^2x}$ (D) $\frac{T^2F}{2\pi^2x}$

14. A galvanometer having a resistance of $18\,\Omega$ is shunted by a wire of resistance $2\,\Omega$. If the total current passing through the combination is 2 A, then current through shunt will be

(A) 1.8 A (B) 0.9 A
(C) 12 A (D) 12.2 A

15. The magnetic field developed due to current carrying coil at its centre is 'B'. If the new coil of two turns is prepared from the above coil and same current is passed, then the magnetic field at the centre of the new coil will be

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

(C) $\frac{B}{4}$ (D) 2 B

16. When a light ray is incident on a prism at an angle of 45°, the minimum deviation is obtained. If refractive index of material of prism is $\sqrt{2}$, then angle of prism will be
[$\sin\frac{\pi}{4}=\frac{1}{\sqrt{2}}$, $\sin 30^\circ=\cos 60^\circ=\frac{1}{2}$]

(A) 30° (B) 75°

(C) 45° (D) 60°

17. The moduli of elasticity for a substance are Young's modulus, Bulk modulus and Modulus of rigidity. All the three moduli of elasticity are possessed by

(A) gases and liquids. (B) solids and liquids.

(C) solids only. (D) solids and gases.

18. A light of wavelength 'λ' and intensity 'I' falls on photosensitive material. If 'N' photoelectrons are emitted, each with kinetic energy E, then

(A) $E\propto\frac{1}{\lambda}$, $N\propto I$ (B) $E\propto I$, $N\propto I$

(C) $E\propto I$, $N\propto\frac{1}{\lambda}$ (D) $E\propto I$, $N\propto\lambda$

19. A mass M moving with velocity v along x axis collides and sticks to another mass 2M which is moving along Y axis with velocity 3v. After collision, the velocity of the combination is

(A) $\frac{v}{3}\hat{i}-2v\hat{j}$ (B) $\frac{2v}{3}\hat{i}+\hat{j}$

(C) $v\hat{i}+\frac{v}{3}\hat{j}$ (D) $\frac{v}{3}\hat{i}+2v\hat{j}$

20. A resonance tube closed at one end is of height 1.5 m. A tuning fork of frequency 340 Hz is vibrating above the tube. Water is poured in the tube gradually. The minimum height of water for which resonance is obtained is
(Neglect end correction. Speed of sound in air = 340 m/s)

(A) 5 cm (B) 125 cm

(C) 150 cm (D) 25 cm

22. In the case of earth, mean radius is 'R', acceleration due to gravity on the surface is 'g', angular speed about its own axis is 'ω'. What will be the radius of the orbit of a geostationary satellite?

(A) $\left[\frac{\omega^2}{gR^2}\right]^{1/2}$ (B) $\left[\frac{gR^2}{\omega^2}\right]^{1/3}$

(C) $\left[\frac{gR^2}{\omega^2}\right]^{1/2}$ (D) $\left[\frac{\omega^2}{gR^2}\right]^{1/3}$

23. For a certain organ pipe, three successive resonant frequencies are heard as 300 Hz, 420 Hz and 540 Hz. If the speed of sound in air is 360 m/s, then the pipe is a

(A) open pipe of 1.5 m length. (B) open pipe of 3 m length.

(C) closed pipe of 3 m length. (D) closed pipe of 1.5 m length.

24. When a certain metallic surface is illuminated with monochromatic light of wavelength 'λ', the stopping potential for photoelectric effect is '$3V_0$'. If the same surface is illuminated with a light of wavelength '2λ', the stopping potential is found as 'V_0'. The threshold wavelength for this surface is

(A) $\frac{\lambda}{4}$ (B) 4λ

(C) 6λ (D) $\frac{\lambda}{6}$

25. Which one of following statements about the angle of contact (θ), is wrong?

(A) θ is not constant for particular solid - liquid pair. (B) $\theta>0^\circ$ for pure water - glass pair.

(C) $\theta>90^\circ$ for mercury - glass pair. (D) $\theta<90^\circ$ for kerosene - glass pair.

26. A plane surface area 200 cm^2 is kept in a uniform electric field of intensity 200 N/C. If the angle between the normal to the surface and the field is 60°, then the electric flux through the surface is
[$\cos 60^\circ=\frac{1}{2}$]

(A) 4 Nm^2/C (B) 100 Nm^2/C

(C) 2 Nm^2/C (D) 200 Nm^2/C

27. The frequency of a tuning fork is 220 Hz and the velocity of sound in air is 330 m/s. When the tuning fork completes 80 vibrations, the distance travelled by the wave is

(A) 100 m (B) 60 m

(C) 53 m (D) 120 m

28. What is the least radius of curve on a horizontal road, at which a vehicle can travel at a speed of 36 km/hr at an angle of inclination 45°? [$g = 10\,m/s^2$, $\tan 45^\circ = 1$]

(A) 10 m (B) 20 m
(C) 25 m (D) 15 m

29. Forces $\vec{P}$ and $\vec{Q}$ have resultant $\vec{R}$ whose magnitude is 40N. $\vec{R}$ makes an angle 45° with $\vec{P}$ as well as $\vec{Q}$.
The magnitude of $\vec{P}$ is
($\tan\frac{\pi}{4} = 1$)

(A) $20\sqrt{5}$ N (B) $\sqrt{20}$ N
(C) $20\sqrt{2}$ N (D) 20 N

30. There are three needles 'N_1', 'N_2' and 'N_3' made of a ferromagnetic, a paramagnetic and a diamagnetic substance respectively. When a magnet is brought close to them, then it will

(A) attract N_2 strongly, N_1 and N_3 weakly. (B) attract N_1 strongly, repel N_2 and N_3 weakly.
(C) attract N_1 strongly, N_2 and N_3 weakly. (D) attract N_1 strongly and N_2 weakly, repel N_3 weakly.

