AIPMT – 1998

Q.1 Boron has two isotopes $_5B^{10}$ and $_5B^{11}$. If atomic weight of Boron is 10.81 then ratio of $_5B^{10}$ to $_5B^{11}$ in nature will be :

(1) 15 : 16 (2) 19 : 81

(3) 81 : 19 (4) 20 : 53

Q.2 A hollow sphere of radius 1m is given a positive charge of 10μC. The electric field at the centre of hollow sphere will be :

(1) 60×10^3 Vm^{-1} (2) 90×10^3 Vm^{-1}

(3) Zero (4) Infinite

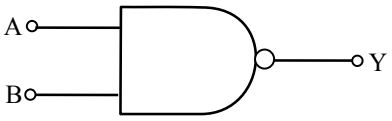
Q.3 Following table is for which logic gate :

Input		Output
A	B	C
0	0	1
0	1	1
1	0	1
1	1	0

(1) AND (2) OR

(3) NAND (4) NOT

Q.4 Following logic gate is :



(1) AND (2) NAND

(3) EX-OR (4) OR

Q.5 For a wave $y = y_0 \sin(\omega t - kx)$, for what value of λ is the maximum particle velocity equal to two times the wave velocity :

(1) πy_0 (2) $2\pi y_0$

(3) $\pi y_0/2$ (4) $4\pi y_0$

Q.6 Two pendulums suspended from same point having length 2m and 0.5m. If they displaced slightly and released then they will be in same phase, when small pendulum will have completed :

(1) 2 oscillation (2) 4 oscillation

(3) 3 oscillation (4) 5 oscillation

Q.7 For protecting a magnetic needle it should be placed :

(1) In iron box (2) In wooden box

(3) In metallic box (4) None of these

Q.8 A circular ring of mass M and radius R is rotating about its axis with constant angular velocity ω. Two particle each of mass m are attached gently to the opposite ends of a diameter of the ting. The angular velocity of the ring will now become :

(1) $\frac{m\omega}{M+2m}$ (2) $\frac{M\omega}{M-2m}$

(3) $\frac{M\omega}{M+2m}$ (4) $\frac{M+2m}{M\omega}$

Q.9 If $x = 3 - 4t^2 + t^3$, then work done in first 4s. will be (Mass of the particle is 3 gram) :

(1) 384 mJ (2) 168 mJ

(3) 192 mJ (4) None of these

Q.10 If force F = 500 – 100t, then function of impulse with time will be :

(1) $500t - 50t^2$ (2) 50t – 10

(3) $50 - t^2$ (4) $100\ t^2$

Q.11 Half life period of two elements are 40 minute and 20 minute respectively, then after 80 minute ratio of the remaining nuclei will be (Initially both have equal active nuclei) :

(1) 4 : 1 (2) 1 : 2 (3) 8 : 1 (4) 16 : 1

Q.12 A particle of mass m is tied to a string of length L and whirled into a horizontal plan. If tension in the string is T then the speed of the particle will be :

(1) $\sqrt{\frac{T\ell}{m}}$ (2) $\sqrt{\frac{2T\ell}{m}}$ (3) $\sqrt{\frac{3T\ell}{m}}$ (4) $\sqrt{\frac{T}{m\ell}}$

Q.13 If the light of wavelength λ is incident on metal surface, the ejected fastest electron has speed v. If the wavelength is changed to $\frac{3\lambda}{4}$, the speed of the fastest emitted electron will be :

(1) Smaller than $\sqrt{\frac{4}{3}}$ v (2) Greater than $\sqrt{\frac{4}{3}}$ v

(3) 2v

(4) Zero

Q.14 A coil of one loop is made from a wire of length L and thereafter a coil of two loops is made from same wire, then the ratio of magnetic field at the centre of coils will be :

(1) 1 : 4 (2) 1 : 1

(3) 1 : 8 (4) 4 : 1

Q.15 The speed of a boat is 5 km/hr is still water. It crosses a river of width 1 km along the shortest possible path in 15 minutes. The velocity of river water is :

(1) 3 km/hr (2) 4 km/hr

(3) 5 km/hr (4) 2 km/hr

Q.16 Two identical balls A and B are moving with velocity +0.5 ms^{-1} and – 0.3 ms^{-1} respectively. They collide head on elastically then their velocities after collision will be :

(1) – 0.3 ms^{-1} & 0.5 ms^{-1}

(2) + 0.5 ms^{-1} & + 0.3 ms^{-1}

(3) –0.4 ms^{-1} & 0.3 ms^{-1}

(4) 0.3 ms^{-1} & – 0.4 ms^{-1}

Q.17 A small ball is suspended from a thread. It is lifted up with an acceleration 4.9 ms^{-2} and lowered with an acceleration 4.9 ms^{-2} then the ratio of tensions in the thread in both cases will be :

(1) 1 : 3 (2) 3 : 1

(3) 1 : 1 (4) 1 : $\sqrt{5}$

Q.18 One part of a device is connected with the negative terminal of a battery and another part is connected with the positive terminal of a battery. If their ends now altered, current does not flow in circuit, then the device will be :

(1) P–N Junction (2) Transistor

(3) Zener diode (4) Triode

Q.19 Light enters at an angle of incidence in a transparent rod of refractive index n. For what value of the refractive index of the material of the rod, the light once entered into it will not leave it through its lateral face whatsoever be the value of angle of incidence :

(1) n > $\sqrt{2}$ (2) 1.0

(3) 1.3 (4) 1.4

Q.20 10^5 coloumb charge liberated 1 gm silver (Ag). If now charge is doubled then the amount of liberated Ag will be :

(1) 1 gm (2) 2 gm (3) 3 gm (4) 4 gm

Q.21 Work function of a metal surface is ϕ = 1.5 eV. If a light of wavelength 5000Å falls on it then the maximum K.E. of ejected electron will be -

(1) 1.2 eV (2) 0.98 eV

(3) 0.45 eV (4) 0 eV

Q.22 If time of mean position from amplitude (extreme) position is 6 s. then the frequency of SHM will be :

(1) 0.01 Hz (2) 0.02 Hz

(3) 0.03 Hz (4) 0.04 Hz

Q.23 Two coil have a mutual inductance 0.005 H. The current changes in first coil according to equation I = I_0 sin ωt where I_0 = 2A and ω = 100π rad/sec. The maximum value of emf in second coil is :

(1) 4π (2) 3π

(3) 2π (4) π

Q.24 Resistance of a Galvanometer coil is 8Ω and 2Ω Shunt resistance is connected with it. If main current is 1 A then the current flow through 2Ω resistance will be :

(1) 0.2 A (2) 0.8 A

(3) 0.1 A (4) 0.4 A

Q.25 If a ladder is not in balance against a smooth vertical wall, then it can be made in balance by :

(1) Decreasing the length of ladder

(2) Increasing the length of ladder

(3) Increasing the angle of inclination

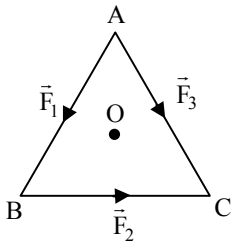
(4) Decreasing the angle of inclination

Q.26 For a Rocket propulsion velocity of exhaust gases relative to rocket is 2 km/s. If mass of rocket system is 1000 kg, then the rate of fuel consumption for a rocket to rise up with acceleration 4.9 m/s^2 will be :

