NEET 2020
FULL TEST-6 SOLUTIONS

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

(1) **(4).** For n, (e/m) = 0, for $\alpha\ ({}_2He^4)$

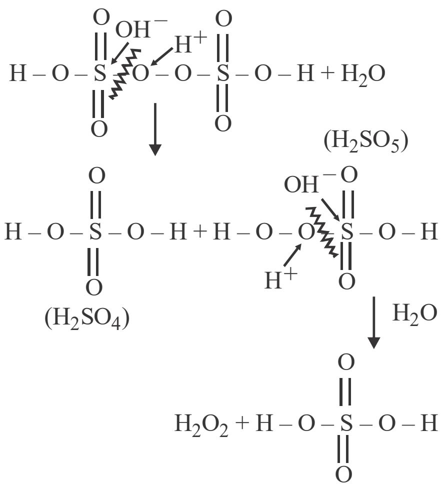
$$\alpha = \frac{e'}{m'} = \frac{2e}{4m};\ \text{for e \& p, charge (e) = same}$$

$$\alpha = \frac{1}{2}\left(\frac{e}{m}\right) \text{ on comparing with proton}$$

$m_e < m_p$

$$\left(\frac{e}{m}\right)_p < \left(\frac{e}{m}\right)_e$$

(2) **(4).**



(3) **(3).** For any ideal gas, in isothermal process ($\Delta T = 0$)

$\Rightarrow$ $\Delta H = 0$ & $\Delta E = 0$

($\Delta H = nC_p\ \Delta T$, $\Delta E = nC_v\Delta T$)

(4) **(1).** LiF lattice energy ↑↑

$\therefore$ Solubility ↓↓

$$NH_4NO_3 \xrightarrow{\Delta} H_2O + N_2O$$

(5) **(3).** $HSO_3^- \rightleftharpoons H^+ + SO_3^{-2}$

CA-CB pair

(6) **(4).** $E°_{cell}$ = +ve

spontaneous

$E°_{cell} = E°_{cathode} - E°_{anode}$

$= (-0.23) - (-0.76) = +0.53$

(7) **(3).** Let a g NH_3 is dissolved in 105 mL H_2O or 105 g H_2O

$\therefore$ % by mass of NH_3 in solution

$$= \frac{a}{105 + a} = \frac{30}{100}$$

$\therefore$ a = 45 g

$\therefore$ Weight of solution = 105 + 45 = 150 g

(8) **(2).** It is test of amide linkage.

(9) **(3).** $R = k\,[NO_2]^1$

Order of reaction = 1 ; $t_{1/2} = \dfrac{0.693}{k}$

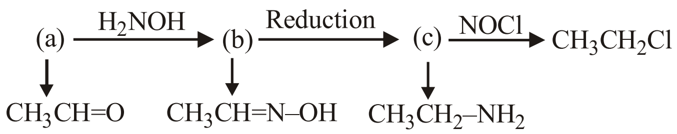
(10) **(2).**

(a) NaCl is composed of two elements that have very different electronegativities than each other, so Na gives up an electron to Cl and the two are held together by electrostatic attraction in an ionic bond.

(b) N_2 contains a triple bond, so it has one sigma (σ) bond and two pi (π) bonds.

(c) Hydrogen bonding occurs between hydrogen atoms of one molecule and electronegative elements (F, O, or N) of another molecule. So in ammonia, hydrogens from one ammonia molecule will form bonds with nitrogens from another ammonia molecule.

(11) **(4).**

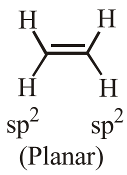


(12) **(4).** Cl exhibits –I and + M effect. Due to which it is ortho/para directing but ring deactivating.

(13) **(3).** There are 5 chiral centers present. Therefore, in this case, the formula for calculating chiral centers is 2^n where n is equal to 5. Two raised to the fifth power is 32.

(14) **(1).** This answer gives the correct parent chain and suffix, the correct name and numbering of substituents and the correct ordering of the alkyl group attached to the oxygen.