31. Time taken by sunlight to penetrate 2 mm through a glass slab is of the order
[Refractive index of glass = 1.5, velocity of light in air = $3 \times 10^8\,m/s$]

(A) 10^{-19} s (B) 10^{-11} s
(C) 10^5 s (D) 10^{-10} s

32. A block of mass 1 kg is kept on ice surface. When velocity of 4 m/s is given to it, it stops by friction in 5 second. The coefficient of friction is [$g = 10\,m/s^2$]

(A) 0.06 (B) 0.04
(C) 0.02 (D) 0.08

33. The resolving power of telescope depends on

(A) length of telescope. (B) focal length of an objective.
(C) diameter of the objective. (D) focal length of an eye piece.

34. Force $F = P + Qt + \frac{1}{r+xs} + c\sin(\omega t + \phi)$ where x and t represent displacement and time respectively. The dimensions of the product 'cs' are

(A) $[L^1M^0T^0]$ (B) $[L^{-1}M^1T^0]$
(C) $[L^{-1}M^0T^0]$ (D) $[L^1M^{-1}T^1]$

35. If a capillary tube is immersed vertically in water, rise of water in capillary is 'h_1'. When the whole arrangement is taken to a depth 'd' in a mine, the water level rises to 'h_2'. The ratio $\frac{h_1}{h_2}$ is
(R = radius of earth)

(A) $\left(1 + \frac{d^2}{R^2}\right)$ (B) $\left(1 + \frac{d}{R}\right)$
(C) $\left(1 - \frac{d^2}{R^2}\right)$ (D) $\left(1 - \frac{d}{R}\right)$

36. A radar of power 1 kW operating at frequency 10 GHz is located on a mountain top of height 500 m. The maximum distance upto which it can detect object located on the surface of the earth is [Radius of earth = $6.4 \times 10^6\,m$]

(A) 8 km (B) 80 km
(C) 70 km (D) 56 km

37. When lens of refractive index 'μ_1' is placed in liquid of refractive index 'μ_2', the lens looks to be disappeared only if

(A) $2\mu_1 = \mu_2$ (B) $\mu_1 = \frac{2\mu_2}{3}$
(C) $\mu_1 = \mu_2$ (D) $\mu_1 = \frac{3\mu_2}{2}$

38. A simple pendulum oscillates with an angular amplitude 'θ'. If the maximum tension in the string is twice the minimum tension then 'θ' is

(A) $\cos^{-1}(0.25)$ (B) $\cos^{-1}(0.75)$
(C) $\cos^{-1}(0.10)$ (D) $\cos^{-1}(0.50)$

39. The kinetic energy of a particle performing S.H.M. is $\frac{1}{n}$ times its potential energy. If the amplitude of S.H.M. is 'A', then the displacement of the particle will be

(A) $\sqrt{\frac{nA^2}{n+1}}$ (B) $\frac{A}{n}$
(C) nA (D) $\sqrt{\frac{(n+1)A^2}{n}}$

40. For the weight of body of mass 5 kg to be zero on equator of the earth, angular velocity of the earth must be
[The radius of earth = 6400 km, acceleration due to gravity = $10\,m/s^2$]

(A) $\frac{1}{80}$ rad/s (B) $\frac{1}{400}$ rad/s
(C) $\frac{1}{800}$ rad/s (D) $\frac{1}{1600}$ rad/s

41. The ratio of areas of electron orbits for the second excited state to the first excited state in hydrogen atom, is

(A) $\frac{4}{9}$ (B) $\frac{16}{81}$

(C) $\frac{81}{16}$ (D) $\frac{9}{4}$

42. A uniform disc of mass 4 kg has radius of 0.4 m. Its moment of inertia about an axis passing through a point on its circumference and perpendicular to its plane is

(A) 0.16 $kg-m^2$ (B) 0.32 $kg-m^2$

(C) 0.64 $kg-m^2$ (D) 0.96 $kg-m^2$

43. An electron moves in a circular orbit of radius 'r' with uniform speed 'v'. It produces magnetic field 'B' at the centre of circle. The magnetic field 'B' is proportional to

(A) $\frac{1}{vr^2}$ (B) $\frac{r^2}{v}$

(C) $\frac{v}{r^2}$ (D) vr^2

44. S.I. Unit of emissive power of a body at a given temperature is

(A) $\frac{J}{m^2s}$ (B) $\frac{J}{m^2}$

(C) $\frac{J}{s}$ (D) $\frac{W}{m}$

45. Two coherent light sources of intensity ratio 'n' are employed in an interference experiment. The ratio of the intensities of the maxima and minima in the interference pattern is $(I_1 > I_2)$

