

BHU (Main)

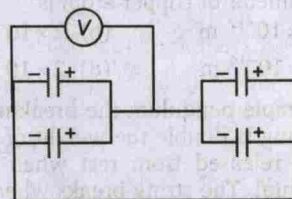
Medical Entrance Exam

Solved Paper 2011

Physics

Section A

- The temperature at which the velocity of oxygen will be half of that of hydrogen at NTP is
 (a) 1092°C (b) 1492°C
 (c) 273 K (d) 819°C
- According to Debye's T^3 law, the specific heat of many solids at low temperature T varies according to the relation $C = 2T^3$, where α is constant. The heat energy required to raise the temperature of 4 kg mass from $T = 1$ K to $T = 3$ K is
 (a) 208α (b) 20α
 (c) 80α (d) 8α
- The work done in turning a magnet of magnetic moment M by an angle of 90° from the meridian is n times the corresponding work done to turn it through an angle of 60°
 (a) $n = \frac{1}{2}$ (b) $n = 2$ (c) $n = \frac{1}{4}$ (d) $n = 1$
- If M is the mass of rocket, r is rate of ejection of gases and u is velocity of gases with respect to rocket, then acceleration of the rocket $\frac{dv}{dt}$ is equal to
 (a) $\frac{ru}{(M - rt)}$ (b) $\frac{(M - rt)}{ru}$
 (c) $\frac{ru}{(M + rt)}$ (d) $\frac{ru}{M}$
- 5 beat/s are produced on blowing together two closed organ pipes of the same diameter but of different lengths. If shorter pipes is of 10 cm length and speed of sound in air is 300 m/s, length of other pipe is
 (a) 10.06 cm (b) 11.22 cm
 (c) 16 cm (d) 14 cm
- Two resistors 400Ω and 800Ω are connected in series with a 6 V battery. The potential difference measured by voltmeter of $10 \text{ k}\Omega$ across 400Ω resistor is
 (a) 2 V (b) 1.95 V (c) 3.8 V (d) 4 V
- A physical quantity x is represented by $x = M^a L^b T^{-c}$ and the maximum percentage error in measurement M , L and T are α , β and γ respectively, then the total maximum percentage error in x is
 (a) $(\alpha + \beta - \gamma)\%$ (b) $(\alpha + \beta + \gamma)\%$
 (c) $(\alpha - \beta - \gamma)\%$ (d) None of these
- The four capacitors, each of $25 \mu\text{F}$ are connected as shown in figure. The DC voltmeter reads 200 V. The charge on each plate of the capacitor is
 (a) $\pm 2 \times 10^{-3} \text{C}$ (b) $\pm 5 \times 10^{-3} \text{C}$
 (c) $\pm 2 \times 10^{-2} \text{C}$ (d) $\pm 5 \times 10^{-2} \text{C}$
- In the uranium radioactive series, the initial nucleus is ${}_{92}\text{U}^{238}$ and that the final nucleus is ${}_{82}\text{Pb}^{206}$. When uranium nucleus decays to lead, the number of α -particles and β -particles emitted are
 (a) 8 α , 6 β (b) 6 α , 7 β
 (c) 6 α , 8 β (d) 4 α , 3 β
- A bullet is fired from a gun. The force on the bullet is given by $F = 600 - 2 \times 10^5 t$, where F is



in newton and t is in second. The force on the bullet becomes zero as soon as it leaves the barrel. What is the average impulse imparted to the bullet?

- (a) 9 N s (b) Zero
(c) 0.9 N s (d) 1.8 N s

11. Forces 5 N, 12 N and 13 N are in equilibrium. If $\sin 23^\circ = \frac{5}{13}$, the angle between 5 N force and 13 N force is

- (a) 23° (b) 67° (c) 90° (d) 113°

12. The speed of earth's rotation about its axis is ω . Its speed increases to x times to make effective acceleration due to gravity equal to zero at the equator, x is

- (a) 1 (b) 8.5
(c) 17 (d) 34

13. Heat absorbed by a mass of 1 g of helium, when its temperature rises from 11°C to 131°C at constant volume, is H . Heat absorbed by 7 g of nitrogen, when its temperature rises from 11°C to 71°C at constant volume, is H_N . The ratio of H to H_N is

- (a) $\frac{3}{2}$ (b) $\frac{4}{3}$
(c) $\frac{6}{5}$ (d) $\frac{8}{7}$

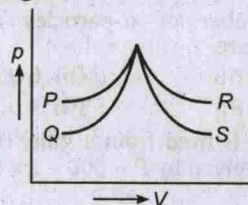
14. Given that 1 kg of copper contains approximately 10^{25} atoms, and density of copper is $9 \times 10^3 \text{ kg/m}^3$. A rough estimate of the diameter of copper atom is

- (a) $2 \times 10^{-12} \text{ m}$ (b) $2 \times 10^{-10} \text{ m}$
(c) $2 \times 10^{-14} \text{ m}$ (d) $2 \times 10^{-7} \text{ m}$

15. In a simple pendulum the breaking strength of the string is double the weight of the bob. The bob is released from rest when the string is horizontal. The string breaks when it makes an angle θ with the vertical

- (a) $\theta = \cos^{-1}\left(\frac{1}{3}\right)$ (b) $\theta = \cos^{-1}\left(\frac{2}{3}\right)$
(c) $\theta = 60^\circ$ (d) $\theta = \text{zero}$

16. Figure shows four p - V diagram for the given sample of gas.



In which case no exchange of heat occurs with the sample?

- (a) P (b) Q
(c) R (d) S

17. The displacement x of a body varies with time as

$$x = -\frac{1}{3}t^2 + 16t + 3$$

where x is in metre and t in second. The time taken by the body to come to rest is

- (a) 12 s (b) 24 s
(c) 30 s (d) 36 s

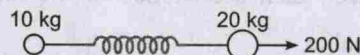
18. Two pendulums of lengths 100 cm and 121 cm start vibrating. At some instant the two are at the mean position in the same phase. After how many vibrations of the longer pendulum will the two be in the same phase at the mean position again?

