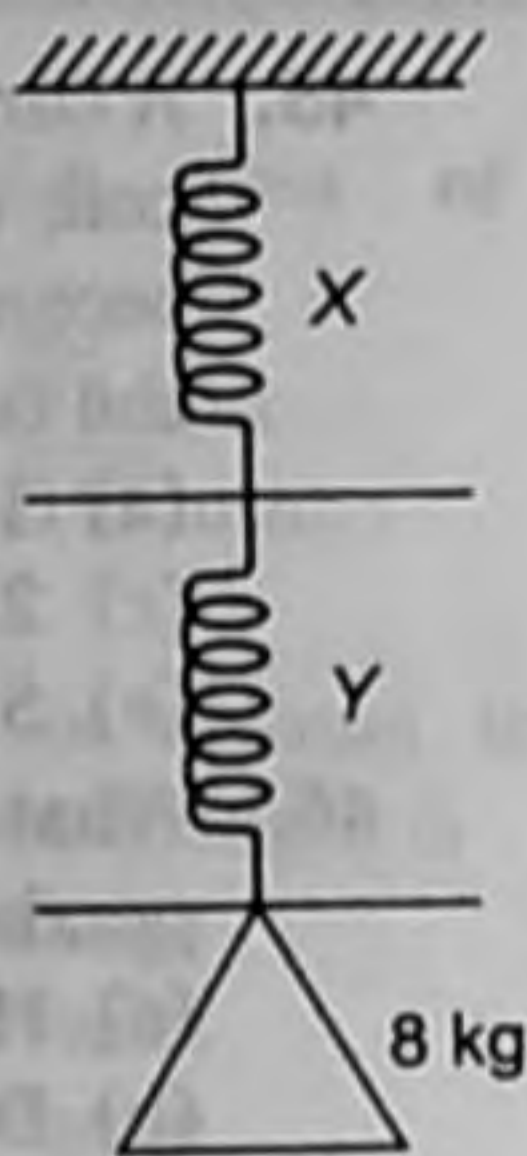


Physics

- If a current of 500 mA produces a deflection of 30° in a tangent galvanometer, then the current that produces a deflection of 60° is
 - 1.5 A
 - 1 A
 - 500 mA
 - 866 mA
 - 2 A
- A wire of length 50 cm moves with a velocity of 300 m/min, perpendicular to a magnetic field. If the emf induced in the wire is 2 V, the magnitude of the field in tesla is
 - 2
 - 5
 - 0.4
 - 2.5
 - 0.8
- Whenever a magnet is moved either towards or away from a conducting coil, an emf is induced, the magnitude of which is independent of
 - the strength of the magnetic field
 - the speed with which the magnet is moved
 - the number of turns in the coil
 - the resistance of the coil
 - the area of cross-section of the coil
- An electromagnetic radiation has an energy of 13.2 keV. Then the radiation belongs to the region of
 - visible light
 - ultraviolet
 - infrared
 - X-ray
 - microwave
- The photosensitive surface is receiving light of wavelength 5000 \AA at the rate of 10^{-8} J/s . The number of photons received per second is
 - 2.5×10^{10}
 - 2.5×10^{11}
 - 2.5×10^{12}
 - 2.5×10^9
 - 2.5×10^{13}
- The nucleus ${}_6\text{C}^{12}$ absorbs an energetic neutron and emits a beta particle (β). The resulting nucleus is
 - ${}_7\text{N}^{14}$
 - ${}_7\text{N}^{13}$
 - ${}_5\text{B}^{13}$
 - ${}_6\text{C}^{13}$
 - ${}_5\text{B}^{12}$
- Select the true statement from the following. Nuclear force is
 - strong, short range and charge independent force
 - charge independent, attractive and long range force
 - strong, charge dependent and short range attractive force
 - long range, charge dependent and attractive force
 - charge independent, short range and strong repulsive force
- In CE mode, the input characteristics of a transistor is the variation of
 - I_B against V_{BE} at constant V_{CE}
 - I_C against V_{CE} at constant V_{BE}
 - I_B against I_C
 - I_E against I_C
 - I_C against V_{CE} at constant I_B
- The electrical conductivity of an intrinsic semiconductor at 0K is
 - less than that of an insulator
 - is equal to zero
 - is equal to infinity
 - more than that of an insulator
 - is equal to that of a metal
- The principle used for the transmission of light signals through the optical fibre is
 - reflection
 - refraction
 - interference
 - diffraction
 - total internal reflection
- The sky wave propagation is suitable for radio-waves of frequency
 - upto 2 MHz
 - from 2 MHz to 20 MHz
 - from 2 MHz to 30 MHz
 - from 2 MHz to 50 MHz
 - from 2 MHz to 80 MHz

12. If voltage $V = (100 \pm 5)$ volt and current $I = (10 \pm 0.2)$ A, the percentage error in resistance R is
 (a) 5.2% (b) 25%
 (c) 7% (d) 10%
 (e) 2.5%
13. A body starting from rest moves with uniform acceleration. The distance covered by the body in time t is proportional to
 (a) \sqrt{t} (b) $t^{3/2}$
 (c) $t^{2/3}$ (d) t^3
 (e) t^2
14. A pendulum of length 1 m is released from $\theta = 60^\circ$. The rate of change of speed of the bob at $\theta = 30^\circ$ is ($g = 10 \text{ ms}^{-2}$)
 (a) 10 ms^{-2} (b) 7.5 ms^{-2}
 (c) 5 ms^{-2} (d) $5\sqrt{3} \text{ ms}^{-2}$
 (e) 2.5 ms^{-2}
15. A body constrained to move in the y -direction is subjected to a force $\vec{F} = 2\hat{i} + 15\hat{j} + 6\hat{k}$ N. The work done by this force in moving the body through a distance of 10 m along y -axis is
 (a) 100 J (b) 150 J
 (c) 120 J (d) 200 J
 (e) 50 J
16. A particle is projected with a speed v at 45° with the horizontal. The magnitude of angular momentum of the projectile about the point of projection when the particle is at its maximum height h is
 (a) zero (b) $\frac{mvh^2}{\sqrt{2}}$
 (c) $\frac{mv^2h}{2}$ (d) $\frac{mvh^3}{\sqrt{2}}$
 (e) $\frac{mvh}{\sqrt{2}}$
17. A gun fires bullets each of mass 1 g with velocity of 10 ms^{-1} by exerting a constant force of 5-g weight. Then the number of bullets fired per second is (Take $g = 10 \text{ ms}^{-2}$)
 (a) 50 (b) 5
 (c) 10 (d) 25
 (e) 15
18. Two equal forces are acting at a point with an angle of 60° between them. If the resultant force is equal to $40\sqrt{3}$ N, the magnitude of each force is
 (a) 40 N (b) 20 N
 (c) 80 N (d) 30 N
 (e) 10 N
19. A man pushes against a wall but fails to move it. He does
 (a) negative work
 (b) positive but not maximum work
 (c) maximum positive work
 (d) no work at all
 (e) maximum negative work
20. When a bullet is fired at a target, its velocity decreases by half after penetrating 30 cm into it. The additional thickness it will penetrate before coming to rest is
 (a) 30 cm (b) 40 cm
 (c) 10 cm (d) 50 cm
 (e) 20 cm
21. The moment of inertia of a flywheel having kinetic energy 360 J and angular speed of 20 rad/s is
 (a) $18 \text{ kg}\cdot\text{m}^2$ (b) $1.8 \text{ kg}\cdot\text{m}^2$
 (c) $2.5 \text{ kg}\cdot\text{m}^2$ (d) $9 \text{ kg}\cdot\text{m}^2$
 (e) $0.9 \text{ kg}\cdot\text{m}^2$
22. Four point masses P, Q, R and S with respective masses 1 kg, 1 kg, 2 kg and 2 kg form the corners of a square of side a . The centre of mass of the system will be farthest from
 (a) P only (b) R and S
 (c) R only (d) P and Q
 (e) P and R
23. The escape velocity from the earth is 11.2 km/s . The escape velocity from a planet having twice the radius and the same mean density is (in km/s)
 (a) 11.2 (b) 5.6
 (c) 15 (d) 22.4
 (e) 33.6
24. The excess of pressure inside the first soap bubble is three times that inside the second bubble. The ratio of volume of the first to that of the second bubble is
 (a) 1 : 3 (b) 1 : 9
 (c) 1 : 27 (d) 9 : 1
 (e) 27 : 1
25. Bernoulli's principle is based on the law of conservation of
 (a) mass
 (b) momentum
 (c) pressure
 (d) energy
 (e) volume

26. A body of mass 8 kg is suspended through two light springs X and Y connected in series as shown in figure. The readings in X and Y respectively are