(1) 12.25 kg/s (2) 17.5 kg/s

(3) 7.35 kg/s (4) 5.2 kg/s

Q.27 O is the centre of an equilateral triangle ABC $\vec{F}_1$, $\vec{F}_2$, $\vec{F}_3$ are three forces acting along the sides AB, BC and AC as shown in fig. What should be the magnitude of $\vec{F}_3$ so that total torque about O is zero :



(1) $|\vec{F}_3| = |\vec{F}_1| + |\vec{F}_2|$ (2) $|\vec{F}_3| = |\vec{F}_1| - |\vec{F}_2|$

(3) $|\vec{F}_3| = \vec{F}_1 + 2\vec{F}_2$ (4) Not possible

Q.28 When volume changes from V to 2V at constant pressure(P) then the change in internal energy will be :

(1) PV (2) 3PV (3) $\frac{PV}{\gamma-1}$ (4) $\frac{RV}{\gamma-1}$

Q.29 A gas of volume changes 2 litre to 10 litre at constant temperature 300K, then the change in internal energy will be :

(1) 12 J (2) 24 J (3) 36 J (4) 0 J

Q.30 When three identical bulbs are connected in series, the consumed power is 10W. If they are now connected in parallel then the consumed power will be :

(1) 30W (2) 90W (3) $\frac{10}{3}$ W (4) 270W

Q.31 A ball is dropped from a height of 5 m, if it rebound upto height of 1.8 m, then the ratio of velocities of the ball after and before rebound is :

(1) $\frac{3}{5}$ (2) $\frac{2}{5}$ (3) $\frac{1}{5}$ (4) $\frac{4}{5}$

Q.32 Two long parallel wires are at a distance of 1m. If both of them carry one ampere of current in same direction, then the force of attraction on unit length of the wires will be :

(1) 2×10^{-7} N/m (2) 4×10^{-7} N/m

(3) 8×10^{-7} N/m (4) 10^{-7} N/m

Q.33 For the diffraction from a crystal with λ = 1Å and Bragg's angle $\theta = 60°$, then for the second order diffraction 'd' will be :

(1) 1.15 Å (2) 0.75 Å

(3) 0.55 Å (4) 2.1 Å

Q.34 If the frequency of a spring is n after suspending mass M, now 4M mass is suspended from spring then the frequency will be :

(1) 2n (2) n/2

(3) n (4) None of the above

Q.35 A standing wave having 3 nodes and 2 antinodes is formed between 1.21 Å distance then the wavelength is :

(1) 1.21 Å (2) 2.42 Å

(3) 0.605 Å (4) 4.84 Å

Q.36 In hot wire Ammeter due to flowing of current temperature of wire is increased by 5°C. If value of current is doubled, then increases in temperature will be :

(1) 15°C (2) 20°C

(3) 25°C (4) 30°C

Q.37 A car is moving with velocity V. If stop after applying break at a distance of 20 m. If velocity of car is doubled, then how much distance it will cover (travel) after applying break :

(1) 40 m (2) 80 m (3) 160 m (4) 320 m

Q.38 A charge q is placed in an uniform electric field E. If it is released, then the K.E of the charge after travelling distance y will be :

(1) qEy (2) 2qEy

(3) $\frac{qEy}{2}$ (4) $\sqrt{qEy}$

Q.39 In the Bohr model of H-atom, an electron (e) is revolving around a proton (p) with velocity v, if r is the radius of orbit and m is mass and ε_0 is vacuum permittivity, the value of v is :

(1) $\frac{e}{\sqrt{4\pi m \in_0 r}}$ (2) $\frac{2e}{\sqrt{\pi m \in_0 r}}$

(3) $\frac{e}{\sqrt{\pi m \in_0 r}}$ (4) $\frac{e}{4\pi m \in_0 r}$

Q.40 Electric field at the equator of a dipole is E. If strength and distance is now doubled then the electric field will be :

(1) E/2 (2) E/8 (3) E/4 (4) E

Q.41 Turn ratio of a step-up transformer is 1 : 25. If current in load coil is 2A, then the current in primary coil will be :

(1) 25A (2) 50A (3) 0.25A (4) 0.5A

Q.42 If a source moves perpendicularly from listener then the change in frequency will be :

(1) 2 n (2) n (3) n/2 (4) Zero

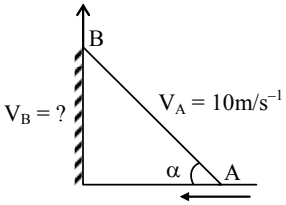
Q.43 for nuclear reaction :

$_{92}U^{235} + {}_0n^1 \rightarrow {}_{56}Ba^{144} + \ldots\ldots\ldots + 3{}_0n^1$

(1) $_{26}Kr^{89}$ (2) $_{36}Kr^{89}$

(3) $_{26}Sr^{90}$ (4) $_{38}Sr^{89}$

Q.44 A rigid rod is placed against the wall as shown in figure. When its velocity of lower end is 10 ms^{-1} and its base makes an angle $\alpha = 60°$ with horizontal, then the vertical velocity of its end B will be :



(1) $10\sqrt{3}$ (2) $10/\sqrt{3}$ (3) $5\sqrt{3}$ (4) $5/\sqrt{3}$

Q.45 Radiation energy corresponding to the temperature T of the sun is E. If its temperature is doubled, then its radiation energy will be :

(1) 32 E (2) 16 E (3) 8 E (4) 4 E

Q.46 The cause of potential barrier in a P–N junction diode is :

(1) Concentration of positive and negative ions near the junction

(2) Concentration of positive charges near the junction

(3) Depletion of negative charges near the junction

(4) Increment in concentration of holes and electrons near the junction

Q.47 Common emitter circuit is used as amplifier, its current gain is 50. If input resistance is 1 kΩ and input voltage is 5 volt then output current will be :

(1) 250 mA (2) 30 mA

(3) 50 mA (4) 100 mA

Q.48 We consider a thermodynamic system. If ΔU represents the increase in its internal energy and W the work done by the system, which of the following statements is true ?

(1) $\Delta U = -W$ in an isothermal process

(2) $\Delta U = W$ in an isothermal process

(3) $\Delta U = -W$ in an adiabatic process

(4) $\Delta U = W$ in an adiabatic process

Q.49 A point Q lies on the perpendicular bisector of an electrical dipole of dipole moment p. If the distance of Q from the dipole is r (much larger than the size of the dipole), then the electric field at Q is proportional to :

(1) p^2 and r^{-3} (2) p and r^{-2}

(3) p^{-1} and r^{-2} (4) p and r^{-3}

Q.50 A particle, with restoring force proportional to displacement and resisting force proportional to velocity is subjected to a force F sin ωt. If the amplitude of the particle is maximum for $\omega = \omega_1$ and the energy of the particle maximum for $\omega = \omega_2$, then :

(1) $\omega_1 \neq \omega_0$ and $\omega_2 = \omega_0$

(2) $\omega_1 = \omega_0$ and $\omega_2 = \omega_0$

(3) $\omega_1 = \omega_0$ and $\omega_2 \neq \omega_0$

(4) $\omega_1 \neq \omega_0$ and $\omega_2 \neq \omega_0$

Q.51 Correct order of –I effect is :