(A) $\left(\frac{n+1}{n-1}\right)^2$ (B) $\left(\frac{\sqrt{n}+1}{\sqrt{n}-1}\right)^2$

(C) $\frac{\sqrt{n}+1}{\sqrt{n}-1}$ (D) $\frac{n+1}{n-1}$

46. For three non-zero vectors $\vec{A}$, $\vec{B}$ and $\vec{C}$, $\vec{A}+\vec{B}=\vec{C}$ and $A^2+B^2=C^2$, then the angle between $\vec{A}$ and $\vec{B}$ will be

(A) 90° (B) 180°

(C) 30° (D) 60°

47. In potentiometer experiment, the balancing length with cell E_1 of unknown e.m.f. is ℓ_1 cm. By shunting the cell E_1 with resistance 'R' which is equal to internal resistance (r) of the cell E_1, the balancing length ℓ_2 is

(A) ℓ_1 (B) $\frac{\ell_1}{4}$

(C) $\frac{\ell_1}{2}$ (D) $2\ell_1$

48. A capacitor of unknown capacitance is connected across a battery of 'V' volt. The charge stored in it is 'Q' coulomb. When potential across the capacitor is reduced by V' volt, the charge stored in it becomes Q' coulomb. The potential V is

(A) $\frac{QV'}{(Q+Q')}$ (B) $\frac{(Q+Q')}{QV'}$

(C) $\frac{(Q-Q')}{QV'}$ (D) $\frac{QV'}{(Q-Q')}$

49. Two bodies rotate with kinetic energies 'E_1' and 'E_2'. Moment of inertia about their axis of rotation is 'I_1' and 'I_2'. If $I_1=\frac{I_2}{3}$ and $E_1=27E_2$ then the ratio of their angular momenta L_1 to L_2 is

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

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

50. A resistance of 100 Ω, inductor of self-inductance $\left(\frac{4}{\pi^2}\right)$ H and a capacitor of unknown capacitance are connected in series to an a.c. source of 200V and 50 Hz. When the current and voltage are in phase, the capacitance and power dissipated is respectively

(A) 2.5×10^{-5} F, 400 W (B) 1.5×10^{-5} F, 200 W

(C) 2.0×10^{-5} F, 100 W (D) 3.0×10^{-5} F, 50 W

1. If ΔH° and ΔS° for the reaction $N_2O_{4(g)} \rightarrow 2NO_{2(g)}$ is 57.24 kJ and 175.8 $JK^{-1}mol^{-1}$ respectively. What is the value of ΔG° for this reaction at 298 K?

(A) 57.24 kJ (B) -17.58 kJ
(C) -4.85 kJ (D) 4.85 kJ

2. Which cation from following does NOT form colourless compound?
(Atomic number - Cu = 29, Ti = 22, Zn = 30, Sc = 21)

(A) Sc^{3+} (B) Cu^{+1}
(C) Ti^{3+} (D) Zn^{2+}

3. Which of the following properties is NOT a colligative property?

(A) elevation in boiling point. (B) Osmotic pressure.
(C) vapour pressure of solvent. (D) depression in freezing point.

4. Which among the following groups has lowest priority in assigning R, S convention?

(A) -COOH (B) $-CONH_2$
(C) $-CH_2$-OH (D) -CN

5. Which of the following set of compounds does NOT demonstrate the law of multiple proportion?

(A) H_2O, CO_2, CH_4 (B) H_2O, H_2O_2
(C) SO_2, SO_3 (D) NO, NO_2

6. Which of following has intramolecular hydrogen bonding?

(A) Ethyl alcohol (B) Ammonia
(C) O-nitrophenol (D) Hydrofluoric acid

7. Which of the following is a Wolff-Kishner reduction?

(A) $-CO- +4[H] \xrightarrow[\Delta]{Zn-Hg/conc.HCl} -CH_2- +H_2O$

(B) $-COCl \xrightarrow{H_2,pd-BaSO_4} -CHO + HCl$

(C) $-C \equiv N + 2[H] \xrightarrow[dilHCl]{SnCl_2} -CH=NH.HCl \xrightarrow{H_3O^+} -CHO + NH_4Cl$

(D) $C=O \xrightarrow[-H_2O]{H_2N-NH_2} C=N-NH_2 \xrightarrow[\Delta]{KOH/ethyleneglycol} CH_2 + N_2$

8. Identify the mineral of iron from following

(A) Willemite (B) Calamine
(C) Siderite (D) Magnesite

9. Which of the following oxyacids of sulphur contain S-O-S linkage?

(A) $H_2S_2O_4$ (B) $H_2S_2O_5$
(C) $H_2S_2O_3$ (D) $H_2S_2O_2$

10. Isochor is the graph plotted between

(A) temperature on X-axis and volume on Y-axis at constant pressure.
(B) temperature on X-axis and pressure on Y-axis at constant volume.
(C) pressure on X-axis and volume on Y-axis at constant temperature.
(D) reciprocal of volume on X-axis and pressure on Y-axis at constant temperature.

11. For the reaction,
$C_2H_5OH_{(l)} + 3O_{2(g)} \rightarrow 2CO_{2(g)} + 3H_2O_{(l)}$
Which among the following is true?