- (a) 10 (b) 11
(c) 20 (d) 21

19. A dip needle lies initially in the magnetic meridian when it shows an angle of dip θ at a place. The dip circle is rotated through an angle x in the vertical plane and then it shows an angle of dip θ' . Then $\frac{\tan \theta'}{\tan \theta}$ is

- (a) $\frac{1}{\cos x}$ (b) $\frac{1}{\sin x}$
(c) $\frac{1}{\tan x}$ (d) $\cos x$

20. Two masses of 10 kg and 20 kg respectively are tied together by a massless spring. A force of 200 N is applied on a 20 kg mass as shown in figure. At the instant shown the acceleration of 10 kg mass is 12 m/s^2 , the acceleration of 20 kg mass is



- (a) zero (b) 10 m/s^2
(c) 4 m/s^2 (d) 12 m/s^2

21. Two closed organ pipes A and B have the same length, A is wider than B. They resonate in the fundamental mode at frequencies n_A and n_B respectively

- (a) $n_A = n_B$
(b) $n_A > n_B$
(c) $n_A < n_B$
(d) either (b) or (c) depending on the ratio of their diameters

22. Shown below is a distribution of charges. The flux of electric field due to these charges through the surface is
- (a) $\frac{3q}{\epsilon_0}$ (b) zero
 (c) $\frac{2q}{\epsilon_0}$ (d) $\frac{q}{\epsilon_0}$
23. Two waves each of frequency 540 Hz travel at a speed of 330 m/s. If the source are in phase, in the beginning, the phase difference of the waves at a point 4 m from one source and 4.4 m from the other is
- (a) 59° (b) 118°
 (c) 177° (d) 236°
24. An astronomical telescope has an eye-piece of focal length 5 cm. If the angular magnification in normal adjustment is 10, the distance between the objective and the eye-piece in cm is
- (a) 2 (b) 45 (c) 50 (d) 55
25. A fuse wire with a circular cross-section and having diameter of 0.4 mm blows with a current of 3 A. The value of current for which another fuse wire made of the same material but having circular cross-section with diameter of 0.6 mm will blow is
- (a) 3 A (b) $3 \times \sqrt{\frac{3}{2}}$ A
 (c) $3 \times \left(\frac{3}{2}\right)^{3/2}$ A (d) $3 \times \frac{3}{2}$ A

Section B

- Directions** In the following questions, more than one of the answers given may be correct. Select the correct answers and mark it according to the codes.
- Code**
- (a) 1, 2 and 3 are correct
 (b) 1 and 2 are correct
 (c) 2 and 4 are correct
 (d) 1 and 3 are correct
26. In an AC circuit the power factor
- (1) is unity when the circuit contain's as ideal resistance only
 (2) is zero when the circuit contain's an ideal inductance only
 (3) is zero when the circuit contain's an ideal resistance only
 (4) is unity when the circuit contain's an ideal inductance only
27. The pair of physical quantities that have the same dimension is (are)
- (1) Reynold's number and coefficient of friction
 (2) Curic and frequency of a light wave
 (3) Latent heat and gravitational potential
 (4) Planck's constant and torque
28. A particle is acted upon by a force of constant magnitude which is always perpendicular to the velocity of the particle. The motion of the particle takes place in a plane. It follows that
- (1) its velocity is constant
 (2) its kinetic energy is constant
 (3) its acceleration is constant
 (4) its moves in a circular path
29. For an isolated system in the absence of any dissipative effect
- (1) KE is conserved
 (2) total energy is conserved
 (3) PE is conserved
 (4) mechanical energy is conserved
30. The charge flowing in a conductor varies with time as $Q = at - bt^2$, then the current
- (1) changes at the rate of $(-2b)$
 (2) falls to zero after $t = \left(\frac{a}{2b}\right)$
 (3) reaches a maximum and then decreases
 (4) will remain constant
31. If an increasing temperature, the resistance decreases, then it is
- (1) superconductor (2) insulator
 (3) semiconductor (4) None of these
32. Velocity of sound in air is 320 m/s. A pipe closed at one end has a length of 1 m. Neglecting end corrections, the air column in the pipe can resonate for sound of frequency
- (1) 80 Hz (2) 240 Hz
 (3) 320 Hz (4) 800 Hz
33. During the melting of a slab of ice at 273 K at atmospheric pressure
- (1) pressure work is done by the ice-water system on the atmosphere
 (2) positive work is done on the ice-water system by the atmosphere
 (3) the internal energy of the ice-water system decreases
 (4) the internal energy of the ice-water increases

34. Which of the following form(s) a virtual and erect image for all positions of the object?
 (1) Convex lens (2) Concave lens
 (3) Concave mirror (4) Convex mirror
35. When a potential difference is applied across, the current passing through
 (1) an insulator at 0 K is zero
 (2) a semiconductor at 0 K is zero
 (3) a p-n junction diode at 300 K is finite, if it reverse biased
 (4) a metal at 0 K is finite
36. A non-conducting solid sphere of radius R is uniformly charged. The magnitude of the electric field due to the sphere at a distance r from its centre
 (1) increases as r increases for $r < R$
 (2) decreases as r increases for $0 < r < \infty$
 (3) decreases as r increases for $R < r < \infty$
 (4) is discontinuous at $r = R$
37. A field line is shown in the figure. This field cannot represent