(1) $-NR_3^+ > OR > F$ (2) $F > -NR_3^+ > -OR$

(3) $-NR_3^+ > F > OR$ (4) $OR > -NR_3^+ > F$

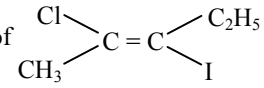
Q.52 Aspirin can be prepared by the reaction of acetyl chloride with :

(1) Benzoic acid

(2) Phenol

(3) p-hydroxy benzoic acid

(4) o-hydroxy benzoic acid

Q.53 IUPAC name of  is :

(1) (Z)-2-chloro-3-iodo-2-pentene

(2) (E)-2-chloro-3-iodo-2-pentene

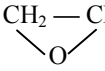
(3) 2-iodo-3-chloro-pentene

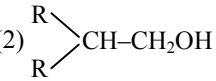
(4) None of the above

Q.54 Which of the following does not given iodoform test :

(1) 3-pentanone (2) 2-pentanone

(3) Ethanol (4) Ethanal

Q.55 The product formed by the reaction of  with RMgX is :

(1) $RCH_2–CH_2OH$ (2) 

(3) $R–O–CH_2CH_3$ (4) 

Q.56 Which of the following is not the characteristic of arenes :

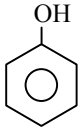
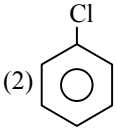
(1) More stability

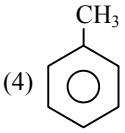
(2) Resonance

(3) Delocalization of π electrons

(4) Electrophilic addition

Q.57 Which of the following gives most easily electrophilic substitution reaction :

(1)  (2) 

(3)  (4) 

Q.58 Which of the following does not give claisen condensation reaction :

(1) $C_6H_5COOC_2H_5$

(2) $C_6H_5CH_2COOC_2H_5$

(3) $CH_3COOC_2H_5$

(4) None of the above

Q.59 Percentage of C, H & N are given as follows :
C = 40% H = 13.33% N = 46.67%
The empirical formula will be :
(1) CH_2N (2) C_2H_4N (3) CH_4N (4) CH_3N

Q.60 Glucose +x phenyl hydrazine → osazone 'x' will be :
(1) 2 (2) 3 (3) 4 (4) 1

Q.61 The base found in DNA but not in RNA :
(1) Thymine (2) Adenine
(3) Guanine (4) Cytosine

Q.62 2-Bromo pentane reacts with ethanolic KOH gives main product :
(1) Trans-2-pentene (2) Cis-2-pentene
(3) 1-pentene (4) None of the above

Q.63 Which of the following does not give nucleophilic substitution with alcohol :
(1) CH_3COCl (2) Acetic anhydride
(3) Ether (4) None

Q.64 Aniline reacts with Br_2 water, $NaNO_2$/HCl gives respectively :
(1) p-Bromo aniline, p-chloro aniline
(2) 2, 4, 6 tri bromo aniline, p-chloro aniline
(3) 2, 4, 6 tri bromo aniline, Benzene diazonium chloride
(4) p-bromo, aniline, Benzene diazonium chloride

Q.65 A complex compound which is formed by ligands nitrate and chloride. It gives two moles of AgCl precipitate with $AgNO_3$. What will be its formulae :
(1) $[Co(NH_3)_5NO_3]Cl_2$
(2) $[Co(NH_3)_5Cl]NO_3Cl$
(3) $[Co(NH_3)_4Cl_2]NO_3$
(4) $[Co(NH_3)_4Cl\ NO_3]Cl$

Q.66 Which of the following molecule is not paramagnetic :
(1) Cu^{++} (2) Fe^{2+}
(3) Cl^- (4) None of the above

Q.67 The number of antibonding electron pair in O_2^{-2} is :
(1) 4 (2) 3 (3) 2 (4) 1

Q.68 When A + Water → C + B, B is reacted with D, gas C again obtained. 'D' gives 'C' with H_2SO_4. B gives yellow colour with bunsen flame. C is a flamable gas then what would be A, B, C and D :
(1) K, H_2, NaOH, Zn (2) Na, NaOH, H_2, Zn
(3) Li, H_2, LiOH, Zn (4) None of the above

Q.69 The concentration of $ZnCl_2$ solution will change when it is placed in a container which is made of :
(1) Al (2) Cu (3) Ag (4) None

Q.70 The cell reaction of an electrochemical cell is $Cu^{+2}(C_1) + Zn \rightarrow Zn^{+2}(C_2) + Cu$. The change in free energy will be the function of :
(1) $\ln(C_1 + C_2)$ (2) $\ln \frac{C_2}{C_1}$
(3) $\ln C_2$ (4) $\ln C_1$

Q.71 $A + B \rightleftharpoons C + D$ Constant = K_1
$E + F \rightleftharpoons G + H$ Constant = K_2
then C + D + E + F ⇒ product. The constant of reaction will be :
(1) $\frac{K_1}{K_2}$ (2) $\frac{K_2}{K_1}$
(3) K_1K_2 (4) None of these

Q.72 Density of which of the following substance not decreases on adding in Br_2 vapours :
(1) CCl_4 (2) CS_2
(3) Ether (4) Coke

Q.73 In which of the following molecule. The internuclear distance will be maximum :
(1) CsI (2) CsF
(3) LiF (4) LiI

Q.74 The fertilizer which makes the soil acidic :
(1) $(NH_4)_2SO_4$
(2) Super phosphate of lime
(3) CH_3COONa
(4) $Ca(NO_3)_2$

Q.75 The chiral centre is absent in :
(1) $DCH_2–CH_2–CH_2–Cl$
(2) $CH_3–CHD–CH_2–Cl$
(3) $CH_3–CHCl–CH_2D$
(4) $CH_3–CHOH–CH_2–CH_3$

Q.76 Number of isomers of $[Pt(NH_3)_4][CuCl_4]$ complex are :
(1) 2 (2) 3
(3) 4 (4) 5

Q.77 ${}_nX^m$ emitted one α and 2β particles, then it will become :
(1) ${}_nX^{m-4}$ (2) ${}_{n-1}X^{m-1}$
(3) ${}_nZ^{m-4}$ (4) None

Q.78 When $X \rightarrow {}_7N^{14} + 2\beta^-$ then number of neutron will be in X :
(1) 3 (2) 5 (3) 7 (4) 9

Q.79 1% solution of other compound is isotonic with 5% sucrose (sugar) solution. Then molecular wt. of compound will be :
(1) 32.4 (2) 68.4 (3) 129.6 (4) 34.2

Q.80 First ionization potential of Be and B will be :
(1) 8.8 and 8.8 (2) 6.6 and 6.6
(3) 6.6 and 8.8 (4) 8.8. and 6.6

Q.81 Which of the following gives colour with the water :
(1) Cu^+ (2) Cr^{3+} (3) Na^+ (4) None

Q.82 Number of significant number will be in following numbers :
(a) 161 cm (b) 0.0161 (c) 1.61
(1) 3, 3, 3 (2) 3, 4, 3
(3) 3, 2, 3 (4) 3, 4, 4

Q.83 Maximum impurity in Pig iron will be of :
(1) Mn (2) P (3) Graphite (4) S

Q.84 Schottky defect shows :
(1) Same number of cation and decrease in anions
(2) Cations and anions are replaces from their sites
(3) Maximum number of cations and anions are same
(4) None