(A) $\Delta H = \Delta U + 2RT$ (B) $\Delta H = \Delta U - 2RT$
(C) $\Delta H = \Delta U - RT$ (D) $\Delta H = \Delta U + RT$

12. van't Hoff factor for $K_3[Fe(CN)_6]$ is 3.333. What is its percentage dissociation in water?

(A) 77.7 % (B) 70 %
(C) 83 % (D) 58 %

14. Which mineral among following contains zinc?

(A) Willemite (B) Corundum
(C) Azurite (D) Malachite

15. Which among the following reaction produces lime water?

(A) $CaO + 2NH_4Cl \xrightarrow{\Delta} CaCl_2 + 2NH_3 + H_2O$
(B) $CaO + SiO_2 \rightarrow CaSiO_3$
(C) $CaO + CO_2 \rightarrow CaCO_3$
(D) $CaO + H_2O \rightarrow Ca(OH)_2$

16. In the following reaction the reagent A is,

$$Ar - N_2^+X^- \xrightarrow{A} Ar - N_2^+BF_4^- \xrightarrow{\Delta} Ar - F + BF_3 + N_2 \uparrow$$

(A) hydrofluoric acid (B) borontrifluoride
(C) boric acid (D) fluoroboric acid

17. In case of substituted aniline the group which decreases the basic strength is

(A) -NH_2 (B) -OCH_3
(C) -NO_2 (D) -CH_3

18. Which of the following is NOT dihydric phenol?

(A) Quinol (B) Catechol
(C) Phloroglucinol (D) Resorcinol

19. Identify the product B in the following reaction

$$CH_3COOH + C_2H_5OH \xrightarrow[-H_2O]{H^+} A \xrightarrow[Ni]{H_2} B$$

(A) Ethanol (B) Ethanol and propionic acid
(C) Ethanol and propanol (D) Ethanol and ethanoic acid

20. Which of the following substances is NOT used for food preservation?

(A) Alitame (B) Sodium benzoate
(C) Propionic acid salts (D) Sorbic acid salts

21. Identify the use of Buna-N.

(A) In making soles of shoes. (B) To prepare bubble gums.
(C) For making inner tubes of tyres. (D) To manufacture chemical containers.

22. What is the number of atoms in 12.08×10^{23} unit cells if an element crystallises in bcc structure?

(A) 4.838×10^{24} (B) 2.08×10^{22}
(C) 2.416×10^{24} (D) 1.208×10^{23}

23. Why is bond order of Be_2 molecule zero? (N_b = bonding electrons, N_a = antibonding electrons)

(A) $N_b > N_a$ (B) $N_b < N_a$
(C) $\frac{N_b}{N_a}$ = Zero (D) $N_b = N_a$

24. Identify the coordinate complex having ambidentate ligand from following.

(A) Diammine silver (I) Chloride
(B) Sodium hexanitrito-N-cobaltate (III)
(C) Tetraaquadichlorochromium (III) chloride
(D) Barium tetrachlorocuprate (II)

25. Which among the following polymers is obtained first by formation of salt by neutralization and then by step growth polymerisation?

(A) Polyester (B) Nylon-6
(C) Nylon-6, 6 (D) Novolac

26. Identify the increasing order of effective magnetic moment of following elements in their + 2 oxidation state.
$\{Fe(Z = 26), Co(Z = 27), Ni(Z = 28), Cu(Z = 29)\}$

(A) Fe < Co < Ni < Cu (B) Cu < Ni < Co < Fe
(C) Cu < Co < Fe < Ni (D) Co < Cu < Fe < Ni

27. If a dilute solution of NaI is added to dilute solution of excess $AgNO_3$, then species adsorbed on AgI colloidal particles is

(A) Na^+ (B) Ag^+
(C) I^- (D) NO_3^-

28. 0.224 g of an organic Compound on complete combustion gives 0.126 g of water. What is the percentage composition of hydrogen in compound?

(A) 6.25 % (B) 35 %
(C) 12.50 % (D) 25 %

29. Which among the following complexes carries no net charge?

(A) $[Ni(NH_3)_6]Cl_2$ (B) $[Fe(H_2O)_6]Cl_3$
(C) $K_2[HgI_4]$ (D) $[Pt(NH_3)_2Cl_2]$

30. Which of the following compounds is obtained when benzene reacts with benzoyl chloride in presence of anhydrous $AlCl_3$?

(A) Chlorobenzene (B) Benzaldehyde
(C) Benzophenone (D) Acetophenone

31. In the reaction $2SO_2 + O_2 \rightarrow 2SO_3$ the rate of appearance of SO_3 is 4×10^{-4} M/s, the rate of disappearance of O_2 is

(A) 1.0×10^{-4} M/s (B) 2.0×10^{-4} M/s
(C) 6.0×10^{-4} M/s (D) 4.0×10^{-4} M/s

32. Identify the product A in the following reaction.
$(CH_3)_3C - OH \xrightarrow[573K]{Cu} A$

(A) 2-methylpropene (B) 2-methylpropanal
(C) Butanal (D) Butanone

33. What is the oxidation state of chlorine atom in chlorous acid?

(A) +3 (B) +1
(C) +2 (D) -1

34. Secondary nitroalkanes react with nitrous acid to form

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

35. When dry cell is in use the change taking place at cathode is

(A) Zn is oxidised (B) $Zn^{++}_{(aq.)}$ is reduced
(C) $NH^{+}_{4(aq.)}$ ions are reduced (D) MnO_2 is oxidised