- (1) Magnetic field
 (2) Electrostatic field
 (3) Gravitational field
 (4) Induced electric field
38. C_V and C_P denote the molar specific heat capacities of a gas at constant volume and constant pressure, respectively. Then,
 (1) $C_P - C_V$ larger for a diatomic ideal gas than for a monoatomic ideal gas
 (2) $C_P + C_V$ is larger for a diatomic ideal gas than for a monoatomic ideal gas
 (3) $\frac{C_P}{C_V}$ is larger for a diatomic ideal gas than for a monoatomic ideal gas
 (4) $C_P \cdot C_V$ is larger for a diatomic ideal gas than for a monoatomic ideal gas
39. A dielectric slab of thickness d is inserted in a parallel plate capacitor whose negative plate is at $x = 0$ and positive plate is at $x = 3d$. The slab is equidistant from the plates. The capacitor is given some charge. As x goes from 0 to $3d$

- (1) the magnitude of the electric field remains the same
 (2) the directions of the electric field remains the same
 (3) the electric potential increases at first, then decreases and again increases
 (4) the electric potential increases continuously
40. A lead ball is dropped into a lake from diving board 5 m above the water. It hits the water with certain velocity and then sinks to the bottom with the same constant velocity. It reaches the bottom 5.0 after it is dropped. If $g = 10 \text{ m/s}^2$
 (1) the depth of lake is 40 m
 (2) the depth of lake is 50 m
 (3) the average velocity of ball is 9 m/s
 (4) the average velocity of ball is 5 m/s
41. A particle is projected from a point A with a velocity v at an angle of elevation θ . At a certain point B, the particle moves at right angle to its initial direction. Then
 (1) velocity of particle at B is $v \sin \theta$
 (2) velocity of particle at B is $v \cot \theta$
 (3) velocity of particle at B is $v \tan \theta$
 (4) velocity of flight from A to B is $\frac{v}{g \sin \theta}$
42. Work done by force of friction
 (1) can be zero (2) can be positive
 (3) can be negative (4) None of these
43. A body of mass 2 kg moving with a speed of 3 m/s collides with a body of mass 1 kg moving with a speed of 4 m/s. If the collision is one dimensional and completely inelastic the speed of composite mass after the collision may be
 (1) $\frac{3}{2}$ m/s (2) $\frac{2}{3}$ m/s
 (3) 4 m/s (4) $\frac{10}{3}$ m/s
44. In a cassette player materials used for coating magnetic tapes are
 (1) cobalt (2) NiFe_2O_4
 (3) nickel (4) CoFe_2O_4
45. A light of wavelength 6000 Å in air enters a medium of refractive index 1.5. Inside the medium, its frequency is ν and its wavelength is λ
 (1) $\nu = 5 \times 10^{14}$ Hz
 (2) $\nu = 7.5 \times 10^{14}$ Hz
 (3) $\lambda = 4000$ Å
 (4) $\lambda = 9000$ Å

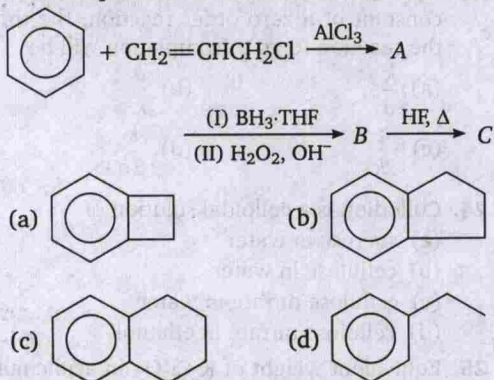
46. Electric conduction takes place in a discharge tube due to movement of
 (1) positive ions (2) negative ions
 (3) electrons (4) photons
47. The impurity atoms with pure silicon should be doped to make a *n*-type semiconductor are those
 (1) phosphorus (2) antimony
 (3) boron (4) aluminium
48. In steady state
 (1) temperature does not change with time
 (2) there is no absorption of heat
 (3) there is no flow of heat

- (4) all parts of the body are at same temperature
49. Which of the following statements are correct about intensity of sound?
 (1) It depends only on amplitude of wave
 (2) It depends both an amplitude and frequency of wave
 (3) Its practical unit is phono
 (4) Its practical unit is decibal
50. Which of the following is a unit of permeability?
 (1) H/m (2) Wb/Am
 (3) Ohm \times s/m (4) $V \times s/m^2$

Chemistry

Section A

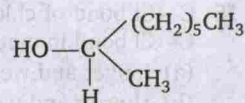
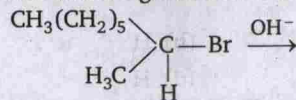
1. Which of the following is not correct?
 (a) In Baeyer's process bauxite is digested with NaOH solution
 (b) In Hall's process bauxite is fused with Na_2CO_3
 (c) In Serpeck's process bauxite is mixed with coke and heated in an atmosphere of CO_2
 (d) Hoopes' electrolytic cell is used for the purification of aluminium
2. Pearl white is
 (a) AsOCl (b) SbOCl (c) HOCl (d) BiOCl
3. Sea divers go deep in the sea water with a mixture of which of the following gases?
 (a) O_2 and He (b) O_2 and Ar
 (c) O_2 and CO_2 (d) CO_2 and Ar
4. The end product 'C' in the following reaction



5. The best reagent to convert pent-3-en-2-ol into pent-3-en-2-one is
 (a) pyridinium chloro chromate
 (b) chromic anhydride in glacial acetic acid