(15) **(4).**



(16) **(4).** $M + NH_3\ (liq) \xrightarrow{Fe} MNH_2 + H_2$

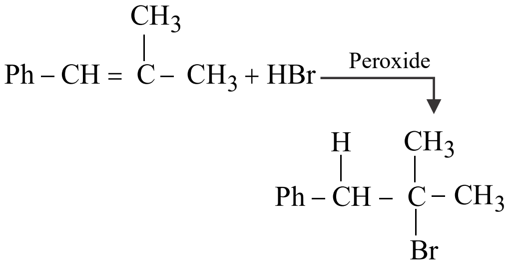
(17) **(4).** Order of acidic strength of groups present in given compound is :

Carboxylic acid > Phenol> Aromatic alcohol > Terminal alkyne.

So, acid base reaction with $NaNH_2$ will be preferred with the most acidic group that carboxylic group (–COOH) in given compound.

(18) **(3).** Reactivity with Lucas reagent
$\propto$ Stability of intermediate carbocation

(19) **(2).**



(20) **(2).**

$$\underset{\text{Methyl magnesium iodide}}{CH_3MgI} + H_2O \longrightarrow \underset{\text{Methane}}{CH_4} + Mg\langle^{I}_{OH}$$

No. of mole of Grignard reagent = No. of mole of CH_4

$$\frac{16.6}{166} = \frac{x}{22.4}; \quad x = \frac{16.6}{166} \times 22.4 = 2.24\text{ L}$$

(21) **(3).** $(T_b)_{solution} = 100.15°\text{ C}$

$\therefore$ $\Delta T_b = 100.15 - 100 = 0.15$

$\Delta T_b = \text{molality (m)} \times K_b$ ...... (1)

$$\text{molality (m)} = \frac{\text{moles}}{\text{wt. of solvent (w) (kg)}}$$

By diluting above solution by equal volume of water wt. of solvent becomes double

$$\therefore \quad \text{Molality (m')} = \frac{\text{Moles}}{2W} = \frac{m}{2}$$

$\therefore$ $\Delta T_f = \text{Molality (m')} \times K_f$ ...... (2)

eq. (2) / (1)

$$\frac{\Delta T_f}{\Delta T_b} = \frac{m' \times K_f}{m \times K_b} \Rightarrow \frac{m/2 \times K_f}{m \times K_b}$$

(22) **(3).** Concentration of $[H^+]$ in negative electrode (Anode) $C_1 = 10^{-8}$ M
Concentration of $[H^+]$ in positive electrode (Cathode) $C_2 = 0.001$ M

$$\text{At anode : } \frac{1}{2}H_2(g) \rightarrow H^+(C_1) + e^-$$

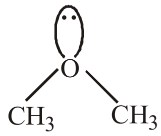
$$\text{At cathode : } H^+(C_2) + e^- \rightarrow \frac{1}{2}H_2(g)$$

Cell reaction $H^+(C_2) \rightarrow H^+(C_1)$
Here n = 1

$$E_{cell} = E^\circ_{cell} - \frac{0.0591}{1}\log\frac{[C_1]}{[C_2]}$$

$$E_{cell} = 0 - \frac{0.0591}{1}\log\frac{10^{-8}}{10^{-3}}$$

(23) **(2).**



(B.B. absent)

(Due to presence of bulky alkyl group repulsion increases so B.A. will also increases)

(24) **(4).** $NCl_3, PCl_3, AsCl_3, SbCl_3 \xrightarrow[\text{(Covalent character } (\downarrow)\text{) Hydrolysis } (\downarrow)]{}$

(25) **(3).** Transition metal oxide give borax bead test and metal ion react with B_2O_3 form colour metal borate.

(26) **(2).** In a gauche conformer, the two largest groups are 60 degrees apart. This is the case in the above conformer.

(27) **(3).** $Cr_2O_7^{2-} + H_2O_2 \rightarrow CrO_5$

(28) **(4).** $\underset{\text{photo-sensitive (undecomposed)}}{AgBr} + \underset{\text{hypo-solution}}{Na_2S_2O_3}$

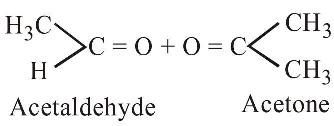
$$\rightarrow \underset{\text{Soluble}}{Na_3[Ag(S_2O_3)_2]} + NaBr$$

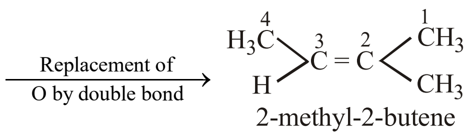
(29) **(3).** $\underset{\text{(aq)}}{CoCl_2} + \underset{\text{(excess)}}{\text{conc. HCl}} \rightarrow \underset{\text{(Blue colour)}}{[CoCl_4]^{2-}}$

(30) **(4).** Zone refining used for semiconductor elements.