- (a) 8 kg, zero
 (b) zero, 8 kg
 (c) 6 kg, 2 kg
 (d) 2 kg, 6 kg
 (e) 8 kg, 8 kg

27. A body cools from 62°C to 50°C in 10 min and to 42°C in the next 10 min. The temperature of the surrounding is

- (a) 16°C (b) 26°C
 (c) 36°C (d) 21°C
 (e) 31°C

28. At what temperature the kinetic energy of a gas molecule is half of the value at 27°C ?

- (a) 13.5°C (b) 150°C
 (c) 75 K (d) 13.5 K
 (e) -123°C

29. A black body emits radiations of maximum intensity for the wavelength of 5000 \AA when the temperature of the body is 1227°C . If the temperature of the body is increased by 1000°C , the maximum intensity would be observed at

- (a) 1000 \AA (b) 2000 \AA
 (c) 5000 \AA (d) 4000 \AA
 (e) 3000 \AA

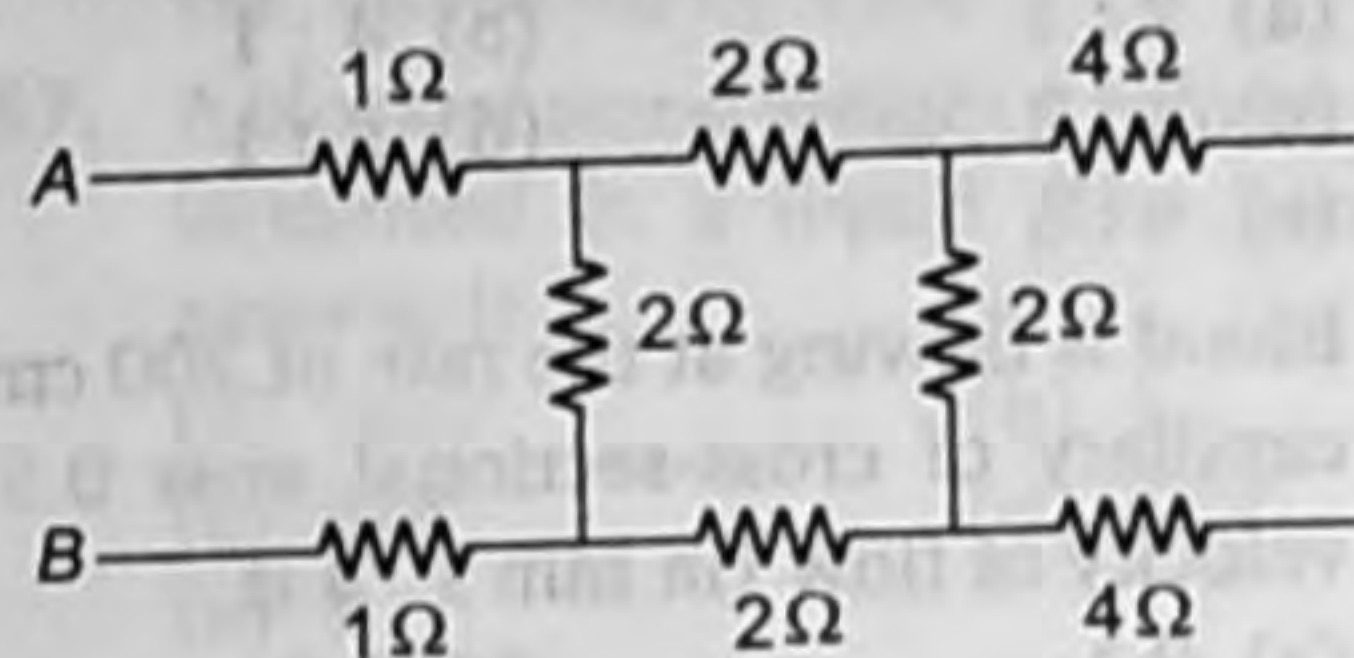
30. A body of mass 20 g connected to spring of constant k executes simple harmonic motion with a frequency of $\left(\frac{5}{\pi}\right)$ Hz. The value of spring constant is

- (a) $4\text{ N}\cdot\text{m}^{-1}$ (b) $3\text{ N}\cdot\text{m}^{-1}$
 (c) $2\text{ N}\cdot\text{m}^{-1}$ (d) $5\text{ N}\cdot\text{m}^{-1}$
 (e) $2.5\text{ N}\cdot\text{m}^{-1}$

31. Two waves are given by $y_1 = \cos(4t - 2x)$ and $y_2 = \sin\left(4t - 2x + \frac{\pi}{4}\right)$. The phase difference between the two waves is

- (a) $\frac{\pi}{4}$ (b) $-\frac{\pi}{4}$
 (c) $\frac{3\pi}{4}$ (d) $\frac{\pi}{2}$
 (e) $\frac{3\pi}{2}$

32. In the adjoining figure the equivalent resistance between A and B is



- (a) 5Ω (b) 8Ω
 (c) 2.5Ω (d) 6.8Ω
 (e) 7.8Ω

33. In a Wheatstone's network $P = 2\Omega$, $Q = 2\Omega$, $R = 2\Omega$ and $S = 3\Omega$. The resistance with which S is to be shunted in order that the bridge may be balanced is

- (a) 1Ω (b) 2Ω
 (c) 4Ω (d) 6Ω
 (e) 8Ω

34. A proton with energy of 2 MeV enters a uniform magnetic field of 2.5 T normally. The magnetic force on the proton is

- (Take mass of proton to be 1.6×10^{-27} kg)
 (a) 3×10^{-12} N (b) 8×10^{-10} N
 (c) 8×10^{-12} N (d) 2×10^{-10} N
 (e) 3×10^{-10} N

35. Two forces of 5N and 12 N simultaneously act on a particle. The net force on the particle is

- (a) 17 N only (b) 12 N
 (c) 13 N (d) between 7N and 17 N
 (e) 7 N only

36. If the acceleration due to gravity on the surface of earth of radius R is g , the gain in potential energy of a body of mass m raised from the surface to a height R is

- (a) $4mgR$ (b) $mgR/4$
 (c) $mgR/2$ (d) $2mgR$
 (e) mgR

37. The core of a transformer is laminated to

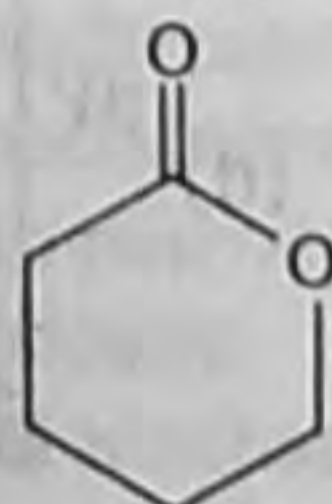
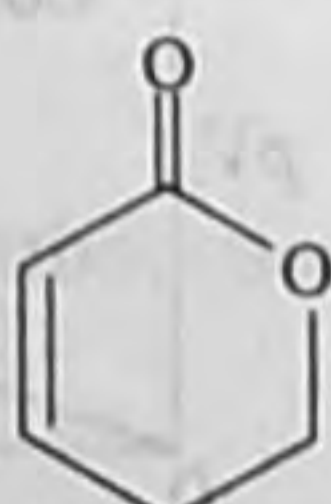
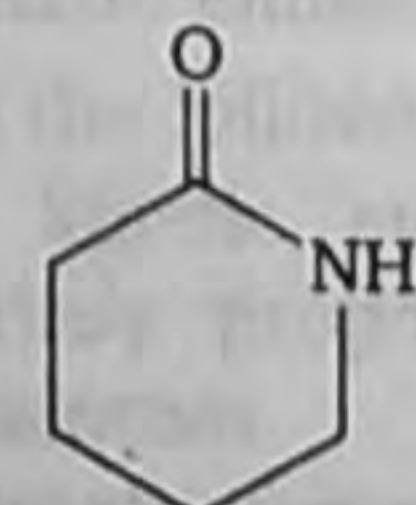
- (a) increase the magnetic flux linked
 (b) reduce the power loss due to eddy current
 (c) reduce the flux leakage loss
 (d) reduce copper loss
 (e) reduce hysteresis loss

38. Two stretched strings of same material are vibrating under same tension in fundamental mode. The ratio of their frequencies is 1 : 2 and