- (c) acidic dichromate
 (d) acidic permanganate

6. The following reaction is described as



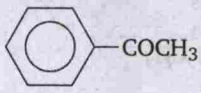
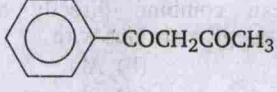
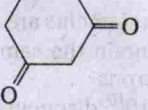
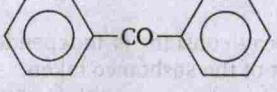
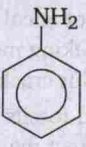
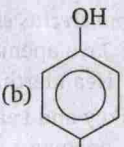
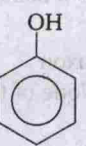
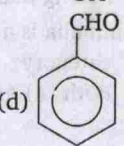
- (a) S_E2 (b) S_N2 (c) S_N1 (d) S_E1
7. A metal oxide has the formula A_2O_3 . It can be reduced by hydrogen to give free metal and water. 0.1596 g of the metal oxide requires 6 mg of hydrogen for complete reduction. What is the atomic weight of metal?
 (a) 52.3 (b) 57.5 (c) 55.8 (d) 59.3
8. For 2s orbital, the nodal surface exists at a distance of
 (a) a_0 from the nucleus
 (b) $1.5 a_0$ from the nucleus
 (c) $2a_0$ from the nucleus
 (d) $2.5 a_0$ from the nucleus
9. The molecule having non-zero dipole moment is
 (a) C_2H_6 (b) CH_4 (c) B_2H_6 (d) H_2O_2
10. A certain metal when irradiated by light ($\nu = 3.2 \times 10^{16}$ Hz) emits photoelectrons with twice kinetic energy as did photoelectrons when the same metal is irradiated by light ($\nu = 2.0 \times 10^{16}$ Hz). Then ν_0 of metal is
 (a) 1.2×10^{14} Hz (b) 8×10^{15} Hz
 (c) 1.2×10^{16} Hz (d) 4×10^{12} Hz

11. A match box exhibits
 (a) cubic geometry
 (b) monoclinic geometry
 (c) tetragonal geometry
 (d) orthorhombic geometry
12. When mercuric iodide is added to the aqueous solution of potassium iodide, the
 (a) freezing point is raised
 (b) freezing point is lowered
 (c) freezing point does not change
 (d) boiling point does not change
13. 4.5 g of aluminium is deposited at cathode from Al^{3+} solution by a certain quantity of electric charge. The volume of hydrogen produced at STP from H^+ ions in solution by the same quantity of electric charge will be
 (a) 5.6 L (b) 11.2 L
 (c) 22.4 L (d) 44.8 L
14. Which one of the following should be most stable?
 (a) H_2^+ (b) H^+
 (c) H (d) H^-
15. C—Cl bond of chlorobenzene in comparison to C—Cl bond in methyl chloride is
 (a) longer and weaker
 (b) shorter and weaker
 (c) shorter and stronger
 (d) longer and shorter
16. Among the following compound which can be dehydrated very easily?
 (a) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$
 (b) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}(\text{OH})\text{CH}_3$
 (c) $\text{CH}_3\text{CH}_2\text{CH}(\text{OH})\text{CH}_2\text{CH}_2\text{OH}$
 (d) $\text{CH}_3\text{CH}_2\text{C}(\text{OH})(\text{CH}_3)\text{CH}_2\text{CH}_3$
17. An organic amino compound reacts with aqueous nitrous acid at low temperature to produce an oily nitroso amine. The compound is
 (a) CH_3NH_2 (b) $\text{CH}_3\text{CH}_2\text{NH}_2$
 (c) $(\text{CH}_3\text{CH}_2)_3\text{N}$ (d) $(\text{CH}_3\text{CH}_2)_2\text{NH}$
18. The correct statement in respect of protein haemoglobin is that it
 (a) acts as an oxygen carrier in the blood
 (b) forms antibodies and offers resistance to diseases
 (c) functions as a catalyst for biological reactions
 (d) maintains blood sugar level
19. Which of the following process is usually employed for the preparation of carbowax from ethylene oxide?
 (a) Base-catalysed polymerization
 (b) Acid-catalysed polymerization
 (c) Free radical polymerization
 (d) Coordination polymerization
20. Which of the following relationships is correct?
 (a) $K = \frac{T\Delta S^\circ - \Delta H^\circ}{RT}$ (b) $K = \frac{\Delta H^\circ - T\Delta S^\circ}{RT}$
 (c) $\ln K = \frac{T\Delta S^\circ - \Delta H^\circ}{RT}$ (d) $\ln K = \frac{\Delta H^\circ - T\Delta S^\circ}{RT}$
21. What is the solubility of calcium fluoride in a saturated solution if its solubility product is 3.2×10^{-11} ?
 (a) 2.0×10^{-4} mol/L (b) 2×10^{-3} mol/L
 (c) 4.0×10^{-4} mol/L (d) 8×10^{-3} mol/L
22. The ionization constant of a weak electrolyte is 25×10^{-6} while the equivalent conductance of its 0.01 M solution is $19.6 \text{ S cm}^2 \text{ eq}^{-1}$. The equivalent conductance of the electrolyte at infinite dilution (in $\text{S cm}^2 \text{ eq}^{-1}$) will be
 (a) 340 (b) 208
 (c) 364 (d) 392
23. If a is the initial concentration and k is the rate constant of a zero order reaction, the time for the reaction to go to completion will be
 (a) $\frac{k}{a}$ (b) $\frac{a}{k}$
 (c) $\frac{a}{2k}$ (d) $\frac{k}{2a}$
24. Collodion is a colloidal solution of
 (a) sucrose in water
 (b) cellulose in water
 (c) cellulose nitrate in water
 (d) cellulose nitrate in ethanol
25. Equivalent weight of $\text{K}_2\text{Cr}_2\text{O}_7$ in acidic medium is
 (a) M (b) $\frac{M}{2}$
 (c) $\frac{M}{5}$ (d) $\frac{M}{6}$

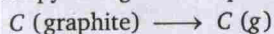
Section B

Directions In the following questions, more than one of the answers given may be correct. Select the correct answers and mark it according to the codes.