(31) **(1).** To decide the structure of alkene that undergoes ozonolysis, bring the products together in such a way that O atoms are face to face, and replace O by double (=) bond.

Thus,





(32) **(1).** The excess base deprotonates the carbon adjacent to the geminal dihalide to form a triple bond between carbons 1 and 2.

(33) **(4).** Tertiary alcohols cannot be oxidized.

(34) **(2).** This reaction is the Friedel-Crafts acylation of benzene. The reaction's final product is an aromatic ketone.

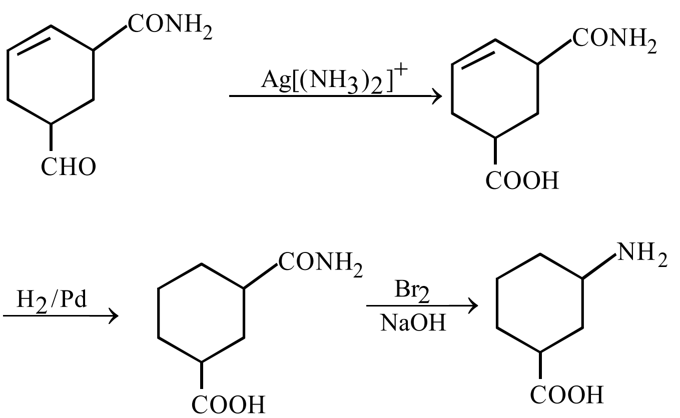
(35) **(2).** After the acid decarboxylates, an enol is formed initially. This enol quickly converts to its keto form to give a ketone as the final product.

(36) **(1).** β-Ketoacids can undergo thermal decarboxylation easily. β-Ketoesters can not until the ester group has been hydrolyzed to the carboxylic acid.

(37) **(3).** In this reaction, a molecule of the alcohol will displace one of the hydroxyl groups on the phosphorus. For every displacement that occurs, a molecule of water is formed. In this case, two equivalents of the alcohol are used so phosphoric acid disopropyl ester is formed along with water.

(38) **(2).** An amine is the product of reducing an amide with lithium aluminum hydride.

(39) **(2).**



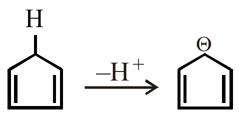
(40) **(1).**

(i) Biodegaradble polymer → PHBV (3-Hydroxybutanoic acid + 4-Hydroxypentanoic acid)

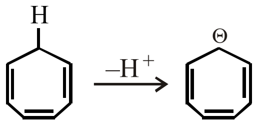
(ii) Bakalite → Phenol + Formaldehyde

(iii) Neoprene → 2-chlorobuta-1,3-diene

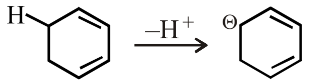
(iv) Glyptal → Phthalic acid + Ethylene glycol

(41) **(3).** 

(more stable due to aromaticity)



[Anti aromatic (least stable)]



(Stable by resonance)

Acidic nature ∝ Stability of conjugate anion (base) I > III > II

(42) **(2).** $\frac{1}{\lambda} = R\left(\frac{1}{m^2} - \frac{1}{n^2}\right) \times Z^2$

For $\lambda_{He^+} = \frac{400}{2^2} = \frac{400}{4} = 100$ nm

(43) **(3).**

	NH_3	+ HCl	→ NH_4Cl
Initial	50 × 0.1	10× 0.1	
	5 m mol	1 m mol	
Rem.	4 m mol	0	1 m mol

$pOH = pk_b + \log \frac{salt}{base}$

$= 4.75 + \log(1/4) = 4.15$

$pH = 14 - pOH = 14 - 4.15 = 9.85$

(44) **(3).** Mixing $AgNO_3$ in excess KI forms negatively charged colloid.