36. What is the oxidation number of V in $V_2O_7^{4-}$ ion?

(A) +4 (B) +3
(C) +6 (D) +5

37. The number of asymmetric carbon atoms present in 2,3-dichloro-4-methyl pentane is

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

38. Which among the following crystal structures the edge length of unit cell is equal to twice the radius of one atom?

(A) End - centred Orthorhombic (B) Simple cubic
(C) Face centred cubic (D) Body centred cubic

39. Which of the following is an example of narrow spectrum antibiotics?

(A) Amoxicillin (B) Ampicillin
(C) Chloramphenicol (D) Penicillin

40. What is the total number of chain isomers exhibited by Hexane?

(A) 9 (B) 3
(C) 4 (D) 5

41. Which statement from following is NOT true about cellobiose?

(A) It is also a reducing sugar. (B) It is obtained by partial hydrolysis of cellulose.
(C) In this C-1 of one β-D-glucopyranose is linked to C-2 of another β-D-glucopyranose. (D) It is a disaccharide.

43. Which among the following elements when added to silicon forms P - type semiconductor?

(A) Sb (B) Bi
(C) B (D) As

45. Calculate the strength of 10 volume solution of hydrogen peroxide?

(A) 30.35 g L^{-1} (B) 60.71 g L^{-1}
(C) 45.51 g L^{-1} (D) 15.175 g L^{-1}

46. In 2 hours, a certain current liberates 0.504 g hydrogen. How many grams of copper can be deposited by the same current flowing for the same time in a $CuSO_4$ solution?
(molar mass of Cu = 63.5 g mol^{-1}, H_2 = 2.0 g mol^{-1})

(A) 31.8 g (B) 32 g
(C) 63.5 g (D) 16.0 g

47. What type of solution is obtained when benzoic acid is added in Benzene?

(A) solid in solid (B) liquid in liquid
(C) liquid in solid (D) Solid in liquid

48. Which of the following noble gas molecules is more polarised by water?

(A) Krypton (B) Helium
(C) Argon (D) Neon

49. Which among the following observations suggests that glucose also exists in cyclic form?

(A) Acetylation of glucose obtains glucose penta acetate.

(B) Glucose does not undergo condensation with 2, 4 dinitro-phenylhydrazine.

(C) Prolong heating of glucose with HI yields n-hexane.

(D) Hydroxylamine reacts with glucose to form glucose oxime.

50. Which of the following is an extensive property?

(A) Specific heat

(B) Volume

(C) Density

(D) Surface tension

1. Self-incompatibility is observed in ____.

(A) Orchids
(B) Callistemon
(C) Salvia
(D) Cestrum

2. Which one of the following does NOT show hypogeal germination?

(A) Pea
(B) Tamarind
(C) Groundnut
(D) Gram

3. The mycorrhiza in relationship with land plants is a ____.

(A) fungus
(B) protozoan
(C) bacterium
(D) virus

4. Select the correct match from the following.

(A) Hair root from human — Extracted and purified insulin
(B) Escherichia coli — smallest genome
(C) Female banded krait — DNA probe
(D) Pancreas from dog — Humulin

5. Match the pairs of proteins and their types in Column-I and Column-II. Choose the correct option.

Column-I | Column-II
a) Structural | i) Immunoglobulin
b) Contractile | ii) Myoglobin
c) Transport | iii) Keratin
d) Defensive | iv) Myosin

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

6. During proton pump (chemiosmosis) for synthesis of $NADPH_2$ from NADP ____ are required.

(A) only protons
(B) only electrons
(C) neither protons nor electrons
(D) protons along with electrons

7. During glycolysis, both oxidation and phosphorylation reactions occur during conversion of ____.

(A) PEPA to Pyruvate
(B) 2-PGA to PEPA
(C) DHAP to PGAL
(D) PGAL to 1,3 -di PGA

8. In which one of the following processes are the bacteria Nitrosomonas, Nitrosococcus and Nitrobacter involved?

(A) Denitrification
(B) Deamination
(C) Eutrophication
(D) Nitrification

9. In human beings, how much quantity of semen is contributed by the prostate gland?

(A) 60 %
(B) 30 %
(C) 80 %
(D) 10 %

10. Which of the following is the first cell of human life?

(A) Oosphere
(B) 1st polar body
(C) Oospore
(D) Synkaryon

11. The blood pressure will be minimum in the ____.

(A) systemic aorta
(B) pulmonary artery
(C) renal vein
(D) coronary artery

12. The monitoring stations established by NEERI have reported that Chembur-Trombay area in Mumbai has highest ____ in air.

(A) hydrocarbons
(B) carbon monoxide
(C) suspended particulate matter
(D) sulphur di-oxide

13. Point mutation is ____.

(A) sudden change in the chemical make up of a gene.
(B) alteration in allele frequency.
(C) changes in gene arrangement in chromosome.
(D) gradual, continuous change in genetic make up.