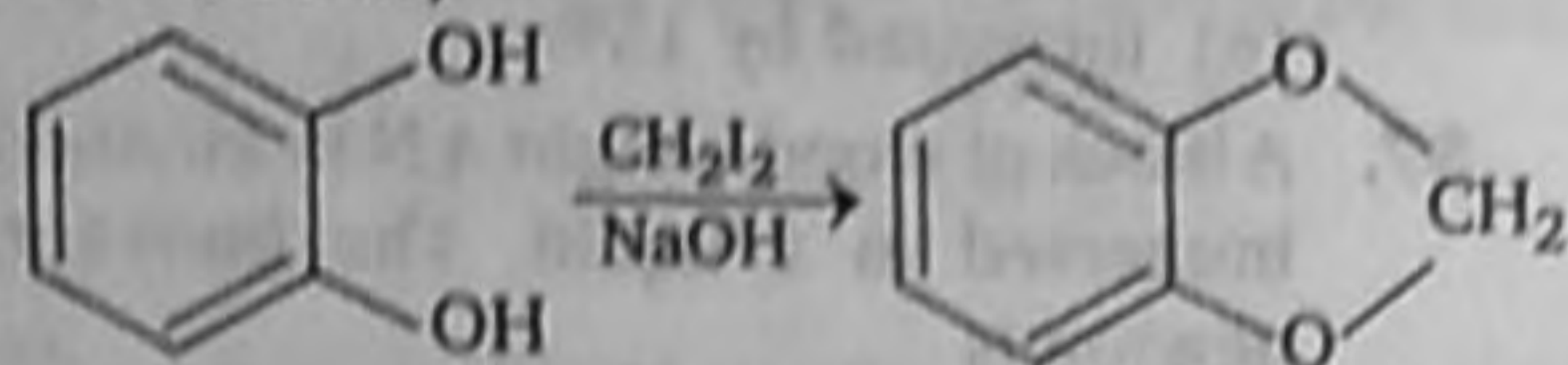
- ratio of the length of the vibrating segments is 1 : 4. Then the ratio of the radii of the strings is
 (a) 2 : 1 (b) 4 : 1
 (c) 3 : 2 (d) 8 : 1
 (e) 4 : 5
39. Blood is flowing at the rate of $200 \text{ cm}^3 \text{ s}^{-1}$ in a capillary of cross-sectional area 0.5 m^2 . The velocity of flow (in mm s^{-1}) is
 (a) 0.1 (b) 0.2
 (c) 0.3 (d) 0.4
 (e) 0.5
40. The electrical conductivity of a semiconductor increases when an electromagnetic radiation of wavelength shorter than 1125 nm is incident on it. The band gap of the semiconductor is
 (a) 0.9 eV (b) 0.7 eV
 (c) 0.5 eV (d) 0.8 eV
 (e) 1.1 eV
41. 4 cells each of emf 2V and internal resistance of 1Ω are connected in parallel to a load resistor of 2Ω . Then the current through the load resistor is
 (a) 2 A (b) 1.5 A
 (c) 1 A (d) 0.888 A
 (e) 0.75 A
42. A thermos flask made of stainless steel contains several tiny lead shots. If the flask is quickly shaken up and down several times, the temperature of lead shots
 (a) increases by adiabatic process
 (b) increases by isothermal process
 (c) decreases by adiabatic process
 (d) remains same
 (e) first decreases and then increases
43. The slope of the kinetic energy *versus* position vector gives the rate of change of
 (a) momentum (b) velocity
 (c) force (d) power
 (e) work
44. The total electrical flux leaving a spherical surface of radius r , in enclosing an electric dipole of charge q is
 (a) zero (b) $\frac{q}{\epsilon_0}$
 (c) $\frac{8\pi r^2 q}{\epsilon_0}$ (d) $\frac{2q}{\epsilon_0}$
 (e) $\frac{4\pi r^2 q}{\epsilon_0}$
45. A current $I = 10 \sin(100\pi t)$ A is passed in first coil, which induces a maximum emf 5π volt in second coil. The mutual inductance between the coils is
 (a) 10 mH (b) 15 mH
 (c) 25 mH (d) 20 mH
 (e) 5 mH
46. What is the effect on the time period of a simple pendulum, if the mass of the bob is doubled?
 (a) Halved
 (b) Doubled
 (c) Becomes eight times
 (d) Becomes zero
 (e) No effect
47. The half-life of thorium X is 3.64 days. After how many days will 0.1 of the mass of a sample of the substance remain undecayed?
 (a) 12.1 days (b) 24 days
 (c) 60 days (d) 4 days
 (e) 14 days
48. Moment of inertia of a body does not depend upon its
 (a) mass (b) axis of rotation
 (c) shape (d) distribution of mass
 (e) angular velocity
49. In terms of Bohr radius a_0 the radius of second Bohr orbit of hydrogen atom is given by
 (a) $4a_0$ (b) $8a_0$
 (c) $\sqrt{2}a_0$ (d) $2a_0$
 (e) $\sqrt{4}a_0$
50. What is the escape velocity for a body on the surface of a planet on which the acceleration due to gravity is $(3.1)^2 \text{ ms}^{-2}$ and whose radius is 8100 km ?
 (a) 2790 km-s^{-1} (b) 27.9 km-s^{-1}
 (c) $\frac{27.9}{\sqrt{5}} \text{ km-s}^{-1}$ (d) $27.9 \sqrt{5} \text{ km-s}^{-1}$
 (e) $\frac{2.79}{\sqrt{5}} \text{ km-s}^{-1}$
51. Which one of the following is not a derived unit?
 (a) Frequency
 (b) Planck's constant
 (c) Gravitational constant
 (d) Charge
 (e) Electric current
52. The diagonals of a parallelogram are represented by vectors $\vec{P} = 5\hat{i} - 4\hat{j} + 3\hat{k}$ and

- $\vec{q} = 3\hat{i} + 2\hat{j} - \hat{k}$. Then the area of the parallelogram is
- (a) $\sqrt{171}$ unit (b) $\sqrt{72}$ unit
 (c) 171 unit (d) $\sqrt{191}$ unit
 (e) None of the above
53. The correct arrangement of colours in the descending order of their wavelength is
 (a) yellow, violet, green, orange
 (b) orange, yellow, green, violet
 (c) violet, green, yellow, orange
 (d) yellow, green, orange, violet
 (e) orange, green, violet, yellow
54. The velocity of sound is v at 273K. The temperature at which it is $2v$ is
 (a) 2×273 K (b) 4×273 K
 (c) 8×273 K (d) 16×273 K
 (e) $\sqrt{2} \times 273$ K
55. Same force acts on two bodies of different masses 3 kg and 5 kg initially at rest. The ratio of times required to acquire same final velocity is
 (a) 5 : 3 (b) 25 : 9
 (c) 9 : 25 (d) $\sqrt{3} : \sqrt{5}$
 (e) 3 : 5
56. To decrease the volume of a gas by 5% at constant temperature the pressure should be
 (a) decreased by 5.26%
 (b) increased by 5.2%
 (c) decreased by 11%
- (d) increased by 11%
 (e) increased by 15%
57. A block of wood weight 4 N in air and 3N, when immersed in a liquid. The buoyant force in newton is
 (a) zero (b) 1
 (c) $3/4$ (d) $4/3$
 (e) 7
58. A $16 \mu\text{F}$ capacitor is charged to a 20V potential. The battery is then disconnected and pure 40 mH coil is connected across the capacitor, so that LC oscillations are setup. The maximum current in the coil is
 (a) 0.2 A (b) 40 mA
 (c) 2 A (d) 0.4 A
 (e) 0.8 A
59. A concave lens of focal length 20 cm produces an image half the size of the real object. The distance of the real object is
 (a) 20 cm (b) 30 cm
 (c) 10 cm (d) 60 cm
 (e) 40 cm
60. If the kinetic energy of the particle is increased by 16 times, the percentage change in the de-Broglie wavelength of the particle is
 (a) 25% (b) 75%
 (c) 60% (d) 50%
 (e) 30%