Q.85 Maximum oxidation state will be of :
(1) La (2) Gd (3) Eu (4) Am

Q.86 The IUPAC name of $[Co(NH_3)_3ClBrNO_2]$ will be :
(1) Triaminebromochloronitrocobaltate (III)
(2) Triaminebromochloronitrocobalt (III)
(3) Triaminebromonitrochlorocobalt (III)
(4) Triaminenitrochlorocobalt (III)

Q.87 By which activation energy calculate :
(1) At a constant temp.
(2) At two different temp.
(3) For reversible reaction
(4) For volatile reaction

Q.88 In the Haemoglobin (Molecular wt = 67200) iron found 0.33% (by weight). The number of iron atom will be in its one molecule :
(1) 1 (2) 2 (3) 3 (4) 4

Q.89 $4NH_3 + 5O_2 \rightarrow 6H_2O + 4NO$
When one mole ammonia and one mole oxygen taken :
(1) Oxygen is completely consumed
(2) Ammonia is completely consumed
(3) Both (1) and (2) are correct
(4) No one is correct

Q.90 In PO_4^{-3} formal charge on every oxygen atom and P-O bond order is respectively :
(1) 0.75 and 1.25 (2) 0.5 and 2
(3) 1 and 1.5 (4) 0.75 and 2

Q.91 The radius of hydrogen shell is 0.53Å, then in first excited state radius of shell will be :
(1) 2.12 Å (2) 1.06 Å
(3) 8.5 Å (4) 4.24 Å

Q.92 Mole fraction of solute is 0.2 in solution then lowering in V.P $\Delta P = 10$. If lowering in V.P. $\Delta P = 20$ then mole fraction of solvent will be in solution :
(1) 0.2 (2) 0.4
(3) 0.6 (4) 0.8

Q.93 Uncertainity in position of a e^- and He is similar. If uncertainity in momentum of e^- is 32×10^5, then uncertainity in momentum of He will be :
(1) 32×10^5 (2) 16×10^5
(3) 8×10^5 (4) None of these

Q.94 The number of molecules of ATP produced in the lipid metabolism of a molecule of palmitic acid is :
(1) 56 (2) 36
(3) 130 (4) 86

Q.95 Identify the correct statement regarding entropy:
(1) At absolute zero of temperature, the entropy of all crystalline substances is taken to be zero
(2) At absolute zero of temperature, the entropy of a perfectly crystalline substance is +ve
(3) At absolute zero of temperature, entropy of a perfectly crystalline substance is taken to be zero
(4) At 0ºC, the entropy of a perfectly crystalline substance is taken to be zero

Q.96 The edge length of face centred unit cubic cells is 508 pm. If the radius of the cation is 110 pm, the radius of the anion is :
(1) 144 pm (2) 398 pm
(3) 288 pm (4) 618 pm

Q.97 At the critical micelle concentration (CMC) the surfactant molecules :
(1) Associate
(2) Dissociate
(3) Decompose
(4) Become completely soluble

Q.98 Which one of the following pairs of substances on reaction will not evolve H_2 gas ?
(1) Copper and HCl (aqueous)
(2) Iron and steam
(3) Iron and H_2SO_4 (aqueous)
(4) Sodium and ethyl alcohol

Q.99 The second order Bragg diffraction of X-rays with $\lambda = 1.00$ Å from a set of parallel planes in a metal occurs at an angle 60º. The distance between the scattering planes in the crystal is :
(1) 2.00 Å (2) 1.00 Å
(3) 0.575 Å (4) 1.15 Å

Q.100 One mole of an ideal gas at 300 K is expanded isothermally from an initial volume of 1 litre to 10 litres. The ΔE for this process is ($R = 2$ cal. $mol^{-1} K^{-1}$) :
(1) 1381.1 cal. (2) Zero
(3) 163.7 cal. (4) 9 lit. atm.

Q.101 If Mendel might have studied 7 pairs of characters in a plant with 12 chromosomes instead of 14 then :
(1) He could not discovered independent assortment
(2) He might have discovered linkage
(3) He might have discovered crossing over
(4) He might have not observed dominance

Q.102 Contraction in gall bladder stimulated by :
(1) CCK (2) PZ
(3) Secretin (4) Enterogastrin

Q.103 Water is essential for bryophyta :
(1) For fertilization and homosporos nature
(2) Water should be filled in archegonium for fertilization
(3) Water is necessary for movement of sperm
(4) For dissemination of spores

Q.104 Which of the following yields citric acid :
(1) *Penicillium citricum*
(2) *Aspergillus niger*
(3) *Saccharomyces*
(4) *Azospirilium*

Q.105 *Saccharomyces cerevissae* is used in the formation of :
(1) Ethanol (2) Methanol
(3) Acetic acid (4) Antibiotics

Q.106 AA Bb Cc genotypes form how many types of gametes :
(1) 4 (2) 8 (3) 2 (4) 6

Q.107 Indicator of water pollution :
(1) *E. Coli* (2) *Chlorella*
(3) *Beggiatoa* (4) *Ulothrix*

Q.108 DNA of *E.Coli* :
(1) ds circular (2) ss circular
(3) ds Linear (4) ss Linear

Q.109 Nucleic acid in HIV :
(1) ss RNA (2) ds RNA
(3) ss DNA (4) ds DNA

Q.110 Knife of DNA :
(1) DNA–ligase
(2) Restriction endonuclease
(3) Exonuclease
(4) Peptidase

Q.111 Genetic engineering involves :
(1) Use of restriction endonuclease on bacterial DNA and formation of new traits
(2) Use of Ligase for cutting DNA
(3) Developing instruments
(4) Use of statistic in genetics

Q.112 Which is wrong for cytochrome P–450
(1) It contains Fe
(2) It concern with oxidation
(3) It is a pigment
(4) It is a coloured cell

Q.113 Enamel of teeth is secreted by :
(1) Ameloblast (2) Odontoblast
(3) Osteoblast (4) Osteoclast

Q.114 If a female having gene for haemophilia and colour-blindness on its one X-chromosome marries a normal male then what are the chances in their offsprings :
(1) 50% son diseased and 50% normal
(2) All normal offsprings
(3) 100% daughters are carrier
(4) 100% son diseased

Q.115 First child of a normal male and female is albino, what are the chances of second child to be albino:
(1) 25% (2) 50% (3) 75% (4) 100%

Q.116 Species separated by geographical barriers are called :
(1) Allopatric (2) Sympatric
(3) Sibling (4) Endemic

Q.117 Point mutation induced by :
(1) Adenine (2) Guanine
(3) 3-cytosine (4) Bromouracil

Q.118 Reason for trisomy in down's syndrome :
(1) Non disjunction during sperm formation
(2) Non disjunction during egg formation
(3) Non disjunction at the time of egg or sperm formation
(4) Addition of one extra chromosome during mitosis

Q.119 Multivalent chromosome form by :
(1) Inversion
(2) Deletion
(3) Reciprocal translocation
(4) Point mutation

Q.120 A cup have 10^5 bacterial cells. Each bacterial cell divides in 35 minutes. What shall be the number of bacteria after 175 min.
(1) 2×10^5 (2) 5×10^5
(3) 32×10^5 (4) 16×10^5

Q.121 Deficiency of protein leads to :
(1) Rickets (2) Scurvy
(3) Kwashiorker (4) Carotenemia