14. How many oxidation steps are involved in aerobic respiration during acetylation and Krebs cycle?

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

15. Match the plant structure in Column-I with the process occurring in it from Column-II and select the correct option.
Column-I | Column-II
i) Stomata | a) Absorption
ii) Hydathode | b) Transpiration
iii) Root hair | c) Guttation
iv) Tracheary elements | d) Translocation

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

16. These blood corpuscles are also called polymorphs ____.

(A) Neutrophils
(B) Monocytes
(C) Basophils
(D) Eosinophils

17. The foliar buds for vegetative propagation are produced on the surface of leaf in ____.

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

18. PCR is NOT used in ____.

(A) lytic cycle
(B) DNA finger printing
(C) DNA cloning
(D) gene amplification

19. Coccidiosis is a disease related to ____.

(A) sericulture
(B) poultry
(C) apiculture
(D) fish hatchery

20. The oxygenated blood is brought to the left atrium by ____ pulmonary veins.

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

21. Polysome is a group of ____.

(A) ribosomes
(B) plastids
(C) microbodies
(D) lysosomes

22. During implantation, the cells of ____ secrete lytic enzymes and destroy endometrial cells.

(A) syncytiotrophoblast
(B) corona radiata
(C) embryonic disc
(D) cytotrophoblast

23. Characteristic three successive free nuclear mitotic divisions are involved in the development of ____ in angiosperms.

(A) female gametophyte
(B) embryo
(C) male gametophyte
(D) endosperm

24. A student of biology would suggest which one of the following agricultural practices to control biomagnification of toxic elements in the ecosystem?

(A) Mixed cropping and use of fertilizers in large amount.
(B) Organic farming and use of biopesticides and biofertilizers.
(C) Crop rotation and use of NPK fertilizers.
(D) Jhum cultivation and use of chemical fertilizers and bio pesticides.

25. Colour of B- carotene is ____.

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

26. How many ATP molecules are generated when one molecule of reduced coenzyme $NADH_2$ is reoxidised during respiratory chain?

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

27. Lantana camara is a ____ species.

(A) endangered
(B) rare
(C) exotic
(D) vulnerable

28. Identify the correct statement for suspension culture.

(A) This does not need sub-culturing at all.
(B) The callus transferred in liquid nutrient medium remains intact even after agitation.
(C) This culture grows much faster than callus culture.
(D) Agitation of the medium is not necessary.

29. A membrane that allows the passage of solvent molecules but not the passage of solute molecules is called ____ membrane.

(A) differentially permeable
(B) impermeable
(C) freely permeable
(D) semi-permeable

30. Which one of the following is NOT a characteristic of garden pea plants?

(A) They show many varieties with contrasting characters.
(B) They are self-pollinating.
(C) They show many intermediate characters.
(D) They are annual plants.

31. In angiosperms, the endosperm is classified on the basis of which one of the following criteria?

(A) Development
(B) Position
(C) Ploidy
(D) Function

32. Ophthalmic, maxillary and mandibular nerves are branches of ____ cranial nerve.

(A) Facial
(B) Vestibulocochlear
(C) Glossopharyngeal
(D) Trigeminal

33. TPA gene is used for ____ in gene therapy.

(A) wound healing
(B) treating haemophiliacs
(C) treating pituitary dwarfism
(D) reversing blood clots

34. In the process of clotting, enzyme prothrombinase requires ____ ions to convert prothrombin to thrombin.

(A) Ca^{++}
(B) Mn^{++}
(C) Mg^{++}
(D) Na^{++}

35. Nucleoid is ____.

(A) chromatin material of eukaryotic cells.
(B) nuclear sap of eukaryotic cells.
(C) prokaryotic chromosome associated with proteins.
(D) spherical, acidophilic body present within distinct nucleus.

36. Which of the parents with following blood groups CANNOT have a child with blood group A?

(A) A and B (heterozygous)
(B) O and B
(C) AB and A (heterozygous)
(D) O and AB

37. Oligodendrocytes are types of ____.

(A) plasma cells
(B) epithelial cells
(C) neuroglial cells
(D) goblet cells

38. Which fossil of human ancestor had cranial capacity of 1450 c.c.?

(A) Homo erectus erectus
(B) Homo habilis
(C) Homo neanderthalensis
(D) Homo sapiens fossilis

39. Which one of the following is a non-endospermic seed?

(A) Gram
(B) Maize
(C) Castor
(D) Sunflower

40. The newly selected plants obtained by hybridization are grown in natural fields for at least ____ successive seasons.

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

41. Bacillus thuringiensis is a soil bacterium that produces a ____ with insecticidal properties.

(A) polysaccharide
(B) hormone
(C) protein
(D) lipid

42. In human beings, the foetal placenta is derived from ____.

(A) allantois
(B) chorion
(C) primary yolk sac
(D) amnion

43. Select the correct statement about the mesosome in bacterial cell. It ____.

(A) stores organic inclusions.
(B) is believed to be involved in the replication of DNA.
(C) brings about photosynthesis by stored pigments such as bacteriochlorophyll and carotenoids.
(D) is infolding of cell wall that provides mechanical support.