Chemistry

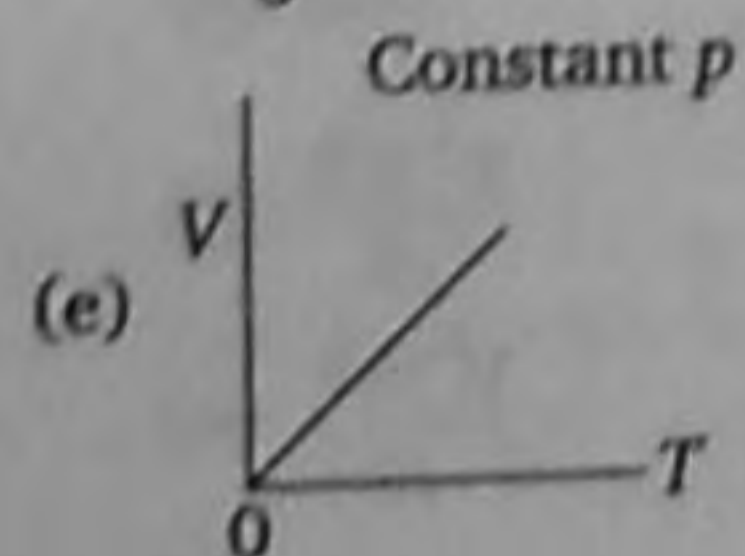
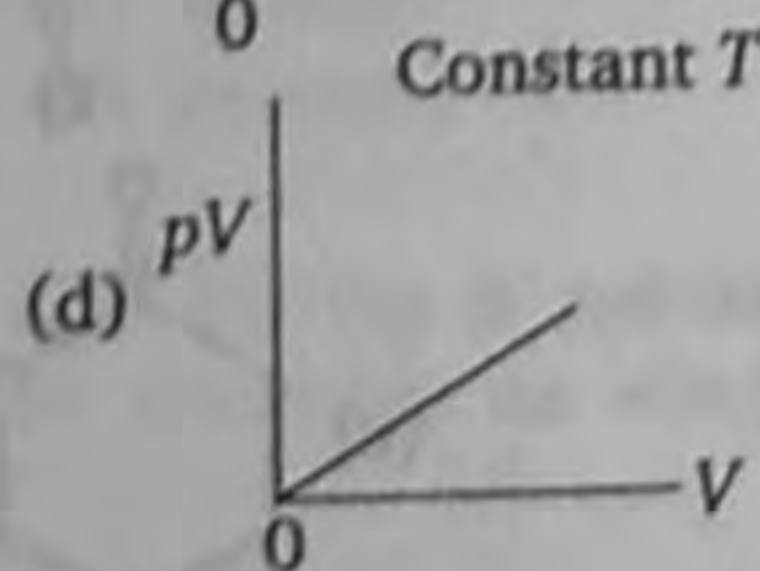
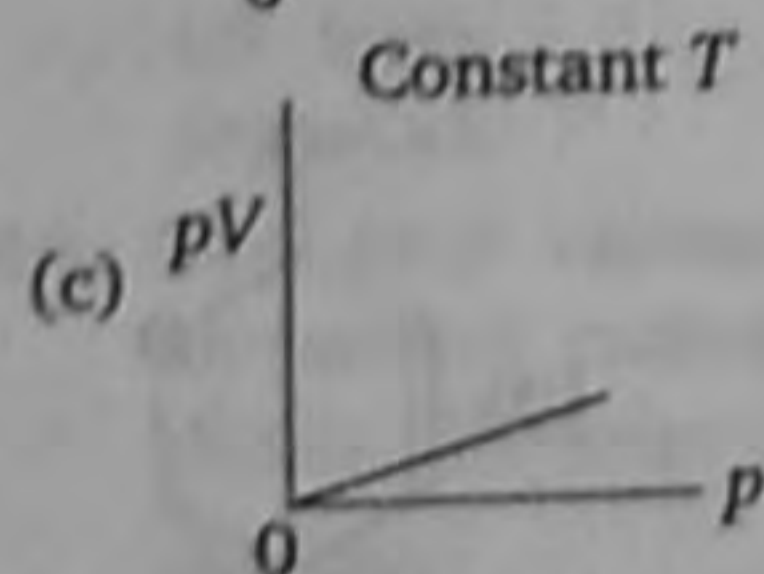
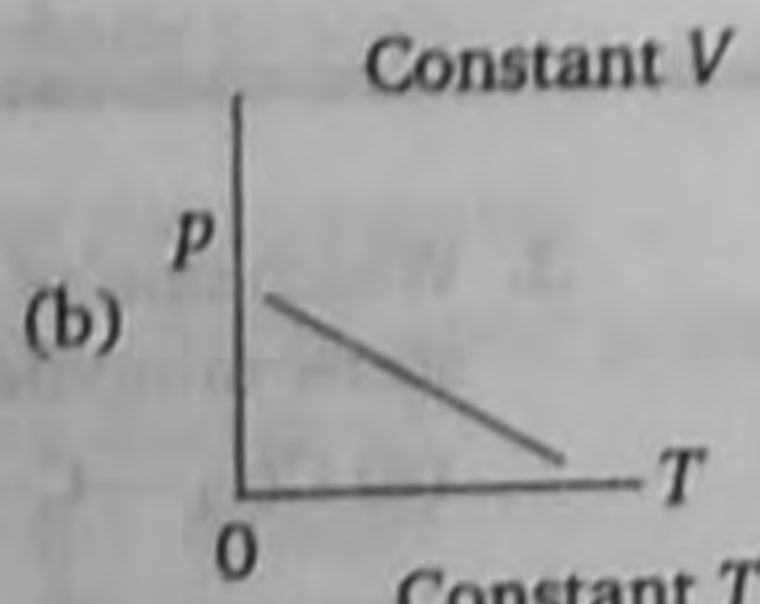
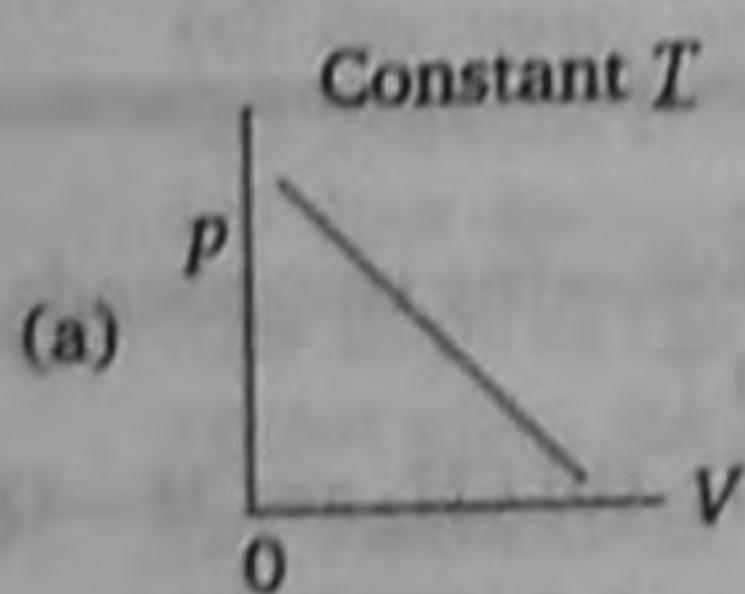
1. Which one of the following is a tridentate ligand ?
 (a) NO_2^- (b) Oxalate ion
 (c) Glycinate ion (d) Dien
 (e) EDTA
2. For the purification, isolation and separation of organic compounds, the latest technique followed is
 (a) chromatography
 (b) steam distillation
 (c) fractional crystallisation
 (d) sublimation
 (e) vacuum distillation
3. Which one of the following compounds cannot show tautomerism ?
 (a) $\text{CH}_3-\text{C}(=\text{O})-\text{CH}_3$ (b) $\text{CH}_2=\text{CH}-\text{OH}$
- (c)  (d) 
- (e) 

4. The reaction,



is an example of

- (a) Wurtz reaction (b) Wittig reaction
 (c) Ullmann reaction (d) Williamson reaction
 (e) Wurtz-Fittig reaction
5. Chloroform gives a trichloro derivative of an alcohol on reaction with
 (a) conc. nitric acid (b) aq. alkali
 (c) acetone and alkali (d) sodium ethoxide
 (e) a primary amine and an alkali
6. 10 L of O_2 gas is reacted with 30 L of CO gas at STP. The volumes of each gas present at the end of the reaction are
 (a) CO = 10 L, CO_2 = 20 L
 (b) O_2 = 10 L, CO = 30 L
 (c) CO = 20 L, CO_2 = 10 L
 (d) O_2 = 10 L, CO_2 = 20 L
 (e) O_2 = 10 L, CO = 10 L
7. For an atom, having $n = 4$, $m_l = +1$, the maximum number of electrons is
 (a) 4 (b) 15
 (c) 3 (d) 1
 (e) 6
8. Which of the following diagrams correctly describes the behaviour of a fixed mass of an ideal gas? (T is measured in K).