Codes

- (a) 1, 2 and 3 are correct
 (b) 1 and 2 are correct
 (c) 2 and 4 are correct
 (d) 1 and 3 are correct
26. Which kinds of isomerism is exhibited by octahedral $\text{Co}(\text{NH}_3)_4\text{Br}_2\text{Cl}$?
 (a) Optical (b) Geometrical
 (c) Linkage (d) Ionisation
27. Which species has one lone pair of electrons on the central atom?
 (a) $[\text{ClO}_3^-]$ (b) XeF_4
 (c) SF_4 (d) $[\text{I}_3^-]$
28. Which of the following are the ores of copper?
 (a) Chalcopyrite (b) Malachite
 (c) Chalcocite (d) Haematite
29. Which of the following are oxidised by O_3 ?
 (a) KI (b) FeSO_4
 (c) K_2MnO_4 (d) KMnO_4
30. Which of the following compounds are expected to show similar colour in aqueous medium?
 (a) FeCl_2 (b) VOCl_2
 (c) MnCl_2 (d) CuCl_2
31. Which of the following represents 32g of the substance?
 (a) 1 g atom of sulphur
 (b) 22.4 L of O_2 gas at STP
 (c) One mole of oxygen atoms
 (d) One mole of sulphur molecules
32. According to Charles' law
 (a) $\left(\frac{dV}{dT}\right)_p = K$ (b) $\left(\frac{dT}{dV}\right)_p = K$
 (c) $\left(\frac{1}{T} - \frac{V}{T^2}\right)_p = 0$ (d) $V \propto \frac{1}{T}$
33. Which of the following statements are correct for an electron that has $n = 4$ and $m = -2$?
 (a) The electron may be in a d -orbital
 (b) The electron is in the fourth principal electronic shell
 (c) The electron may be in a p -orbital
 (d) The electron must have the spin quantum number = $+\frac{1}{2}$
34. Species having the same bond order are
 (a) N_2^{2-} (b) N_2^+ (c) N_2 (d) N_2^-
35. Among the following chain transfer reagents are
 (a) carbon tetrachloride
 (b) carbon tetrabromide
 (c) benzoyl peroxide
 (d) benzoquinone
36. Which of the following hormones do not contain nitrogen?
 (a) Progesterone (b) Epinephrine
 (c) Androsterone (d) Insulin
37. Benzene and aniline can be separated from their mixture by
 (a) distillation (b) vacuum distillation
 (c) dil. HCl (d) dil. NaOH
38. Keto-enol tautomerism is exhibited by
- (a) 
- (b) 
- (c) 
- (d) 
39. In which of the following compounds the π -electron cloud contains the same number of electrons
 (a) naphthalene (b) anthracene
 (c) biphenylene (d) phenanthrene
40. Oxidation of A gives p -benzoquinone. A can be
- (a) 
- (b) 
- (c) 
- (d) 

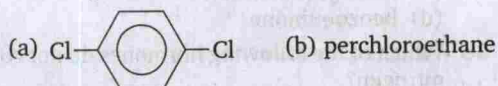
41. The enthalpy change for the process



is called

- (a) heat of vaporisation
- (b) heat of sublimation
- (c) heat of atomisation
- (d) heat of allotropic change

42. Moth repellents are



43. Which of the following will give yellow precipitate with I_2 / NaOH ?

- (a) $\text{ICH}_2\text{COCH}_2\text{CH}_3$
- (b) $\text{CH}_3\text{COOCOCH}_3$
- (c) $\text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{CH}_3$
- (d) CH_3COOH

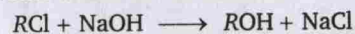
44. Nitrogen can combine directly at higher temperature to give nitrides with

- (a) Mg
- (b) Al
- (c) Zn
- (d) Pb

45. Which of the following statements are incorrect?

- (a) Nuclear isomers contain the same number of protons and neutrons
- (b) One curie = 3.7×10^{10} disintegrations/minute
- (c) The decay constant is independent of the amount of the substance taken
- (d) Actinium series starts with U-238

46. The rate law for the reaction



is given by rate = $k[\text{RCl}]$. The rate of this reaction

- (a) is doubled by doubling the concentration of NaOH
- (b) is halved by reducing the concentration of RCl by one half
- (c) is unaffected by change in temperature
- (d) is increased by increasing the temperature of the reaction

47. The units of conductance are

- (a) siemens
- (b) ohm^{-1}
- (c) mhos
- (d) ohm

48. When Cl_2 is passed through hot NaOH, oxidation number of Cl changes from

- (a) 0 to +5
- (b) -1 to 0
- (c) 0 to -1
- (d) 0 to +7

49. Which of the following will have nearly equal H^+ concentration?

- (a) 100 mL 0.1 M HCl mixed with 50 mL water
- (b) 50 mL 0.1 M H_2SO_4 mixed with 100 mL water
- (c) 50 mL 0.1 M H_2SO_4 mixed with 50 mL water
- (d) 50 mL 0.1 M HCl mixed with 50 mL water

50. Which of the following represent van't Hoff equation?

- (a) $K = Ae^{-E_a/RT}$
- (b) $K = Ae^{-\Delta H/RT}$
- (c) $d(\ln K)/dT = -\Delta H/RT^2$
- (d) $d(\ln K)/dT = \Delta H/RT^2$