44. Lateral ventricles of cerebral hemispheres communicate with third ventricle through ____.

(A) foramen ovale
(B) foramen of Monro
(C) foramen magnum
(D) hypophyseal fossa

45. The auricle (external ear) in man is made up of ____.

(A) calcified cartilage (B) elastic cartilage
(C) hyaline cartilage (D) brown adipose tissue

46. Match the correct numbers regarding the inheritance of human skin colour.
Number of different types of gametes produced by mulattoes | Total number of different combinations in F_2 generation | Number of different phenotypes in F_2 generation

(A) 64 | 8 | 7 (B) 7 | 8 | 64
(C) 8 | 64 | 7 (D) 7 | 64 | 8

47. During the reactions of HSK pathway in bundle sheath chloroplast, malate undergoes ____.

(A) decarboxylation (B) reduction
(C) phosphorylation (D) hydration

48. Risk taking behavior in adolescents is thought to be caused by ____ part of brain developing faster than other parts during this growth period.

(A) frontal cortex (B) medulla oblongata
(C) corpus callosum (D) amygdala

49. Dihybrid ratio is a product of two monohybrid ratios. Which principle of statistics did Mendel apply here?

(A) Standard deviation (B) Mode
(C) Median (D) Probability

50. Which gland in the male human being is homologous to the vestibular gland in the human female?

(A) Bartholin's gland (B) Seminal vesicle
(C) Prostate gland (D) Cowper's gland

51. Which one of the following is a restriction enzyme?

(A) RNA polymerase (B) DNA polymerase
(C) Ligase (D) EcoR I

52. Cancer characterized by a change in wart or mole on the skin is called ____.

(A) Carcinoma (B) Sarcoma
(C) Melanoma (D) Adenoma

53. Which one of the following is dominant among the wing sizes in Drosophila?

(A) Normal wings (B) Vestigeal wings
(C) Notched wings (D) Nicked wings

54. Column-I consists of names of fungi classes while Column-II consists of names of genera. Find out the correct option.
Column-I | Column-II
I. Phycomycetes | p. Alternaria, Trichophyton
II. Ascomycetes | q. Agaricus, Puccinia
III. Basidiomycetes | r. Mucor, Rhizopus
IV. Deuteromycetes | s. Aspergillus, Penicillium

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

55. In honey bees, drones are produced by ____.

(A) spermatogenesis (B) transgenesis
(C) parthenogenesis (D) haemopoiesis

56. Which phytohormone is useful for leaf expansion in leafy vegetable?

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

57. Which one of the following enzyme does NOT operate in Lac Operon?

(A) DNAase (B) permease
(C) β - galactosidase (D) transacetylase

58. During anaerobic respiration, pyruvate undergoes decarboxylation in presence of enzyme pyruvate decarboxylase. Which of the following coenzymes and cofactors respectively are required in this reaction?

(A) Acetyl Co-A and Mg^{++} (B) Acetyl Co-A and Zn^{++}
(C) Co-enzyme Q and Mg^{++} (D) Thiamine pyrophosphate and Zn^{++}

59. The acceptor of atmospheric CO_2 in C_3 plants is ____.

(A) RUBP and PEPA (B) RUBP only
(C) PEPA only (D) OAA or PEPA

60. Finches of Galapagos islands differ from main land finches in size, colour and food habits. It is due to ____.

(A) geographical isolation
(B) reproductive isolation
(C) ethological isolation
(D) seasonal isolation

61. Duct of Bellini is formed by joining ____ collecting ducts.

(A) 4-5
(B) 7-8
(C) 12-14
(D) 9-11

62. In DNA molecule at the 5' end there is a free ____.

(A) oxygen
(B) nitrogen
(C) phosphate
(D) hydroxyl

63. Select the INCORRECT match.

(A) Urinary bladder – transitional epithelium
(B) Ureter – detrusor muscle
(C) Column of Bertini – in renal medulla
(D) Kidneys - retroperitoneal

64. Spinal cord is a cylindrical tube with a narrow cavity, lined by ependymal cells. This cavity is called ____.

(A) central canal
(B) neural canal
(C) inguinal canal
(D) central sulcus

65. ____ gives seeds protection against mechanical shock, dry conditions etc.

(A) Testa
(B) Tegmen
(C) Scutellum
(D) Endosperm

66. India contributes ____ % of total lac production in the world.

(A) 95
(B) 75
(C) 85
(D) 60

67. In a pregnant woman, ____ is the major source of progesterone during the first trimester.

(A) corpus callosum
(B) corpus albicans
(C) placenta
(D) corpus luteum

68. A pollen grain is provided resistance from physical and biological decomposition by its ____.

(A) intine made up of cellulose and pectin
(B) exine composed of sporopollenin
(C) exine composed of cellulose and pectin
(D) intine made up of sporopollenin

69. Which one of the following pyramid will be always inverted?

(A) Pyramid of biomass on land
(B) Pyramid of energy
(C) Pyramid of biomass in sea
(D) Pyramid of number

70. The expelled excited electron form chlorophyll-a after photo excitation comes back to ground state in ____.

(A) 10^{-9} minutes
(B) 10^{-8} minutes
(C) 10^{-8} hours
(D) 10^{-9} seconds

71. Occurrence of an extra chromosome in a diploid set of chromosome is called ____.

(A) monosomy
(B) polysome
(C) trisomy
(D) polyploidy

72. Match the Column-I with Column-II and select the correct option.

Column-I | Column-II
A. Fibroblasts | i) Storage of fat
B. Mast cells | ii) Secretion of elastin fibres.
C. Macrophages | iii) Secretion of histamines.
D. Adipocytes | iv) Phagocytosis

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

74. When GFR decreases, lungs secrete ____ in renin-angiotensin mechanism.

(A) angiotensin II
(B) angiotensinogen
(C) renin
(D) angiotensin converting enzyme

75. Select the correct statement.

(A) Presence of non functional retinal cone cells lead to colour blindness.
(B) Y- linked inheritance is criss-cross in human beings.
(C) X-linked disorders very frequently appear in human females.
(D) In human being carrier females are colour blind.