Q.122 Lactose composed of :
(1) Glucose + galactose
(2) Glucose + fructose
(3) Glucose + glucose
(4) Glucose + mannose

Q.123 True statement for cellulose molecule :
(1) β–1–4 linkage, unbranched
(2) β–1–4 linkage, branched
(3) α–1–4 linkage, branched
(4) β–1–6 linkage, unbranched

Q.124 True statement for *Ulothrix* :
(1) Filamentous thallus and flagellated reproductive structures
(2) Branched thallus
(3) Flagellated cells absent
(4) None of the above

Q.125 Which of the following exercise a control over transcription :
(1) Operator (2) Regulator
(3) Promoter (4) Recon

Q.126 Vitamin which induces maturation of R.B.C. :
(1) B_1 (2) A
(3) B_{12} (4) D

Q.127 Lower jaw composed of :
(1) Dentary (2) Maxilla
(3) Premaxilla (4) Palatine

Q.128 Number of bones in hind limb of man :
(1) 14 (2) 24
(3) 26 (4) 30

Q.129 Which of the following stimulates the secretion of gastric juice :
(1) Gastrin (2) Enterogasterone
(3) Secretin (4) Hepatocrinin

Q.130 Age of Dryopithecous :
(1) 2.46 crore years (2) 2.46 lakh year
(3) 1 lakh year (4) 1 crore year

Q.131 Which of the following statement is true :
(1) *Homo erectus* is direct ancestor of *Homo sapiens*
(2) Neanderthal man is direct ancestor of modern man
(3) Australopithecous is direct ancestor of modern man
(4) Fossils of cromagnon man first found in Ethiopia

Q.132 Which statement is wrong for *Cycas* :
(1) Xylem have vessels
(2) Female flowers well developed
(3) It has coralloid roots
(4) Circinate ptyxis

Q.133 Evolution of heart from one to two, three and four chambered proves :
(1) Biogenetic law of Haeckel
(2) Lamarckism
(3) Hardy weinberg's law
(4) Neo Darwinism

Q.134 What is necessary for ripening of fruits :
(1) 80% of ethylene (2) Abscissic acid
(3) 2, 4 D (4) A.M.O. – 16

Q.135 Which of the following induces morphogenesis in tissue culture :
(1) Gibberline (2) Cytokinin
(3) IAA (4) Ethylene

Q.136 Which weedicide can defoliate the complete forest :
(1) 2, 4-D (2) AMO–1618
(3) MH (4) ABA

Q.137 Heterosis (Hybrid vigour) desirable in vegetatively propagated plants because :
(1) Heterosis is maintained for a longer duration
(2) These plants are easy to cultivate
(3) Vegetative reproduction help to multiply fast
(4) It is due to homozygosity

Q.138 What is correct for stages of *Puccinia* :
(1) Telia and aecia on wheat
(2) Telia and uredo stage on wheat
(3) Telia and aecia on barberry
(4) None

Q.139 Typhoid caused by :
(1) Rickettssiae (2) Chlamydia
(3) Salmonella typhi (4) Mycobacterium

Q.140 Agent orange is :
(1) Biodegradable insecticide
(2) Di auxin (2–4,D and 2, 4, 5 T) weedicide
(3) Biofertilizer
(4) Biopesticide

Q.141 Largest sperm of :
(1) *Pinus* (2) *Cycas*
(3) *Ephedra* (4) *Sequoia*

Q.142 Hollow air filled bones (pneumatic bones) occurs in :
(1) Mammals (2) Reptiles
(3) Urodela (4) Aves

Q.143 Non–symbiotic nitrogen fixing bacteria :
(1) *Rhizobium* (2) *Azospirilium*
(3) *Azotobacter* (4) *Nitrosomonas*

Q.144 Extrastelar secondary growth takes place by :
(1) Vascular cambium (2) Phellogen
(3) Phellem (4) Phelloderm

Q.145 If CO_2 is absent in atmosphere of earth then :
(1) Temperature will decrease
(2) Temperature will increase
(3) Plants will flourish well
(4) No effect

Q.146 *Acacia, Prosopis* and *Capparis* belongs to :
(1) Deciduous forest (2) Tropical forest
(3) Thorn forest (4) Evergreen forest

Q.147 Animals of desert are :
(1) Arboreal (2) Fossorial
(3) Crepuscular (4) Nocturnal

Q.148 Which part not have only involuntary muscles :
(1) Urethra (2) Irish
(3) Heart muscles (4) Blood vessels

Q.149 Solenocytes occur in :
(1) Platyhelminthes (2) Arthropoda
(3) Annelida (4) Aschelminthes

Q.150 Which characteristic is true for *Obelia* :
(1) Metagenesis (2) Morphogenesis
(3) Apolysis (4) Pedogeny

Q.151 In angiosperm, characters of flowers are used in classification because :
(1) Characters of flowers are conservative
(2) Flowers are large
(3) Flowers are attractive
(4) None of the above

Q.152 Transport of gases in alveoli takes place by :
(1) Active transport (2) Passive transport
(3) Simple diffusion (4) None

Q.153 Oral contraceptives contain :
(1) Progesterone (2) LH
(3) Oxytocin (4) Steroles

Q.154 In S–phase, DNA is replicated in a medium containing radioactive thymidine, radioactivity will be observed in :
(1) Euchromatin (2) Heterochromatin
(3) Both (4) Nucleolus

Q.155 CO is harmful because :
(1) It forms stable compound with hemoglobin
(2) It blocks mitosis
(3) It is mutagenic
(4) It causes defoliation

Q.156 Function of thyrocalcitonin :
(1) To reduce the calcium level in blood
(2) To increase the calcium level in blood
(3) Oppose the action of thyroxine
(4) Maturation of gonads

Q.157 Osmotic potential and water potential of pure water respectively :
(1) 0 and 0 (2) 0 and 1
(3) 100 and 0 (4) 100 and 100

Q.158 A normal leaf cell have how many genomes :
(1) 1 (2) 2
(3) 3 (4) 4

Q.159 Contractile protein is :
(1) Actin (2) Myosin
(3) Troponin (4) Tropomysin

Q.160 Unit of contraction :
(1) Sarcomere (2) Muscle fiber
(3) Actin (4) None

Q.161 Oxidation of palmitic and yield :
(1) 129 ATP (2) 132 ATP
(3) 36 ATP (4) 76 ATP

Q.162 Total amount of energy trapped by green plants in food is called :
(1) Gross primary production
(2) Net primary production
(3) Standing crop
(4) Standing state

Q.163 Role of microtubules :
(1) To help in cell division
(2) Cell membrane formation
(3) Respiration
(4) Pinocytosis

Q.164 Difference between eukaryotes and prokaryotes:
(1) ss circular DNA in prokaryotes
(2) Histone with prokaryotic DNA
(3) Operon in eukaryotes
(4) Membrane bound organelles in eukaryotes

Q.165 According to five kingdom system blue green algae belongs to :
(1) Metaphyta (2) Monera
(3) Protista (4) Algae

Q.166 Bacteria are essential in carbon cycle as :
(1) Decomposer (2) Synthesizer
(3) Consumer (4) Pri. Producer

Q.167 What occurs in crossing over :
(1) Recombination (2) Mutation
(3) Independent assortment
(4) None

Q.168 Histamine secreted by :
(1) Mast cells (2) Fibroblast
(3) Histiocytes (4) Plasma cells