9. The hybridisation of oxygen atom in H_2O_2 is
 (a) sp^3d (b) sp
 (c) sp^2 (d) sp^3
 (e) sp^3d^2
10. Among the metals Cr, Fe, Mn, Ti, Zn and Mg, the one that cannot be obtained by reduction of its metal oxide by aluminium is
 (a) Cr (b) Fe
 (c) Mn (d) Zn
 (e) Mg
11. For which one of the following minerals, the composition given is incorrect?
 (a) Glauber's salt — $Na_2SO_4 \cdot 10H_2O$
 (b) Borax — $Na_2B_4O_7 \cdot 7H_2O$
 (c) Carnallite — $KCl \cdot MgCl_2 \cdot 6H_2O$
 (d) Soda ash — Na_2CO_3
 (e) Epsom salt — $MgSO_4 \cdot 7H_2O$
12. Which of the following is the correct order of increasing enthalpy of vaporisation?
 (a) $NH_3 < PH_3 < AsH_3$
 (b) $AsH_3 < PH_3 < NH_3$
 (c) $PH_3 < AsH_3 < NH_3$
 (d) $NH_3 < AsH_3 < PH_3$
 (e) $AsH_3 < NH_3 < PH_3$
13. Chlorine reacts with excess of ammonia to form
 (a) NH_4Cl (b) $N_2 + HCl$
 (c) $N_2 + NH_4Cl$ (d) $N_2 + NCl_3$
 (e) $NCl_3 + HCl$
14. The correct order of ionic radii of Y^{3+} , La^{3+} , Eu^{3+} and Lu^{3+} is
 (a) $Y^{3+} < La^{3+} < Eu^{3+} < Lu^{3+}$
 (b) $Lu^{3+} < Eu^{3+} < La^{3+} < Y^{3+}$
 (c) $La^{3+} < Eu^{3+} < Lu^{3+} < Y^{3+}$
 (d) $Y^{3+} < Lu^{3+} < Eu^{3+} < La^{3+}$
 (e) $Eu^{3+} < La^{3+} < Lu^{3+} < Y^{3+}$
15. The bond dissociation energies of H_2 , Cl_2 and HCl are 104, 58 and 103 kcal mol⁻¹ respectively. The enthalpy of formation of HCl would be
 (a) -22 kcal mol⁻¹ (b) -44 kcal mol⁻¹
 (c) +44 kcal mol⁻¹ (d) +22 kcal mol⁻¹
 (e) -11 kcal mol⁻¹
16. The van't Hoff factor for a solute that associates in solution is
 (a) zero (b) 1.0
 (c) less than 1 (d) more than 1
 (e) between 1 and 2

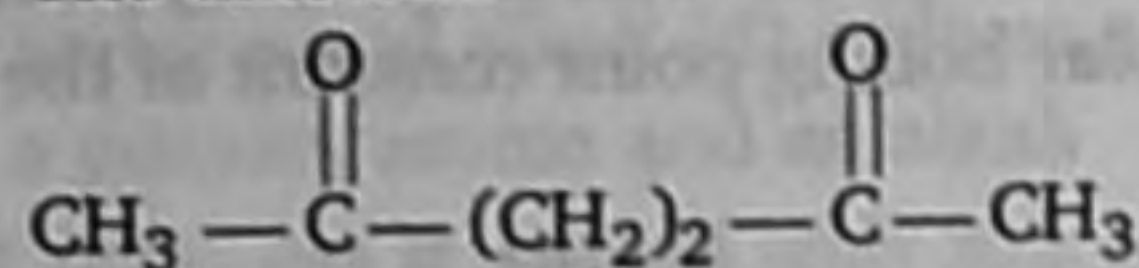
17. Which of the following is redox reaction ?
 (a) $2\text{CuSO}_4 + 4\text{KI} \rightarrow \text{Cu}_2\text{I}_2 + 2\text{K}_2\text{SO}_4 + \text{I}_2$
 (b) $\text{SO}_2 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{SO}_3$
 (c) $\text{Na}_2\text{SO}_4 + \text{BaCl}_2 \rightarrow \text{BaSO}_4 + 2\text{NaCl}$
 (d) $\text{CuSO}_4 + 4\text{NH}_3 \rightarrow [\text{Cu}(\text{NH}_3)_4]\text{SO}_4$
 (e) $\text{C}_{12}\text{H}_{22}\text{O}_{11} + \text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + \text{C}_6\text{H}_{12}\text{O}_6$
18. The resistance of N/10 solution is found to be 2.5×10^3 ohm. The equivalent conductance of the solution is (cell constant = 1.25 cm^{-1})
 (a) $2.5 \text{ ohm}^{-1} \text{ cm}^2 \text{ equiv}^{-1}$
 (b) $5.0 \text{ ohm}^{-1} \text{ cm}^2 \text{ equiv}^{-1}$
 (c) $2.5 \text{ ohm}^{-1} \text{ cm}^{-2} \text{ equiv}^{-1}$
 (d) $5.0 \text{ ohm}^{-1} \text{ cm}^{-2} \text{ equiv}^{-1}$
 (e) $1.25 \text{ ohm}^{-1} \text{ cm}^2 \text{ equiv}^{-1}$
19. Which one of the following acts as the best coagulating agents for ferric hydroxide sol ?
 (a) Magnesium chloride
 (b) Hydrochloric acid
 (c) Aluminium chloride
 (d) Potassium oxalate
 (e) Potassium ferricyanide
20. If the equilibrium constant for the reaction $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$ at 750 K is 49, then the equilibrium constant for the reaction $\text{NH}_3(\text{g}) \rightleftharpoons \frac{1}{2}\text{N}_2(\text{g}) + \frac{3}{2}\text{H}_2(\text{g})$ at the same temperature is
 (a) 1/49 (b) 49
 (c) 7 (d) 49^2
 (e) 1/7
21. The correct relation between equilibrium constant (K), standard free energy (ΔG°) and temperature (T) is
 (a) $\Delta G^\circ = RT \ln K$
 (b) $K = e^{-\Delta G^\circ/2303 RT}$
 (c) $\Delta G^\circ = -RT \log_{10} K$
 (d) $K = 10^{-\Delta G^\circ/2.303 RT}$
 (e) $\Delta G^\circ = R \ln K$
22. Which among the following is the heaviest?
 (a) 1 mole of oxygen
 (b) 1 molecule of sulphur trioxide
 (c) 100 u of uranium
 (d) 10 moles of hydrogen
 (e) 44 g of carbon dioxide
23. Which one of the following electrolytes would dissolve in water to give an alkaline solution?
 (a) CH_3COOH (b) CH_3COONa
 (c) NH_4Cl (d) HCN
 (e) NaCl
24. The efficiency of an enzyme to catalyse a reaction is due to its capacity to
 (a) reduce the activation energy of the reaction
 (b) form strong enzyme-substrate complex
 (c) decrease the bond energy of all substrate molecules
 (d) increase the free energy of the catalyst-substrate reaction
 (e) alter the substrate geometry to fit into the shape of the enzyme molecule
25. If 0.5 g of a solute (molar mass 100 g mol^{-1}) in 25 g of solvent elevates the boiling point by 1K, the molar boiling point constant of the solvent is
 (a) 2 (b) 8
 (c) 5 (d) 0.5
 (e) 10
26. $\text{A} \xrightarrow{\text{Dil NaOH}} (\text{CH}_3)_2\text{C}=\text{CHCOCH}=\text{C}(\text{CH}_3)_2$
 What is A?
 (a) Acetone (b) Acetaldehyde
 (c) Propionaldehyde (d) Formaldehyde
 (e) Ethyl alcohol
27. Which of the following metals, Fe, Zn, Pb, Ag and Pt, do not give a metal nitrate on treatment with concentrated HNO_3 ?
 (a) Fe and Zn (b) Fe and Pt
 (c) Pb, Ag and Pt (d) Fe, Ag and Pt
 (e) Fe, Zn and Pt
28. One of the different amino acids which can be synthesized in the body is
 (a) lysine (b) leucine
 (c) valine (d) phenyl alanine
 (e) alanine
29. Neopentyl bromide undergoes dehydro halogenation to give alkene even though it has no β -hydrogen. This is due to
 (a) E2 mechanism
 (b) E1 mechanism
 (c) due to rearrangement of carbocation by E1 mechanism
 (d) E1 CB mechanism
 (e) Hofmann elimination
30. Which of the following statements is true?
 (a) The kinetic energy of an electron is inversely proportional to square of its momentum
 (b) de-Broglie wavelength associated with a particle is directly proportional to its mass

- (c) de-Broglie wavelength associated with a particle is directly proportional to square of its velocity
 (d) The wavelength associated with an electron is directly proportional to square root of accelerating potential
 (e) The kinetic energy of an electron is directly proportional to accelerating potential