Zoology

Section A

1. *Homo erectus erectus* is the zoological name of

- (a) Java apeman
- (b) Peking man
- (c) Neanderthal man
- (d) Nut cracker man

2. Leakey and Leakey discovered fossils of

- (a) apeman
- (b) erect man
- (c) Peking man
- (d) tool maker

3. Mammalia is a

- (a) category
- (b) taxon
- (c) Both (a) and (b)
- (d) None of these

4. Paroxysm in certain malaria occurs after every

- (a) 72 h
- (b) 48 h
- (c) 24 h
- (d) 12 h

5. Lime-knots of slime moulds are

- (a) swarm cells
- (b) spore
- (c) capillitia
- (d) fruit bodies

6. Corals belong to the phylum

- (a) Ctenophora
- (b) Cnidarians
- (c) Porifera
- (d) Ciliophora

7. Sponges have originated from
 (a) ciliate protozoans
 (b) sporozoan protozoans
 (c) sarcodine protozoans
 (d) choanoflagellate protozoans
8. Cingulum of earthworm is concerned with
 (a) copulation (b) cocoon formation
 (c) burrowing (d) spermatogenesis
9. The larva of echinoderm is
 (a) torula larva (b) dipleurula larva
 (c) zaoela larva (d) nauplius larva
10. Bone marrow is absent in
 (a) Reptilia (b) birds
 (c) amphibians (d) fish
11. The pentose sugar present in genetic material of polio virus is
 (a) ribose (b) deoxyribose
 (c) sucrose (d) fructose
12. Which one of the following pairs refers to one and the same things?
 (a) Adrenal and suprarenal
 (b) Centrosome and centriole
 (c) Notochord and vertebral column
 (d) Malpighian capsule and Bowman's capsule
13. In human, philadelphia chromosomes results from the reciprocal translocations between chromosome numbers
 (a) 20 and 9 (b) 9 and 21
 (c) 3 and 11 (d) 9 and 22
14. If a boy's father has haemophilia and his mother has one gene for haemophilia, what is the chance that the boy will inherit the disease?
 (a) 100% (b) 50%
 (c) 0% (d) 75%
15. Which one of the following codons codes for the same information as UGC?
 (a) UGU (b) UGA
 (c) UAG (d) UGG
16. Red muscles are rich in
 (a) only myosin
 (b) haemoglobin and glucose
 (c) lactic acid and acetic acid
 (d) myoglobin and cytochrome
17. Which pair is incorrect?
 (a) Patella — Knee cap
 (b) Malleus — Hammer bone
 (c) Sternum — Chest bone
 (d) Stapes — Anvil bone
18. Camouflage of chameleon is associated with
 (a) chromosome
 (b) chromomere
 (c) chromoplast
 (d) chromatophore
19. If pH of stomach is 1.6, then which enzyme will digest protein?
 (a) Trypsin (b) Pepsin
 (c) Amylase (d) Erypsin
20. In micturition
 (a) urethra relaxes
 (b) ureter contracts
 (c) ureter relaxes
 (d) urethra contracts
21. A vertebrate bone, which directly develops from mesenchyme is called
 (a) dermal bone
 (b) replacing bone
 (c) endochondrial bone
 (d) All of the above
22. Pons connect the
 (a) two lobes of cerebellum
 (b) two cerebral hemispheres
 (c) spinal cord with the brain
 (d) cerebrum and cerebellum
23. Sensation of stomach pain is due to
 (a) enteroceptors (b) exteroceptors
 (c) proprioceptors (d) teloreceptors
24. Treatment with 'alloxan' destroys
 (a) STH cells
 (b) β -cells of islets of Langerhans
 (c) cells of Sertoli
 (d) cells of Leyding
25. Sperms are stored in earthworm after fertilization in
 (a) kidney (b) testes
 (c) spermatheca (d) seminal vesicle

Section B

Directions In the following questions, more than one of the answers given may be correct. Select the correct answers and mark it according to the codes.

Codes

- (a) 1, 2 and 3 are correct
 (b) 1 and 2 are correct
 (c) 2 and 4 are correct
 (d) 1 and 3 are correct
26. The correct statement about Reptilia is
 (1) their RBCs are nucleated
 (2) fertilization is internal
 (3) they are poikilotherms
 (4) metamorphosis is present
27. Histology is
 (1) the study of tissues
 (2) the word coined by Mayer
 (3) related to ion balance of body
 (4) not related to plant tissues
28. Arteries
 (1) are thick walled vessels
 (2) carry CO₂ throughout the body
 (3) carry blood at high pressure
 (4) are collapsible vessels
29. Brain is
 (1) protected by meninges
 (2) enveloped by cranium
 (3) divided into forebrain, mid brain and hind brain
 (4) part of peripheral nervous system
30. Relaxin is
 (1) an enzyme
 (2) a hormone secreted during pregnancy
 (3) secreted by corpus luteum
 (4) broadens the uterus cervix for easy birth of child
31. Which of the following pairs is correctly matched?
 (1) Pivot joint — Radius and ulna
 (2) Saddle joint — Wrist bone
 (3) Hinge joint — Knee joint
 (4) Gliding joint — Atlas and axis
32. What is true about lymphokines?
 (1) They are chemical messengers
 (2) They are released by helper T-lymphocytes
 (3) High levels of cholesterol
 (4) Types of blood coagulants

33. Select the correct match from the table.

List I	List II
1. Cistron	A. Is a region of DNA that encodes a single polypeptide.
2. Epistasis	B. A condition in which an allele of one gene obliterates the phenotypic expression of all allelic alternatives of another gene.
3. Genome	C. Complete set of chromosomes
4. Monosomic	D. An individual having two chromosomes.

34. What is true about kidney?
 (1) Kidneys excrete undigested food
 (2) Kidneys excrete nitrogenous waste
 (3) Controls metabolism
 (4) Maintain osmotic pressure in blood and tissues
35. Which of the following pairs is/are correctly matched?
 (1) Cholecystokinin — Activates gall bladder to release bile
 (2) Secretin — Controls secretion of pancreatic enzymes
 (3) Placenta — Also acts as an endocrine gland
 (4) Thyroxine — Low serum and high serum phosphate
36. Adenohypophysis produces
 (1) somatotrophic hormone (STH)
 (2) antidiuretic hormone (ADH)
 (3) follicle stimulating hormone (FSH)
 (4) oxytocin hormone
37. Functions of bile in humans are to
 (1) neutralises the acid produced by the stomach
 (2) maintains fats in an emulsified state
 (3) helps in storage of vitamin-A and D
 (4) digests cellulose
38. In born errors of metabolism are
 (1) phenylketonuria (2) cancer
 (3) alkaptonuria (4) marasmus
39. Exoskeleton of cockroach is
 (1) made of bones
 (2) chitinous
 (3) secreted by hair cells
 (4) secreted by epidermal cells

40. What is true about *Taenia solium*?
- (1) Endoparasite
 - (2) Saprozoic
 - (3) Digestive system absent
 - (4) Excretion through spiracles
41. Find out the correctly matched pairs
- (1) Niacin — Rickets
 - (2) Vitamin-A — Night blindness
 - (3) Thiamine — Prolong blood clotting time
 - (4) Vitamin-C — Scurvy
42. Select the correct answer from the table.