Q.169 Arterial blood pressure in human beings :
(1) 120 and 80 mm Hg (2) 150 and 100 mm Hg
(3) 50 and 100 mm Hg (4) None

Q.170 Which of the following survives a temperature of 104 to 106ºC :
(1) Marine Archaebacteria
(2) Hot water spring thermophiles
(3) Seeds of angiosperms
(4) Eubacteria

Q.171 Mental retardness in man occur due to :
(1) Loss of one X chromosome
(2) Addition of one X chromosome
(3) Slight growth in Y
(4) Overgrowth in Y

Q.172 Symptoms of Lathyrism :
(1) Bone deformation
(2) Muscular dystrophy and paralysis
(3) Asphyxia
(4) Cordiac arrest

Q.173 A cell 'A' with D.P.D. = 8 is surrounded by three cells 'B', 'C' and 'D' with D.P.D. respectively 4, 6 and 5. What shall be the direction of water movement :
(1) $B \rightarrow A \leftarrow C$, $D \uparrow A$
(2) $A \rightarrow B \rightarrow C \rightarrow D$
(3) $D \rightarrow C \rightarrow B \leftarrow A$
(4) $A \rightarrow B \leftarrow C \rightarrow D$

Q.174 What change occurs during conversion of proto chlorophyll to chlorophyll :
(1) Addition of 2H in one pyrrole ring
(2) Loss of 2H
(3) Addition of Mg
(4) Loss of Mg

Q.175 Transduction in bacteria carried out by :
(1) Bacteriophage (2) B.G.A.
(3) Mycoplasma (4) Rickettsiae

Q.176 Which of the following most used in genetic engineering :
(1) *E. coil* and *Agrobacterium*
(2) *Mycobacteria* and *Salmonella*
(3) *Aspergillus*
(4) *Penicillium*

Q.177 Variations in proteins are due to :
(1) Sequence of amino acids
(2) Number of amino acids
(3) R–group
(4) None

Q.178 Genetic drift in mendelian population takes place in :
(1) Small population (2) Large population
(3) Oceanic population (4) Never occurs

Q.179 Embryo of sunflower have :
(1) Two cotyledons (2) One cotyledons
(3) Eight cotyledons (4) Cotyledons absent

Q.180 Effect of light and dark rhythm on plants :
(1) Photonasty (2) Phototropism
(3) Photoperiodism (4) Photomorphogenesis

Q.181 ABO blood group have :
(1) Two codominant and one recessive allele
(2) Two codominant and two recessive allele
(3) Two incompletely dominant genes
(4) Two pseudo alleles

Q.182 Walking fern name of *Adiantum* is due to :
(1) Dispersal by animals
(2) Reproduction by spores
(3) Vegetative reproduction
(4) Power of locomotion

Q.183 Modern farmer's can increase the yield of Paddy upto 50% by the use of :
(1) Cyanobacteria
(2) Rhizobium
(3) Cyanobacteria in *Azolla pinnata*
(4) Farm yard manure

Q.184 Which destroys the acetyl choline esterase :
(1) Malathione (2) CO
(3) KCN (4) Colchicine

Q.185 Growth of leaf primordia :
(1) First apical then marginal
(2) Only apical
(3) Only marginal
(4) Lateral

Q.186 Reason for elimination of wild life is :
(1) Deforestation (2) Forest fire
(3) Floods (4) Less Rain fall

Q.187 Beside CH_4 and CO_2 other green house gas from agriculture area :
(1) SO_2 (2) NH_3 (3) NO_2 (4) CFC

Q.188 In which biome a new plant may adapt soon :
(1) Tropical rain forest (2) Desert
(3) Mangroove (4) Sea island

Q.189 In present times the origin of life is not possible from inorganic compounds due to :
(1) Raw material not available
(2) High conc. Of O_2 in atmosphere
(3) Decrease in temperature
(4) Excess of pollution

Q.190 On Galopagos island Darwin observed variation in beaks of birds (Darwin's finches) and he concluded :
(1) Inter species variation
(2) Intraspecies variation
(3) Natural selection according to food
(4) Inheritance of acquired characters

Q.191 A male insect mistakes a flower of orchid to be its female due to shape and perform the act of copulation and induce pollination. This is an example of :
(1) Mimicry
(2) Pseudo copulation
(3) Pseudo pollination
(4) None

Q.192 Correct sequence of embryo development :
(1) Gamete $\rightarrow$ Zygote $\rightarrow$ Morula $\rightarrow$ Blastula $\rightarrow$ Gastrula
(2) Gamete $\rightarrow$ Zygote $\rightarrow$ Blastula $\rightarrow$ Morula $\rightarrow$ Gastrula
(3) Gamete $\rightarrow$ Neurula $\rightarrow$ Gastrula
(4) Gamete $\rightarrow$ Neurula $\rightarrow$ Morula

Q.193 Segments of DNA which can move in genome :
(1) Transposons (2) Introns
(3) Exons (4) Cistrons

Q.194 Botulism affects :
(1) Digestive system
(2) Blood vascular system
(3) Nervous system
(4) Respiratory system

Q.195 Temperature variation in Pacific ocean in present time is called :
(1) Cyclone effect
(2) Alnino effect
(3) Green house effect
(4) Gaudikov's effect

Q.196 Sewage purification is performed by :
(1) Microbes (2) Fertilisers
(3) Antibiotics (4) Antiseptics

Q.197 Effect of anaesthetics on body :
(1) Inhibits Na–K pump
(2) Kills nerves
(3) Stops brain functions
(4) Inactivates skin cells

Q.198 Two opposite forces operate in the growth and development of every population. One of them related to the ability to reproduce at a given rate. The force opposite to it is called :
(1) Fecundity
(2) Environmental resistances
(3) Biotic control
(4) Mortality

Q.199 Transfusion tissue is present in the leaves of :
(1) *Pinus* (2) *Dryopteris*
(3) *Cycas* (4) Both (1) and (3)

Q.200 The periderm includes :
(1) Secondary phloem (2) Cork
(3) Cambium (4) All of these

ANSWER KEY (AIPMT-1998)

Ques.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans	2	3	3	2	1	1	1	3	1	1	1	1	2	1	1	1	2	1	1	2
Ques.	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Ans	2	4	4	2	3	3	1	3	4	2	1	1	1	2	1	2	2	1	1	3
Ques.	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans	2	4	2	2	2	1	1	3	4	2	3	4	2	1	1	4	1	1	3	2
Ques.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Ans	1	1	3	3	1	3	1	2	1	2	2	4	1	1	1	3	1	4	2	4
Ques.	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Ans	2	1	3	1	4	2	2	4	1	1	1	3	1	3	3	1	1	1	4	2
Ques.	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
Ans	1	1	3	2	1	1	1	1	1	2	1	4	1	1	1	1	4	3	3	3
Ques.	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140
Ans	3	1	1	1	2	3	1	4	1	1	1	1	1	1	2	1	1	2	3	2
Ques.	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160
Ans	2	4	3	2	1	3	2	1	1	1	1	3	1	3	1	1	1	2	1	1
Ques.	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
Ans	1	1	1	4	2	1	1	1	1	2	2	2	1	1	1	1	1	1	1	3
Ques.	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
Ans	1	3	3	1	1	1	3	1	2	3	1	1	1	3	2	1	1	2	4	2