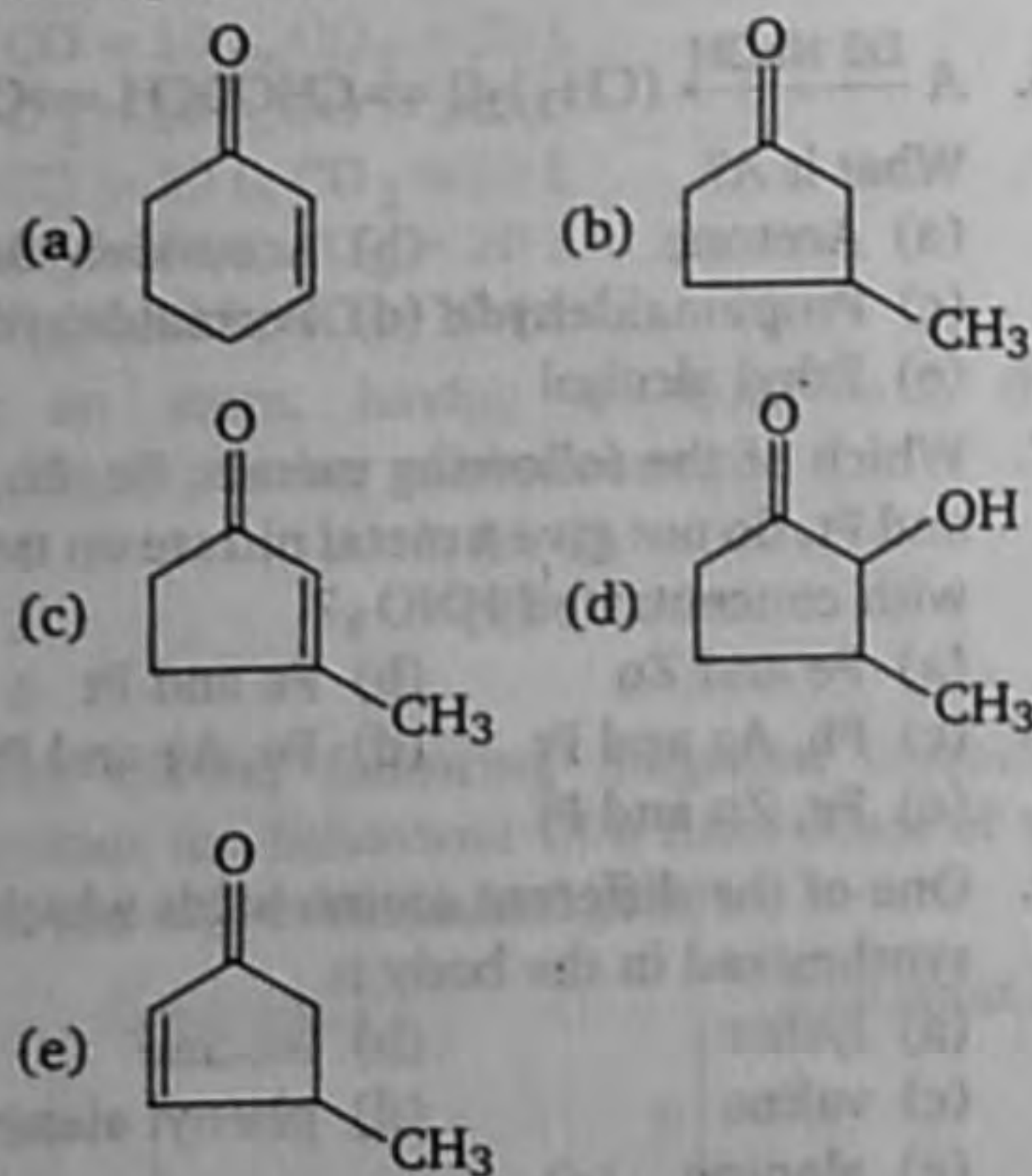
31. Dead burnt plaster is

- (a) $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ (b) $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$
 (c) $\text{CaSO}_4 \cdot 1/2\text{H}_2\text{O}$ (d) CaSO_4
 (e) MgSO_4

32. The diketone



on intramolecular aldol condensation gives the final product



33. The electronic configuration of four elements are

1. $[\text{Xe}] 6s^1$ 2. $[\text{Xe}] 4f^{14}, 5d^1, 6s^2$
 3. $[\text{Ar}] 4s^2 4p^5$ 4. $[\text{Ar}] 3d^7, 4s^2$

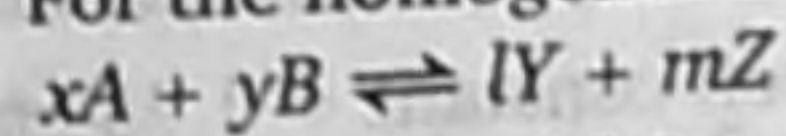
Which one of the following statements about these elements is not correct?

- (a) 1 is a strong reducing agent
 (b) 2 is a *d*-block element
 (c) 3 has high electron affinity
 (d) 4 shows variable oxidation state
 (e) The compound formed between 1 and 3 is ionic

34. Which one of the following statements about CH_3CN is not true?

- (a) Its IUPAC name is ethanenitrile
 (b) The bond between C and N is a triple bond
 (c) The C — C — N bond angle is 180°
 (d) The carbon-carbon bond is longer than the carbon-nitrogen bond
 (e) It has a relatively high boiling point due to hydrogen bonding

35. For the homogeneous reaction



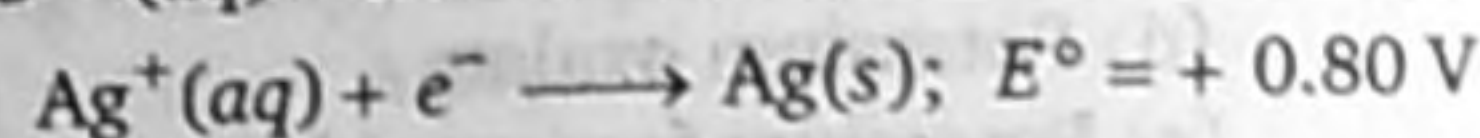
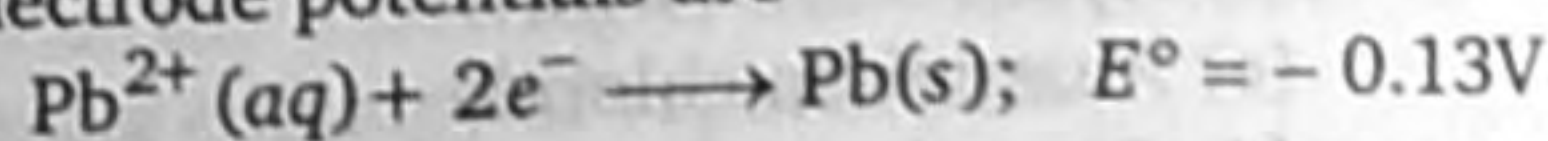
$$\Delta H^\circ = -30 \text{ kJ mol}^{-1}$$

$$\text{and } \Delta S = -100 \text{ JK}^{-1} \text{ mol}^{-1}$$

At what temperature the reaction is at equilibrium?

- (a) 50°C (b) 250°C
 (c) 100K (d) 27°C
 (e) 500K

36. The half cell reaction with their standard electrode potentials are



What is the emf of the cell?

- (a) -0.93V (b) $+0.93\text{V}$
 (c) $+0.67\text{V}$ (d) -0.67V
 (e) None of these

37. Which of the following molecule is planar?

- (a) CH_4 (b) NH_3
 (c) C_2H_4 (d) SiCl_4
 (e) PCl_3

38. The formula of compound which gives violet colour in Lassaigne's test for sulphur with sodium nitroprusside is

- (a) $\text{Na}_4[\text{Fe}(\text{CN})_6\text{S}]$
 (b) $\text{Na}_4[\text{Fe}(\text{CN})_5\text{NCS}]$
 (c) $\text{Na}_4[\text{Fe}(\text{CN})_5\text{NOS}]$
 (d) $\text{Na}_2[\text{Fe}(\text{CN})_5\text{NOS}]$
 (e) $\text{Na}_4[\text{Fe}(\text{CN})_5\text{S}]$

39. The strongest *ortho-para* and strongest *meta*-directing groups respectively, are

- (a) $-\text{NO}_2$ and $-\text{NH}_2$
 (b) $-\text{CONH}_2$ and $-\text{NH}_2$
 (c) $-\text{NH}_2$ and $-\text{CONH}_2$
 (d) $-\text{X}$ and $-\text{CONH}_2$
 (e) $-\text{NH}_2$ and $-\text{NO}_2$

40. When excess ammonia is added to CuSO_4 solution the deep blue complex obtained is

- (a) tetrahedral and paramagnetic
 (b) tetrahedral and diamagnetic
 (c) square planar and diamagnetic