76. Secretion of pancreatic enzymes and bile juice is stimulated by ____ hormone.

(A) cholecystokinin
(B) coherin
(C) secretin
(D) gastrin

77. A person involved in stone masonry work is likely to suffer from ____.

(A) CO poisoning
(B) silicosis
(C) emphysema
(D) asbestosis

78. Polyribosomes are ____.

(A) total number of ribosomes in the cell.
(B) devoid of r-RNA.
(C) number of ribosomes linked to m-RNA.
(D) not capable of helping in the synthesis of polypeptide chain.

79. How many chromosomes are usually found in the human secondary oocyte?

(A) 22
(B) 44
(C) 46
(D) 23

80. Which one of the following is NOT a vector in genetic engineering?

(A) Plasmid
(B) Lambda phage
(C) Cosmid
(D) Mosquito

81. In prokaryotes both transcription and translation take place in cytoplasm as there is no ____.

(A) chromosome
(B) nucleus
(C) ATP
(D) ribosome

82. Which of the following sequences of Krebs cycle reactions is correct?

(A) Cisaconitate → succinate → malate → fumarate
(B) Oxaloacetate → malate → succinate → fumarate
(C) Citrate → succinate → oxaloacetate → fumarate
(D) Oxalosuccinate → α- ketoglutarate → succinyl Co-A → succinate

83. Select the mis-matched pair.

(A) Archaeopteryx — Long tail supported by caudal vertebrae, feathery exoskeleton.
(B) Human beings — Orthognathous face, dental arch rounded parabola.
(C) Lemur — Limbs with adhesive pads, long hind limbs with elongated tarsals.
(D) Gorilla — Slanting forehead, narrow and elongated pelvic girdle.

84. ____ is obtained from fermented grains of corn, wheat and barley.

(A) Beer
(B) Wine
(C) Rum
(D) Whisky

85. Natality of a region is assessed by rate of ____ of individuals per unit area, per unit time.

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

86. Mice are appropriate choice as transgenic animals for following reasons EXCEPT.

(A) They do not normally exhibit super ovulation.
(B) They are used to test safety of polio vaccine.
(C) They have short generation time.
(D) They exhibit polyembryony.

87. Identify labels A and B in the following chemical reactions and select the correct option given below.
i) Pepsinogen (inactive enzyme) --A--> Pepsin (active enzyme)
ii) Proteins --B--> Peptones + Proteoses.

(A) A-mucus, B-chymotrypsin
(B) A- ptyalin, B-trypsin
(C) A- HCl, B- pepsin
(D) A- HCl, B- ptyalin

88. Select the INCORRECT statement.

(A) Capillary endothelium provides for exchange of substances in the tissues.
(B) Capillaries originate from arterioles.
(C) Pulmonary artery contains oxygenated blood.
(D) Vein provides minimum frictional resistance to the blood flow.

89. Prokaryotic organisms belong to ____ kingdom.

(A) Plantae
(B) Animalia
(C) Protista
(D) Monera

90. The algal partner of the lichen is called ____.

(A) photobiont or mycobiont
(B) phytobiont or mycorrhiza
(C) phycobiont or photobiont
(D) mycobiont or phycobiont

91. Carbohydrate molecules are characterized by any one of the following groups EXCEPT ____.

(A) aldehyde (CNO)
(B) hydroxyl (OH)
(C) carboxyl (COOH)
(D) ketone (C=O)

92. Which one of the following organism used as a biofertilizer is free living and never shows symbiosis?

(A) Mycorrhiza
(B) Azotobacter
(C) Anabaena
(D) Rhizobium

93. Which among the following microbes are commonly employed in dairy industry?

(A) Lactobacillus, Streptomyces, Penicillium
(B) Saccharomyces, Streptomyces, Aspergillus
(C) Eremothecium, Rhizopus, Acetobacter
(D) Pseudomonas, Penicillium, Saccharomyces

94. Which of the following does NOT take place during aerobic cellular respiration?

(A) release of energy
(B) utilization of O_2
(C) oxidation of food
(D) utilization of CO_2

95. Upper surface of tongue bears many projections called ____.

(A) folia
(B) villi
(C) papillae
(D) cristae

97. Which of the following is a fungal disease?

(A) Malaria
(B) Acute coryza
(C) Ringworm infection
(D) Ascariasis

98. The most effective, cheapest and convenient method to protect plants from pathogens is ____.

(A) producing resistant varieties
(B) physical method
(C) biological herbicides
(D) chemical pesticides

99. The saprophytes like bacteria, actinomycetes and fungi are ____.

(A) pioneers in ecological succession.
(B) climax communities in ecological succession.
(C) macro-consumers in an ecosystem.
(D) micro-consumers in an ecosystem.

100. Which of the following is NOT a mesodermal derivative?

(A) Liver
(B) Dermis of skin
(C) Cardiac muscles
(D) Blood

- End of Question Paper -