HINTS & SOLUTIONS

1. $\frac{N_1}{N_2}$ = ratio

$$\text{Average weight} = \frac{N_1W_1 + N_2W_2}{N_1 + N_2}$$

$$10.81 = \frac{10N_1 + 11N_2}{N_1 + N_2}$$

$10.81N_1 = 10.81N_2 = 10N_1 + 11N_2$

$0.81N_1 = 0.19N_2 \Rightarrow \boxed{\frac{N_1}{N_2} = \frac{19}{81}}$

2. Electric field will be zero at the centre of hollow sphere.

3. AND gate $\rightarrow$ C = A . B

OR gate $\rightarrow$ C = A + B

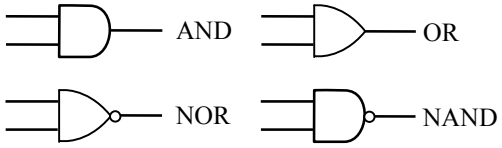
NOT gate $\rightarrow$ (It has only one input)

NAND gate $\rightarrow$ C = $\overline{A.B}$

A	B	A.B	A + B	$\overline{A.B}$	$\overline{A+B}$
0	0	0	0	1	1
0	1	0	1	1	0
1	0	0	1	1	0
1	1	1	1	0	0

Therefore answer is NAND gate.

4. **Note:**



5. $v_{wave} = \frac{\omega}{k}$

$v_{particle} = \frac{dy}{dt} = \underbrace{y_0\,\omega}\quad \cos(\omega t - kx)$

$\boxed{y_0\omega = 2\frac{\omega}{k}} \Rightarrow \boxed{k = \frac{2}{y_0} = \frac{2\pi}{\lambda}} \Rightarrow \boxed{\lambda = \pi y_0}$

6. $(N + 1)T_S = NT_\ell$ because $T \propto \sqrt{\ell}$

$$\Rightarrow \quad \frac{N+1}{N} = \sqrt{\frac{\ell_\ell}{\ell_S}} = \sqrt{\frac{2}{0.5}} = 2$$

$$\Rightarrow \quad \frac{N+1}{N} = 2 \Rightarrow N = 1 \Rightarrow N + 1 = 2$$

8. According to law of conservation of angular momentum

$$I_\omega = I'\omega'$$

$Mr^2\omega = (Mr^2 + 2mr^2)\omega'$

$$\omega' = \frac{M\omega}{M + 2m}$$

9. Work energy theorem

$W = \Delta KE$

$x = 3 - 4t^2 + t^3$

$v = \frac{dx}{dt} = -8t + 3t^2$

$v_1(t = 0) = 0$

$v_2(t = 4) = 16$

Therefore, $\Delta KE = \frac{1}{2} mv_2^2 - \frac{1}{2} mv_1^2$

$= \frac{1}{2} \times 3 \times 10^{-3} \times 16 \times 16 - 0 = 384$ mJ

10. $\because F = \frac{dP}{dt} \Rightarrow Fdt = dP$

$\Delta P = \text{Impulse} = \int_0^t Fdt = \int_0^t (500 - 100t)dt$

$= 500t - 50t^2$

11. $T_{1/2(A)} = 40$min, $T_{1/2(B)} = 20$ min

$t = 80$ min

$n_A = \frac{t}{T_{1/2_{(A)}}} = \frac{80}{40} = 2$

$n_B = \frac{t}{T_{1/2_{(B)}}} = \frac{80}{20} = 4$

$\frac{N_A}{N_B} = \frac{N_0/2^2}{N_0/2^4} = \frac{16}{4} = 4 : 1$

13. From Einstein's photoelectric effect eq^n

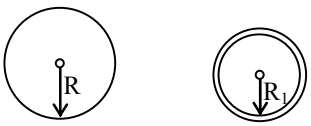
$\frac{hc}{\lambda} = \phi_0 + \frac{1}{2} mv^2$

$\frac{4hc}{3\lambda} = \phi_0 + \frac{1}{2} mv_1^2$

$\Rightarrow \frac{4}{3}\left(\phi_0 + \frac{1}{2} mv^2\right) = \phi_0 + \frac{1}{2} mv_1^2$

$\Rightarrow \frac{1}{2} mv_1^2 = \frac{\phi_0}{3} + \frac{1}{2} m\left(\sqrt{\frac{4}{3}}v\right)^2 \Rightarrow \boxed{v_1 > \sqrt{\frac{4}{3}}v}$

14.

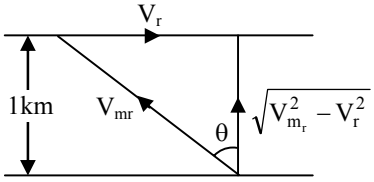


$2\pi R = L$ $\quad 4\pi R_1 = L$

$B_1 = \frac{\mu_0 I}{2R} \times N = \frac{\mu_0 I\pi}{L}$; $B_2 = \frac{\mu_0 I}{2R_1} \times 2 = \frac{4\mu_0 I\pi}{L}$

$\Rightarrow \quad \boxed{\frac{B_1}{B_2} = \frac{1}{4}}$

15.



$V_{mr} = 5$ km/hr

$t = 15$ min

$t = \frac{d}{\sqrt{V_{mr}^2 - V_r^2}} \Rightarrow \frac{15}{60} = \frac{1}{\sqrt{25 - V_r^2}}$

$\Rightarrow \quad 4 = \sqrt{25 - V_r^2} \Rightarrow V_r^2 = 25 - 16 \Rightarrow V_r^2 = 9$

$\Rightarrow \quad V_r = 3$ km/hr

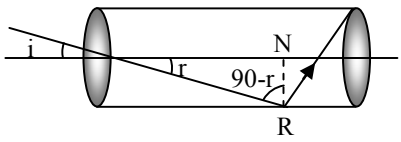
16. In elastic collision of bodies of same mass, the velocities get mutually exchanged between them.

17. $T_1 - mg = ma$ $\quad mg - T_2 = ma$

$T_1 = m(g + a)$ $\quad T_2 = m(g - a)$

$\frac{T_1}{T_2} = \frac{g + a}{g - a} = \frac{14.7}{4.9} = \frac{3}{1}$

19.



$\therefore \quad 90^\circ - r > i_c \quad$ or $\quad r < 90^\circ - i_c$

According to Snell's law

$\sin i = n \sin r < n \sin(90^\circ - i_c)$

$\Rightarrow \quad \frac{\sin i}{\cos i_c} < n \quad \Rightarrow \frac{\sin i}{\sqrt{1 - \sin^2 i_c}} < n$

$\Rightarrow \quad \frac{\sin i}{\sqrt{1 - 1/n^2}} < n \quad \Rightarrow n^2 - 1 > 1$

$\Rightarrow \quad n > \sqrt{2}$

20. $m = ZIt = ZQ \quad \Rightarrow m \propto Q$

Then amount of librated Ag will be double.

21. $K.E_{max} = \frac{hc}{\lambda} - \phi$

$= \frac{12400 eV\text{Å}}{5000\text{Å}} - 1.5eV$

$= (2.48 - 1.5)eV = 0.98$ eV

22. $\frac{T}{4} = 6$ sec. $\Rightarrow T = 24$ sec.