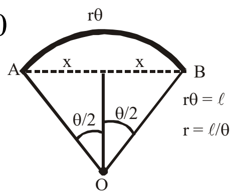
(45) **(2).** Black coffee → 5.0

Blood → 7.4

Gastric juice → 1.8 – 2.0

Saliva → 6.8

(46) **(4).** From figure,



$\sin\frac{\theta}{2} = \frac{x}{r} \Rightarrow x = r\sin\frac{\theta}{2}$

Hence new magnetic moment M' = m (2x)

$= m \cdot 2r\sin\frac{\theta}{2} = m \cdot \frac{2\ell}{\theta}\sin\frac{\theta}{2} = \frac{2m\ell\sin(\theta/2)}{\theta}$

$= \frac{2M\sin(\pi/6)}{\pi/3} = \frac{3M}{\pi}$

(47) **(3).** By using, $e = \frac{1}{2}B\ell^2\omega$

For part AO : $e_{OA} = e_O - e_A = \frac{1}{2}B\ell^2\omega$

For part OC : $e_{OC} = e_O - e_C = \frac{1}{2}B(3\ell)^2\omega$

$e_A - e_C = 4B\ell^2\omega$

(48) **(4).** COLM $mu + 0 = 2mV_C$

$V_c = u/2$

By COME

$$\frac{1}{2}(2m)\,V_c^2 = 2mgh$$

$$h = \frac{V_c^2}{2g} = \frac{u^2}{8g} = \frac{1}{80}m = 1.25\text{ cm}$$

(49) **(2).** $V = V_0\,(e^{-\lambda t})$

After 1 seconds

$V_1 = 320\,(e^{-\lambda}) \Rightarrow 240 = 320\,(e^{-\lambda})$

$\Rightarrow\ e^{-\lambda} = 3/4$

After 2 seconds

$V_2 = 320\,(e^{-\lambda})^2 = 320 \times (3/4)^2\text{ m} = 180\text{volts}$

After 3 seconds

$V_3 = 320\,(e^{-\lambda})^3 = 320 \times (3/4)^3\text{ m} = 135\text{volts}$

(50) **(3).** $$|\vec{a}_{avg}| = \frac{|\Delta\vec{v}|}{t} = \frac{2V\sin\left(\frac{180^\circ}{2}\right)}{\frac{\pi r}{V}} = \frac{2V^2}{\pi r}$$

(51) **(4).** $$f' = f\left[\frac{v - v_0}{v - v_s}\right]$$

$$f' = f\left[\frac{v + (v/5)}{v}\right]\ ;\ f' = \frac{6f}{5}$$

$$\text{Percentage increase} = \frac{f' - f}{f} \times 100 = 20\%$$

(52) **(2).** According to Kepler's second Law, equal areas are swept in equal intervals of time.

As SCD = 2 area SAB, hence ($t_1 = 2t_2$)

(53) **(3).** K.E. = $2E_0 - E_0 = E_0$ (for $0 \le x \le 1$)

$$\Rightarrow\ \lambda_1 = \frac{h}{\sqrt{2mE_0}}$$

K.E. = $2E_0$ (for $x > 1$)

$$\Rightarrow\ \lambda_2 = \frac{h}{\sqrt{4mE_0}}\ \Rightarrow\ \frac{\lambda_1}{\lambda_2} = \sqrt{2}$$

(54) **(2).** Moment of inertia of a cylinder about an axis passing through centre and normal to circular face = $MR^2/2$

Moment of inertia of a cylinder about an axis passing through centre and normal to its length.

$$= M\left[\frac{L^2}{12} + \frac{R^2}{4}\right]$$

$$\text{But } \frac{MR^2}{2} = M\left[\frac{L^2}{12} + \frac{R^2}{4}\right]$$

$$\text{or } \frac{R^2}{2} = \frac{L^2}{12} + \frac{R^2}{4}\ \text{ or }\ \frac{R^2}{4} = \frac{L^2}{12}$$