- (d) square planar and paramagnetic
(e) tetrahedral and ferromagnetic
41. The angular momentum of an electron is zero. In which orbital may it be present?
(a) 2s (b) 2p
(c) 3d (d) 4f
(e) 5f
42. Which of the following will show geometrical isomerism?
(a) 2-methyl butene (b) Propene
(c) Vinyl chloride (d) But-2-ene
(e) 2-methyl propene
43. A substance with initial concentration of 'a' mol dm^{-3} reacts according to zero order kinetics. The time it takes for the completion of the reaction is : (k = rate constant)
(a) k/a (b) $a/2k$
(c) a/k (d) $2k/a$
(e) ka
44. Biotin is an organic compound present in yeast. Its deficiency in diet causes dermatitis and paralysis. It is also known as
(a) Vitamin H (b) Vitamin B₃
(c) Vitamin B₁₂ (d) Vitamin D
(e) Vitamin E
45. Consider the following reaction at 1000°C.
(I) $\text{Zn}(s) + \frac{1}{2}\text{O}_2(g) \longrightarrow \text{ZnO}(s);$
 $\Delta G^\circ = -360 \text{ kJ mol}^{-1}$
(II) $\text{C}(\text{graphite}) + \frac{1}{2}\text{O}_2(g) \longrightarrow \text{CO}(g);$
 $\Delta G^\circ = -460 \text{ kJ mol}^{-1}$
Choose the correct statement at 1000°C.
(a) Zinc can be oxidised by carbon monoxide
(b) Zinc oxide can be reduced by graphite
(c) Both statements (a) and (b) are true
(d) Both statements (a) and (b) are false
(e) Carbon monoxide can be reduced by zinc
46. Which of the following metals in solution forms a precipitate with NaOH, which is not soluble in an excess of the base?
(a) Fe (b) Sn
(c) Pb (d) Zn
(e) Al
47. The following is known as "Bordeaux mixture".
(a) borax and copper sulphate
(b) orthoboric acid and ferrous sulphate
(c) sodium borate and zinc sulphate
(d) copper sulphate and lime
(e) borax and manganous sulphate
48. Which among the following will give a precipitate with ammoniacal silver nitrate?
(a) 2-butene (b) 2-butyne
(c) Chlorobenzene (d) 3-methyl-1-butyne
(e) 1, 3-butadiene
49. Consider the following representations
- $$\begin{array}{c} \text{CH}_3 \\ | \\ \text{H} - \text{C} - \text{Br} \\ | \\ \text{H} - \text{C} - \text{Br} \\ | \\ \text{C}_2\text{H}_5 \end{array}$$

$$\begin{array}{c} \text{CH}_3 \\ | \\ \text{Br} - \text{C} - \text{H} \\ | \\ \text{H} - \text{C} - \text{Br} \\ | \\ \text{C}_2\text{H}_5 \end{array}$$
- They are
(a) enantiomers
(b) diastereomers
(c) conformational isomers
(d) identical
(e) *cis-trans* isomers
50. Which one of the following compounds is used as a body deodorant?
(a) Aspirin
(b) Omeprazole
(c) Indigosol-O
(d) *p*-chlorometaxyleneol
(e) Bithional
51. The rate constant for a first order reaction becomes six times when the temperature is raised from 350 K to 400 K. Calculate the activation energy for the reaction.
($R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$)
(a) 41.7 kJ mol⁻¹ (b) 4.17 kJ mol⁻¹
(c) 417 kJ mol⁻¹ (d) 0.417 kJ mol⁻¹
(e) 4170 kJ mol⁻¹
52. Which of the following is not a green house gas?
(a) CO₂ (b) CH₄
(c) O₃ (d) N₂
(e) CCl₂F₂
53. KBr is 80% dissociated in aqueous solution of 0.5m concentration. (Given, k_f for water = 1.86 K kg mol⁻¹). The solution freezes at
(a) 271.326 K (b) 272 K
(c) 270.5 K (d) 268.5 K
(e) 269 K
54. $^{39}\text{Ar}_{18}$ and $^{40}\text{K}_{19}$ are
(a) isotopes (b) isobars
(c) isotones (d) isosters
(e) isodiaphers

55. Which pair of the gases diffuses with the same rate at same temperature and pressure?
 (a) CO and NO (b) NO₂ and CO₂
 (c) NH₃ and PH₃ (d) NO and C₂H₆
 (e) Cl₂ and SO₂
56. In the Victor-Meyer's test, the colours given by 1°, 2° and 3° alcohols are respectively
 (a) red, colourless, blue
 (b) red, blue, colourless
 (c) colourless, red, blue
 (d) red, blue, violet
 (e) blue, red, violet
57. A particular solid is very hard and has a high melting point. In solid state it is a non conductor and its melt is a conductor of electricity. Classify the solid
 (a) metallic (b) molecular
 (c) network (d) ionic
 (e) amorphous.
58. Which one of the following statements about diborane is not true?
 (a) The B atoms in it are sp³ hybridised
 (b) It contains two 3-centre-2-electron bonds
 (c) All B—H bond lengths in it are equal due to resonance
 (d) The molecule is non-planar
 (e) The molecule contains 12 valence electrons
59. Which of the following is not aromatic?
 (a) Benzene
 (b) Cyclopropenyl cation
 (c) Tropylium cation
 (d) Cyclopentadienyl cation
 (e) Cyclopentadienyl anion
60. The element that does not exhibit positive oxidation state is
 (a) Fe (b) Cl
 (c) O (d) N
 (e) F

Biology

1. Which one is related to urine concentration in mammals?
 (a) Testosterone hormone
 (b) Antidiuretic hormone
 (c) Oxytocin hormone
 (d) Insulin
 (e) All of the above
2. Adjacent epithelial cells are held together by means of
 (a) microsomes (b) liposomes
 (c) desmosomes (d) glyoxysomes
 (e) None of these
3. First CO₂ acceptor in C₄-plants is
 (a) PEP (b) PGA
 (c) RuBP (d) pyruvic acid
 (e) OAA
4. In the members of family-Malvaceae anthers are described as
 (a) diadelphous and ditheous
 (b) diadelphous and monotheous
 (c) monadelphous and monotheous
 (d) monadelphous and ditheous
 (e) None of the above
5. In the angiosperm ovule, central cell of the embryo sac, prior to the entry of pollen tube, contains
 (a) a single haploid nucleus
 (b) one diploid and one haploid nuclei
 (c) two haploid polar nuclei
 (d) one diploid secondary nucleus
 (e) two diploid polar nuclei
6. Which type of cells are absent in sponges?
 (a) Trophocytes (b) Myocytes
 (c) Archeocytes (d) Cnidocytes
 (e) All of these
7. Which of the following is purely motor cranial nerve?
 (a) Optic (b) Olfactory
 (c) Vagus (d) Abducens
 (e) All of these
8. Which one of the following is correctly matched?
 (a) Body louse — Typhoid
 (b) House fly — Yellow fever
 (c) *Anopheles* — Malaria
 (d) *Aedes* — Plague
 (e) *Leishmania* — Syphilis
9. In earthworm self fertilization can not occur due to
 (a) protogyny (b) protandry
 (c) epigyny (d) hypogyny
 (e) None of these

10. Which of the following is an opiate narcotic?
 (a) Morphine (b) LSD
 (c) Amphetamines (d) Barbiturates
 (e) Both (a) and (d)
11. Pollination by snail and slug is known as
 (a) entomophilous (b) ornithophilous
 (c) anemophilous (d) malacophilous
 (e) hydrophilous
12. Which is the example of conditioned reflex?
 (a) Your kneeing took up a stone than dog run away
 (b) Eye closed when anything enter into it
 (c) Hand took up when piercing with needle
 (d) Digestive food goes forward in alimentary canal
 (e) None of the above
13. Colchicine prevents the mitosis of cells at which of the following stage?
 (a) Anaphase (b) Metaphase
 (c) Prophase (d) Interphase
 (e) Telophase
14. Hydrolytic enzymes are found in
 (a) lysosomes (b) peroxisomes
 (c) lomasomes (d) ribosomes
 (e) centrosome
15. The binomial names was accepted by all after the publication of the work by
 (a) Linnaeus (b) Hooke
 (c) Bentham (d) Darwin
 (e) Lamarck
16. The pair of disease caused by virus is
 (a) typhoid, tetanus
 (b) rabies, mumps
 (c) cholera, tuberculosis
 (d) AIDS, syphilis
 (e) TB, typhoid
17. An angiospermic leaf carries 16 chromosomes. The number of chromosomes in its endosperm will be
 (a) 16 (b) 24
 (c) 12 (d) 8
 (e) 32
18. A chemical fertilizin is produced form
 (a) polar bodies
 (b) middle piece of sperm
 (c) acrosome
 (d) mature eggs
 (e) Sertoli cells
19. Free living, aerobic, non-photosynthetic nitrogen fixing bacterium is
 (a) *Azotobacter* (b) *E. coli*
 (c) *Nostoc* (d) *Salmonella*
 (e) *Clostridium*
20. Which of the following hormones stimulates the stomach to secrete gastric juice?
 (a) Gastrin (b) Enterokinase
 (c) Remin (d) Zymase
 (e) Secretin
21. The meristem responsible for extra stelar secondary growth in dicot stem is
 (a) interfascicular cambium
 (b) intrafascicular cambium
 (c) intercalary meristem
 (d) phellogen
 (e) phelloderm
22. Minamata disease prevalent in industrial area due to pollution is due to
 (a) lead (b) cadmium
 (c) mercury (d) zinc
 (e) arsenic
23. As a fungus completes its life cycle on two hosts it is termed as
 (a) heteroecious (b) autoecious
 (c) heterothallic (d) monothallic
 (e) None of these
24. In an ovule the wall curvature is more pronounced and embryo sac become horse shoe shaped. The ovule is
 (a) campylotropous (b) anatropous
 (c) amphitropous (d) orthotropous
 (e) hemianatropous
25. The stomata in CAM plants open during
 (a) day (b) night
 (c) Both (a) and (b) (d) always closed
 (e) always open
26. Engler and Prantl published a phylogenetic system in the monograph
 (a) *Die Naturlichen pflanzen Familien*
 (b) *Historia Plantarum*
 (c) *Species Plantarum*
 (d) *Genera Plantarum*
 (e) *Origin of Species*
27. Vascular bundles are arranged in a ring in the members of family
 (a) Orchidaceae (b) Iridaceae
 (c) Euphorbiaceae (d) Lilliaceae
 (e) Palmae