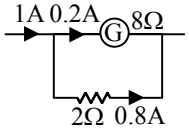
Frequency $= \frac{1}{T} = \frac{1}{24}$ Hz $= 0.04$ Hz

23. $e = M\frac{di}{dt} = 0.005 \times \frac{d}{dt}(i_0 \sin\omega t)$

$= 0.005\, i_0\, \omega \cos\omega t = e_0 \cos\omega t$

$\therefore \quad e_{max} = 0.005 \times 2 \times 100\pi = \pi$

24. $S = \left(\frac{i - i_s}{i_s}\right)G$



$\frac{i_s}{i} = \frac{G}{S+G} = \frac{8}{2+8} = \frac{8}{10}$

$i_S = 0.8i = 0.8 \times 1 = 0.8A$

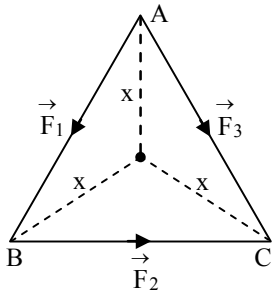
26. Here $v\frac{dm}{dt} = m(4.9 + 9.8) = (14.7)m$

$v = 2km/s \qquad m = 1000$

$2000\frac{dm}{dt} = 14.7 \times 1000$

$\frac{dm}{dt} = \frac{14.7}{2} = 7.35$ kg/s

27. From the centre distance of three sides are equal



$\therefore \qquad F_1X + F_2X - F_3X = 0$

$F_3 = F_1 + F_2$

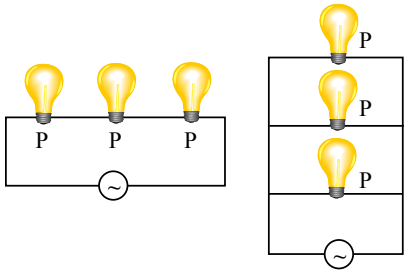
$\left|\vec{F}_3\right| = \left|\vec{F}_1\right| + \left|\vec{F}_2\right|$

28. $dU = \mu C_V dt = \frac{\mu R dT}{\gamma - 1} = \frac{P(2V - V)}{\gamma - 1} = \frac{PV}{\gamma - 1}$

29. $\Delta U = \mu C_V \Delta T = 0$

$\therefore \qquad \Delta T = 0$ (temp. constant)

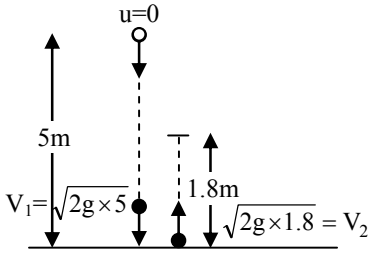
30.



$\frac{1}{P_{eq}} = \frac{1}{P_1} + \frac{1}{P_2} + \frac{1}{P_3} \qquad P_{eq} = P_1 + P_2 + P_3$

$\Rightarrow \boxed{10 = \frac{P}{3}} \Rightarrow P_{eq} = 3P = 3 \times 30 = 90$ watt

31.



$\frac{V_2}{V_1} = \frac{\sqrt{2g \times 1.8}}{\sqrt{2g \times 5}} = \sqrt{\frac{18}{50}} = \sqrt{\frac{9}{25}}$

$\frac{V_2}{V_1} = \frac{3}{5}$

32. $F = \frac{\mu_0 i_1 i_2}{2\pi d} = \frac{4\pi \times 10^{-7} \times 1 \times 1}{2\pi \times 1} = 2 \times 10^{-7}$ N/m

33. $n\lambda = 2d \sin\theta$; $\theta = 60^\circ$, $n = 2$

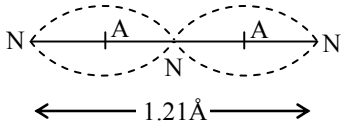
$d = \frac{2 \times 1 \times 2 \times 10^{-10}}{2 \times \sqrt{3}} = 1.15Å$

34. $n = \frac{1}{2\pi}\sqrt{k/m}$; $n \propto \frac{1}{\sqrt{m}}$

$\frac{n}{n_2} = \sqrt{\frac{m_2}{m_1}} = \sqrt{\frac{4m}{m}}$

$n_2 = \frac{n}{2}$

35.



Therefore $\lambda = 1.21Å$

36. $I^2RT = ms\Delta\theta$

$\Rightarrow \qquad I^2 \propto \Delta\theta$

$\frac{\Delta\theta_2}{\Delta\theta_1} = \frac{I_2^2}{I_1^2}$

$\Rightarrow \qquad \frac{\Delta\theta_2}{5} = (2)^2 \Rightarrow \Delta\theta_2 = 20^\circ C$

37. $v^2 = u^2 - 2as$

$s = \frac{u^2}{2a} \Rightarrow s \propto u^2$

$\Rightarrow \frac{20}{s'} = \frac{u^2}{4u^2}$

$s' = 80$ meter

38. $\Delta K.E.$ = force × displacement = Work done

$\Delta K.E. = qEy$

39. $\frac{mv^2}{r} = \frac{1}{4\pi \in_0} \times \frac{e^2}{r^2}$

$$v = \frac{e}{\sqrt{4\pi \in_0 rm}}$$

40. $E = \frac{kp}{r^3}$

$$\Rightarrow \quad E \propto \frac{p}{r^3} \quad \Rightarrow \quad \frac{E_1}{E} = \frac{2}{8}$$

$$\Rightarrow \quad E_1 = \frac{E}{4}$$

41. **Note :** Load coil = Secondary coil

$$\frac{E_s}{E_p} = \frac{N_s}{N_p} = \frac{I_p}{I_s} \quad \Rightarrow \quad \frac{25}{1} = \frac{I_p}{2}$$

Therefore $I_p = 50$ A

42. If source moves perpendicular to observer's motion then change in freq. = 0

(No doppler's effect)

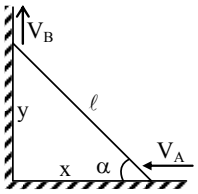
43. ${}_{92}U^{235} + {}_0n^1 \rightarrow {}_{56}Ba^{144} + {}_zX^A + 3{}_0n^1$

$235 + 1 = 144 + A + 3 \Rightarrow A = 89$

$92 + 0 = 56 + Z + 0 \Rightarrow Z = 36$

Therefore ${}_{36}X^{89} \rightarrow {}_{36}Kr^{89}$

44. $x^2 + y^2 = \ell^2 = \text{constant}$



$$2x\frac{dx}{dt} + 2y\frac{dy}{dt} = 0$$

$$\frac{dx}{dt} = -V_A = -10$$

$$\frac{dy}{dt} = V_B \ \&$$

$$\frac{y}{x} = \tan\alpha = \tan 60^\circ = \sqrt{3}$$

$$10 = \sqrt{3}V_B \quad \Rightarrow \quad \boxed{V_B = \frac{10}{\sqrt{3}}}$$

45. According to Stefan's law

$E \propto T^4$

$$\frac{E}{E_2} = \left(\frac{T}{2T}\right)^4$$

$E_2 = 16E$

47. $I_B = \frac{V}{R} = \frac{5}{10^3} = 5 \times 10^{-3}$

$$\beta = \frac{I_C}{I_B} = 50 = \frac{\text{out put current}}{\text{input current}}$$

$$50 = \frac{I_C}{5\times 10^{-3}}$$

$I_C = 25$ mA