$\therefore\quad L = \sqrt{3}\,R$

(55) **(2).** Acceleration of car is, $a = \frac{d^2x}{dt^2} = g\sqrt{3}$

$$g_{eff} = \sqrt{g^2 + (g\sqrt{3})^2} = 2g$$

$$T = 2\pi\sqrt{\frac{\ell}{g_{eff}}} = \pi\sqrt{\frac{2\ell}{g}}$$

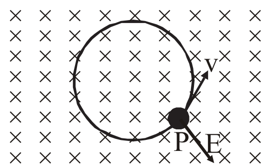
(56) **(3).** $$\beta = \frac{I_C}{I_B}$$

$I_C = \beta\,I_b = (50)\,(40 \times 10^{-6}) = 2 \times 10^{-3}$ amp

$V_0 = (I_C)\,(R_L)$

$V_0 = (2 \times 10^{-3})\,(3 \times 10^3) = 6V$

(57) **(3).** When the particle moves along a circle in the magnetic field B, the magnetic force is radially inward. If an electric field of proper magnitude is switched on which is directed radially outwards, the particle may experience no force. It will then move along a straight line with uniform velocity. This will be the case when $qE = qvB \Rightarrow E = vB$

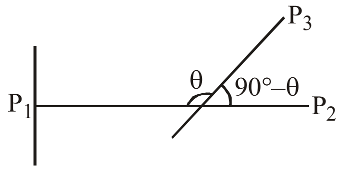


$$\text{Also, } r = \frac{mv}{qB} \Rightarrow v = \frac{qBr}{m}$$

$$E = \frac{qB^2r}{m} = \frac{(10\times10^{-6})\times(0.1)^2\times10\times10^{-2}}{1\times10^{-3}\times10^{-6}}$$

$= 10$ V/m

(58) **(1).** No light is emitted from the second polaroid, so P_1 and P_2 are perpendicular to each other



Let the initial intensity of light is I_0. So intensity of light after transmission from first polaroid $= I_0/2$

Intensity of light emitted from P_3

$$I_1 = \frac{I_0}{2}\cos^2\theta$$

Intensity of light transmitted from last polaroid i.e. from

$$P_2 = I_1\cos^2(90° - \theta) = \frac{I_0}{2}\cos^2\theta\cdot\sin^2\theta$$

$$= \frac{I_0}{8}(2\sin\theta\cos\theta)^2 = \frac{I_0}{8}\sin^2 2\theta$$

(59) **(1).** $\frac{dt}{dx} = 2\alpha x + \beta \Rightarrow v = \frac{1}{2\alpha x + \beta}$

$$\because\ a = \frac{dv}{dt} = \frac{dv}{dx}\cdot\frac{dx}{dt}$$

$$a = v\frac{dv}{dx} = \frac{-v\cdot 2\alpha}{(2\alpha x + \beta)^2} = -2\alpha.v.v^2 = -2\alpha v^3$$

$\therefore$ Retardation $= 2\alpha v^3$

(60) **(3).** Let n be the frequency of fork C then

$$n_A = n + \frac{3n}{100} = \frac{103n}{100}$$

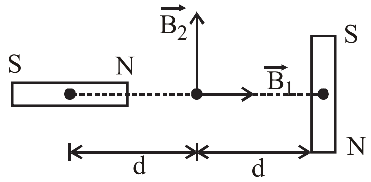
and $n_B = n - \frac{2n}{100} = \frac{98n}{100}$

But $n_A - n_B = 5 \Rightarrow \frac{5n}{100} = 5$

$\Rightarrow$ n = 100 Hz

$$\therefore\ n_A = \frac{103\times 100}{100} = 103\text{ Hz}$$

(61) **(4).** $B_1 = \frac{\mu_0}{4\pi}\frac{2M}{d^3},\ B_2 = \frac{\mu_0}{4\pi}\frac{M}{d^3}$



$$B_{net} = \sqrt{B_1^2 + B_2^2} = \sqrt{5}\frac{\mu_0}{4\pi}\frac{M}{d^3}$$

(62) **(1).** $\frac{7}{8}$ part decays, i.e., remaining part is $\frac{1}{8}$.

$$N = N_0\left(\frac{1}{2}\right)^{t/T_{1/2}} \Rightarrow \frac{1}{8} = \left(\frac{1}{2}\right)^{15/T_{1/2}}$$

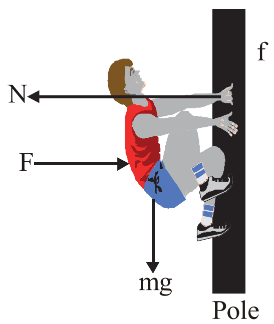
$\Rightarrow$ $T_{1/2} = 5$ min.