28. The cloves which are used in food preparation are
 (a) seeds (b) leaves
 (c) flower buds (d) stem tips
 (e) terminal buds
29. How many female flowers occur in a cyathium?
 (a) One (b) Two
 (c) Three (d) Four
 (e) Many
30. Which of the following features is absent in the family-Asteraceae?
 (a) Cypsela fruit
 (b) Capitulum inflorescence
 (c) Hypogynous flowers
 (d) Syngenesious anthers
 (e) Pappus calyx
31. Casparian strip is made up of
 (a) lignin (b) pectin
 (c) suberin (d) cellulose
 (e) starch
32. The phloem of angiosperms differs from that of other vascular plants by the presence of
 (a) vessels (b) companion cells
 (c) tylosoides (d) albuminous cells
 (e) secretory cells
33. Fat is stored in the plant cell in
 (a) lysosome (b) sphaerosome
 (c) microsomes (d) peroxisome
 (e) macrophage
34. Which of the following is the unit of measurement of water potential?
 (a) Watts (b) Joule
 (c) Pascal (d) Litre
 (e) Cubic centimetre
35. The number of NADPH molecules that are used during the conversion of carbon dioxide into one molecule of glucose
 (a) 1 (b) 4
 (c) 6 (d) 8
 (e) 12
36. DNA duplication takes place during
 (a) cell division phase
 (b) entire interphase
 (c) only in G₁-phase
 (d) only in G₂-phase
 (e) only in S-phase
37. If RQ is 0.6 in a respiratory metabolism. It would mean that
 (a) carbohydrates are used as respiratory substrate
 (b) organic acids are used as respiratory substrate
 (c) the oxidation of the respiratory substrate consumed more oxygen than the amount of CO₂ released
 (d) the oxidation of the respiratory substrate consumed more oxygen than the amount of CO₂ released
 (e) the reaction is anaerobic
38. Which of the following gene clusters in bacteria is responsible for nitrogen fixation?
 (a) Nod, nif, fix (b) Nod, ndf, nfx
 (c) Nod, nix, nfx (d) Ndx, nif, flx
 (e) Ndx, nif, nix
39. In Electron Transport System (ETS) which of the following cytochrome reacts with oxygen?
 (a) Cyt.-b (b) Cyt.-a₃
 (c) Cyt.-b₆ (d) Cyt.-f
 (e) Cyt.-b₃
40. The process in which haploid embryo is formed from haploid egg without fertilization is called
 (a) apospory
 (b) agamospermy
 (c) apogamy
 (d) vegetative reproduction
 (e) adventive polyembryony
41. CO₂, CH₄, N₂O and CFCs are called green house gases because they can absorb
 (a) ultraviolet radiation
 (b) long wave infra red radiation
 (c) visible light radiation
 (d) X-rays radiation
 (e) γ-rays radiation
42. The transition zone between two communities is known as
 (a) ecotone (b) keystone
 (c) edge effect (d) critical link species
 (e) edge species
43. Which of the following statements is false?
 (a) Male round worm is smaller than female
 (b) Earthworms are hermaphrodites
 (c) Echinoderms are protostomous coelomates
 (d) Human teeth are anatomically comparable to scales of shark
 (e) Hair is a derivative of skin
44. "Triploblastic, unsegmented, acoelomate exhibiting bilateral symmetry and reproducing

both asexually and sexually, with some parasitic forms". "The above description is characteristic of the phylum"

- (a) Annelida
- (b) Ctenophora
- (c) Cnidaria
- (d) Porifera
- (e) Platyhelminthes

45. Dr. Khorana and his colleagues synthesized an RNA molecule with repeating sequence of UG n bases (UG UG UG UG UG UG). It produced a tetrapeptide with alternating sequence of cystein and valine.

It proves that codons for cystein and valine is

- (a) UGU and GUU
- (b) UGU and GUG
- (c) UUG and GGU
- (d) GUG and UGU
- (e) GUU and UGU

46. Inter-vertebral disc consists of a shock absorber connective tissue known as

- (a) hyaline cartilage
- (b) elastic cartilage
- (c) fibro cartilage
- (d) reticulo cartilage
- (e) calcified cartilage

47. Blackening of urine when exposed to air is a metabolic disorder in human beings. This is due to

- (a) phenylalanine
- (b) tyrosine
- (c) valine replacing glutamine
- (d) glutamine replacing valine
- (e) homogentisic acid

48. Phenylketonuria is a genetic disorder of

- (a) trisomic condition
- (b) monosomic condition
- (c) autosomal dominant gene
- (d) autosomal recessive gene
- (e) X-linked

49. Neoteny refers to

- (a) development of gonads
- (b) pre-adult animal
- (c) metamorphosis
- (d) retention of larval or embryonic trait in the adult body
- (e) precocious development

50. In earthworm the dorsal wall of the intestine from the 26th segment to 95th segment forms a median internal fold called

- (a) trochophore
- (b) typhlosole

- (c) clitellum
- (d) trachea
- (e) nephridium

51. Reproductive isolation means

- (a) inability to interbreed
- (b) breed in isolation
- (c) ability to interbreed
- (d) breeding in a species
- (e) None of the above

52. The plant which gives agar-agar is

- (a) *Laminaria*
- (b) *Chara*
- (c) *Sargassum*
- (d) *Gelidium*
- (e) *Cephaleuros*

53. Rhythmic heart beat is maintained by a highly specialized excitatory and conductive system.

The correct sequence of events will be?

- (a) Atrio-ventricular node-bundle of His-Sino-atrio node-network of Purkinje fibres
- (b) Net work of Purkinje fibres-Atrio-ventricular node-Sino-Atrio node-bundle of His
- (c) Atrio-ventricular node-Sino-Atrio node-bundle of His-Purkinje fibres
- (d) Sino-atrial node-Atrio-ventricular node-bundle of His-Purkinje fibres
- (e) Sino-atrial node-Atrio-ventricular node-Purkinje fibres-bundle of His

54. Okazaki fragments are joined in a correct sequence by

- (a) DNA polymerase
- (b) DNA ligase
- (c) RNA polymerase
- (d) primase
- (e) helicase

55. The muscle band that remains unchanged during contraction and relaxation of the skeletal muscle is

- (a) I
- (b) H
- (c) A
- (d) A line
- (e) H and Z line

56. Hypothalamus does not control

- (a) hunger and satiety
- (b) thermoregulation
- (c) libido
- (d) creative thinking and consciousness
- (e) osmoregulation

57. A gland which gradually atrophies at the age of 14-16 due to the activities of sex gland is

- (a) thyroid
- (b) parathyroid
- (c) pancreas
- (d) pineal
- (e) thymus

58. Rate of breathing is controlled by
- (a) the amount of freely available oxygen
 - (b) carbon dioxide
 - (c) muscular functions of the body
 - (d) stress
 - (e) All of the above
59. You are watching a horror movie and you notice your heart is beating fast and mouth is dry. It is because of
- (a) fight and flight response
 - (b) autonomic nervous system
 - (c) sympathetic nervous system
 - (d) para sympathetic nervous system
 - (e) Both (a) and (c)
60. In male's testes are contained in the scrotal sacs because
- (a) other organs do not make space for the testes in the abdominal cavity
 - (b) testes in the abdomen will hamper maturation of sperms
 - (c) it provides temperature that is slightly lower than body temperature required for formation of functional sperms
 - (d) it facilitates ejaculation
 - (e) testes in the abdomen will accelerate maturation of sperms