List I	List II
1. Ampulla of Lorenzini	A. Thermoreceptor: found on dorsal and ventral region of head of <i>Scoliodon</i>
2. Fishes	B. 12 pairs of cranial nerves
3. Skull of fish	C. Monocondylic
4. Fishes	D. Bisexual and usually viviparous

43. BMR is raised with the
- (1) muscular activity like exercise
 - (2) after food intake
 - (3) cold weather
 - (4) hypothyroidism

44. Which is related to pectoral girdle?
- (1) It is V-shaped
 - (2) Its half is Os innominatum
 - (3) It is not fused to the sternum
 - (4) A glenoid cavity fits the head to humerus bone
45. Which is/are the forms of cancer?
- (1) Lymphoma
 - (2) Carcinoma
 - (3) Down's syndrome
 - (4) Trisomy-13
46. Which one is a true statement about haemophilia?
- (1) Caused by X-linked recessive gene
 - (2) Caused by abnormal type of haemoglobin
 - (3) It is hereditary bleeding disorder
 - (4) Characterized by absence of melanin
47. Symptoms of ageing in humans can be studied at which of these following levels?
- (1) At cellular level
 - (2) At organismic level
 - (3) At extracellular level
 - (4) At ecosystem level
48. Discoblastula is found in
- (1) frog
 - (2) fishes and reptiles
 - (3) insects
 - (4) birds
49. Booklungs are respiratory organs in
- (1) scorpions
 - (2) insects
 - (3) spiders
 - (4) rats
50. Reflex actions are associated with
- (1) coughing
 - (2) sneezing
 - (3) yawning
 - (4) running

Botany

Section A

1. According to Engler and Prantl system the
 - (a) angiosperms are placed before gymnosperms
 - (b) dicots are placed before monocots
 - (c) monocots are placed before dicots
 - (d) Archichlamydeae is placed before dicots
2. Floridean starch is found in
 - (a) Chlorophyceae
 - (b) Rhodophyceae
 - (c) Myxophyceae
 - (d) Cyanophyceae
3. Laboratory weed is
 - (a) *Neurospora*
 - (b) *Chlamydomonas*
 - (c) *Aspergillus*
 - (d) *Chara*
4. Which of the following is aquatic bryophyte?
 - (a) *Anthoceros*
 - (b) *Riccia fluitans*
 - (c) *Riccia discolor*
 - (d) *Sphagnum*
5. In gymnosperms, the ovules are
 - (a) naked unitegmic
 - (b) covered multitegmic
 - (c) bitegmic
 - (d) covered unitegmic
6. Haustorial root is exceptional to
 - (a) *Zea mays*
 - (b) Cactus
 - (c) *Cuscuta*
 - (d) Orchids
7. Plant cell differs from an animal cell in the absence of
 - (a) endoplasmic reticulum
 - (b) mitochondria
 - (c) ribosomes
 - (d) centriole

8. Highest quantity of cellulose can be traced in
 (a) flax (b) coir
 (c) hemp (d) cotton
9. The common phycobiont of lichens is
 (a) *Trebauxia* (b) *Microcystis*
 (c) *Euglena* (d) *Fucus*
10. The nature of endosperm in angiosperm and gymnosperm is respectively.
 (a) triploid and haploid
 (b) haploid and triploid
 (c) triploid and diploid
 (d) both triploid
11. In which of the following excurrent stem found?
 (a) *Cycas* (b) *Pinus*
 (c) Mango (d) Wheat
12. Breathing roots are found in
 (a) *Rhizophora* (b) Epiphytes
 (c) *Avicennia* (d) Both (a) and (c)
13. The leaves are modified into pitcher in
 (a) *Drosera* (b) *Aldrovenda*
 (c) *Sarracenia* (d) *Utricularia*
14. In *Opuntia*, the spine is the modification of
 (a) stem (b) root
 (c) leaf (d) None of these
15. Cleistogamous flowers
 (a) open at dusk (b) open at dawn
 (c) open during noon (d) never open
16. Coir of coconut is obtained from
 (a) endocarp (b) mesocarp
 (c) pericarp (d) placenta
17. High lysine content is present in
 (a) bajara (b) maize
 (c) wheat (d) rice
18. ABA, coumarin and phenolic compounds induce
 (a) flowering (b) cloning
 (c) rooting (d) dormancy
19. Orchid seeds are
 (a) large and sticky (b) small and hairy
 (c) small and light (d) large and heavy
20. Flower which is pollinated by wind is characterized by
 (a) small, non-scented, colourless flowers
 (b) big, scented, coloured flowers
 (c) big, non-scented, coloured flowers
 (d) big, non-scented, colourless flowers
21. The mineral constituent of the cell wall is
 (a) Fe (b) Mg
 (c) K (d) Ca
22. The inter xylary phloem is found in
 (a) *Salvia* stem
 (b) *Cucurbita* stem
 (c) *Calotropis* stem
 (d) None of the above
23. A water proof protective tissue with suberized walls is
 (a) bark (b) bast
 (c) intraxylary fibres (d) tylose
24. Diffuse porous growing in woods are characteristic of plants of
 (a) alpine region (b) cold winter region
 (c) temperate climate (d) tropics
25. The osmotic pressure of the cell sap is more in
 (a) xerophytes
 (b) hydrophytes
 (c) mesophytes
 (d) floating hydrophytes

Section B

Directions In the following question, more than one of the options given may be correct. Select the correct answers and mark it according to the codes.