(63) **(4).** $\tan\phi = \frac{\omega L}{R}$

(64) **(3).** Here, $\mu = 0.8$.

Let F be horizontal force that the boy is applying on the pole.

The various forces are acting on the body as shown in the figure.

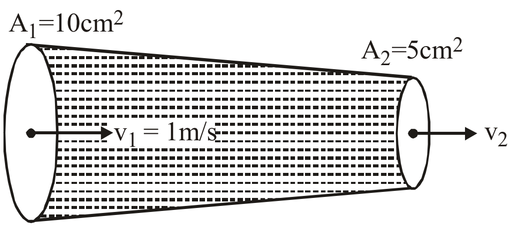


Frictional force, $f = \mu N = mg$

$$N = \frac{mg}{\mu} = \frac{40\times 10}{0.8} = 500\text{ N}$$

$\Rightarrow$ F = N = 500 N

(65) **(4).** According to equation of continuity.



$$A_1v_1 = A_2v_2$$

$$v_2 = \frac{A_1 v_1}{A_2} = \frac{10\text{cm}^2 \times 1\text{ m/s}}{5\text{ cm}^2} = 2\text{ m/s}$$

For a horizontal pipe, according to Bernoulli's theorem

$$P_1 + \frac{1}{2}\rho v_1^2 = P_2 + \frac{1}{2}\rho v_2^2$$

$$P_2 = P_1 + \frac{1}{2}\rho(v_1^2 - v_2^2)$$

$$= 2000 + \frac{1}{2}\times 10^3 \times (1^2 - 2^2)$$

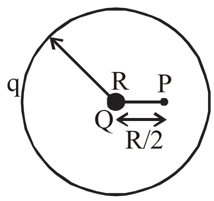
[Density of water, $\rho = 10^3$ kg/m^2]

$$= 2000 - \frac{1}{2}\times 10^3 \times 3 = 2000 - 1500 = 500\text{ Pa}$$

(66) **(1).** $U = -\int F\,dx = -\int kx\,dx = -k\frac{x^2}{2}$

This is the equation of parabola symmetric to U axis in negative direction.

(67) **(4).** Electric potential at P



$$V = \frac{k.Q}{R/2} + \frac{k.q}{R} = \frac{2Q}{4\pi\varepsilon_0 R} + \frac{q}{4\pi\varepsilon_0 R}$$

(68) **(1).** $\frac{\lambda_{m_2}}{\lambda_{m_1}} = \frac{T_1}{T_2} \Rightarrow \lambda_{m_2} = \frac{2000}{2400}\times 4 = 3.33\ \mu\text{m}$

(69) **(1).** $W_{AB} = 0$; $W_{BC} = 2P_0V_0$; $W_{CD} = 0$;
$W_{DA} = -P_0V_0$

So total work done $= P_0V_0$

From A to B, heat given to the gas

$$= nC_v\Delta T = n\frac{3}{2}R\Delta T = \frac{3}{2}V_0\Delta P = \frac{3}{2}P_0V_0$$

From B to C, heat given to the system

$$= nC_p\Delta T = n\left(\frac{5}{2}R\right)\Delta T = \frac{5}{2}(2P_0)\,\Delta V = 5P_0V_0$$

From C to D and D to A, heat is rejected.
efficiency,

$$\eta = \frac{\text{Work done by gas}}{\text{Heat given to the gas}} \times 100$$

$$\eta = \frac{P_0V_0}{\frac{3}{2}P_0V_0 + 5P_0V_0} = 15.4\%$$

(70) **(4).** $f = \frac{R}{2} = 20\text{cm}$, $m = 2$ for real image $m = -2$

By using,

$$m = \frac{f}{f-u},\ -2 = \frac{-20}{-20-u} \Rightarrow u = -30\text{cm}$$

For virtual image; $m = +2$

So, $+2 = \frac{-20}{-20-u} \Rightarrow u = -10$ cm.