Codes

- (a) 1, 2 and 3 are correct
 - (b) 1 and 2 are correct
 - (c) 2 and 4 are correct
 - (d) 1 and 3 are correct
26. Which of the following statements are correct?
 (1) Rate of water absorption increases with gradual increase in the osmotic pressure of the cell sap of root hairs

- (2) Passive absorption of water in readily facilitated by transpiration
 - (3) KCN is a respiratory inhibitor
 - (4) Indole acetic acid induces the rate of water absorption
27. Which are related to ascent of sap?
 (1) Vital force theory
 (2) Cohesion theory
 (3) Physical force theory
 (4) Diffusion theory

28. Factor which affect translocation of solutes is/are
- (1) presence of carbon dioxide
 - (2) oxygen
 - (3) dryness
 - (4) temperature between 25°C-35°C
29. Select the true statements
- (1) *Aldrovanda* is a rootless, free floating insectivorous aquatic plant
 - (2) *Sarracenia* is a pitcher like plant
 - (3) *Rafflesia* is a total stem parasite
 - (4) *Striga* is a parasite of khuskhus
30. Amphitropous (transversal) ovules are found in
- (1) *Lemna*
 - (2) poppy
 - (3) *Ranunculus*
 - (4) *Opuntia*
31. Primary wall of cell wall is composed of
- (1) cellulose
 - (2) hemicellulose
 - (3) pectin
 - (4) protein
32. Endoplasmic reticulum occurs in the forms of
- (1) cisternae and vesicles
 - (2) tubules
 - (3) myeloid bodies
 - (4) vacuoles
33. Messenger RNA (mRNA)
- (1) forms 5-10% of total cellular RNA
 - (2) transcribes genetic information coded in DNA molecule
 - (3) is synthesized on DNA template
 - (4) is also called adaptive RNA
34. Facilitated diffusion
- (1) occurs from higher concentration to lower concentration
 - (2) takes place along the concentration gradient
 - (3) form carrier-transport complex
 - (4) is stereospecific
35. Plasmodesmata
- (1) also called tight junctions
 - (2) increase area of absorption
 - (3) are barriers for diffusion
 - (4) five finger like foldings
36. C₃-plants have
- (1) Calvin cycle
 - (2) Kranz type of anatomy
 - (3) Photorespiration
 - (4) No photorespiration
37. High concentration of CO₂
- (1) is not favourable for respiration in plants
 - (2) inhibits all those activities of the plant which require energy
 - (3) is important for aerobic respiration
 - (4) is available in soil
38. Lichens
- (1) are indicators of pollution
 - (2) are also used in cosmetics
 - (3) play important role in formation of soil
 - (4) are algal and bacterial partners
39. Transpiration is a
- (1) physical process in which water changes from liquid to gaseous form
 - (2) vital physiological process
 - (3) slow loss of water molecules from the surface
 - (4) pressure which act on guard cells
40. Auxins
- (1) accelerate rootings
 - (2) help in storage by increasing the period of dormancy
 - (3) control fruit growth
 - (4) shorten stem growth
41. Select the correct match from the table.
- | List I | List II |
|---------------------|------------------------------------------------------------|
| 1. Epidermis | A. Outermost layer of parenchyma covered by a thin cuticle |
| 2. Hypodermis | B. Immediately below the vascular bundles |
| 3. Ground tissue | C. Parenchymatous cells enclosed by the hypodermal layer |
| 4. Vascular bundles | D. Scattered in the hypodermis |
42. Which one is/are not rootless?
- (1) *Raphanus* and *Daucus*
 - (2) *Beta vulgaris* and sweet potato
 - (3) *Utricularia*
 - (4) *Wolffia*
43. Which one is a correct match about leaf modification?
- (1) Fleshy leaves — *Aloe*, *Agave*, *Sedum*
 - (2) Bladder — *Utricularia stellaris*
 - (3) Phyllode — *Acacia*, *Parkinsonia*
 - (4) Leaf spine — *Cucurbita*

44. Select the correct match from the table.

List I	List II
1. Capsular fruits	A. dry, many seeded and split open at maturity.
2. Achenial fruits	B. break into one seeded segments known as mericarps.
3. Simple fleshy fruits	C. have fleshy pericarp which is edible.
4. Berry	D. ripened inflorescence called sorosis.

45. Phloem contains

- (1) dead matter in it known as bast
- (2) long and narrow sclerenchymatous fibres
- (3) companion cells, which are living, thin-walled, narrow.
- (4) cells which are long and tubular with lignified cell wall

46. Select the correct match from the table.

List I	List II
1. Magnesium	A. Constituent of lipids, nucleic acid and proteins
2. Potassium	B. Cofactor for ATPase enzyme
3. Iron	C. Required by plants for sugar translocation.
4. Copper	D. Constituent of plastocyanin and cofactor of respiratory enzymes.

47. Select the correct match from the table.

List I	List II
1. Chalaza	A. Basal part of ovule
2. Bitegmic ovules	B. Have two integuments
3. Pollen grain	C. Has an outer exine and an inner intine
4. Study of pollen grain	D. Anthology

48. Nuclear type of endosperm is found in

- (1) *Adoxa*
- (2) *Primula*
- (3) *Peperomia*
- (4) *Mangifera*

49. Cytokinins

- (1) help in cell enlargement
- (2) counteract the influence of apical dominance over the lateral buds
- (3) help in germination of cereal seeds
- (4) helps in initiation of flowering

50. Which of these statements is related to partial root parasite?

- (1) *Santalum* (sandal wood tree) develops haustoria and enter the roots of neighbouring trees of *Dalbergia sissoo*
- (2) *Thesium* grows on grasses
- (3) *Viscum* grows on oak
- (4) *Loranthus* is a parasite on mango