(71) **(2).** The diode in lower branch is forward biased and diode in upper branch is reverse biased

$$i = \frac{5}{20+30} = \frac{5}{50}\text{A}$$

(72) **(2).** Full deflection current, Ig = 5mA
Resistance of galvanometer, G = 15Ω

$$R = \frac{V}{I_g} - G = \frac{10}{5\times 10^{-3}} - 15$$

$= 2000 - 15 = 1985\ \Omega = 1.985 \times 10^3\ \Omega$

(73) **(1).** $V_a - 6 - 5 + 3 - 6 = V_b$; $V_a - V_b = 14$ V

(74) **(4).** Power of combination
$P = P_1 + P_2 = 20 - 4 = 16$ D
Focal length of combination

$$f = \frac{1}{P} = \frac{1}{16}\text{m} = \frac{25}{4}\text{cm}$$

$$m = 1 + \frac{D}{f} = 1 + \frac{25}{25/4} = 5$$

(75) **(1).** $200 \propto \frac{\sqrt{T_1}}{\ell}$; $300 \propto \frac{\sqrt{T_2}}{2\ell}$

$$\sqrt{\frac{T_2}{T_1}} = 3\ ;\ \frac{T_2}{T_1} = 9:1$$

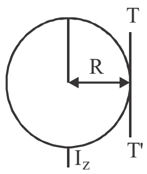
(76) **(4).** $F = T\ell = 0.075 \times 30 \times 10^{-2}$
$= 2.25 \times 10^{-2}$ N

(77) **(3).** $2\left(\frac{\mu_0 I}{4\pi a}\right)\odot$

(78) **(3).** Due to 10.2 eV photon one photon of energy 10.2 eV will be detected.
Due to 15 eV photon the election will come out of the atom with energy
(15–13.6) = 1.4eV.

(79) **(1).** $TV^{\gamma-1}$ = constant
$\gamma - 1 = 0.4 \Rightarrow \gamma = 1.4$ diatomic gas

(80) **(3).** $I_z = 2I$, where $I = \frac{MR^2}{4}$



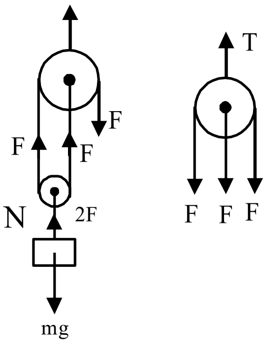
According to theorem of parallel axes, required moment of inertia about axis TT' is
$I_{TT'} = I_z + MR^2 = 2I + MR^2 = 2I + 4I = 6I$

(81) **(2).** $\phi = \frac{\mu_0 Ic}{2\pi}\int_a^b \frac{dx}{x} = MI$

$$M = \frac{\mu_0 c}{2\pi}\ln\left(\frac{b}{a}\right)$$

(82) **(4).** Among the given physical quantities angle has a unit but no dimensions. Angle = $[M^0L^0T^0]$
The SI unit of angle is radian.

(83) **(3).** T = 3F
T = 3F ; 2F = mg
2F = 100 × 9.8 ;
F = 490 N
So, T = 3F
T = 3 × 490 = 1470 N



(84) **(3).** Gravitational potential on the surface of the shell is V = Gravitational potential due to particle (V_1) + Gravitational potential due to shell itself (V_2)

$$-\frac{Gm}{R}+\left(-\frac{G3m}{R}\right)=-\frac{4Gm}{R}$$

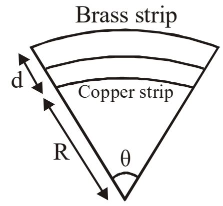
(85) **(1).** We know that $r_n \propto n^2$ or $\left(\frac{r_n}{r_1}\right) = n^2$

So, $\log(r_n / r_i) = 2\log n$

Hence, the graph between $\log(r_n / r_i)$ and $\log n$ will be a straight line passing through origin. The positive slope is given by $\tan\theta = 2$.

(86) **(2).** Let L_0 be the initial length of each strip before heating. Length after heating will be
$L_B = L_0(1 + \alpha_B \Delta T) = (R + d)\theta$
$L_C = L_0(1 + \alpha_C \Delta T) = R\theta$

$$\Rightarrow \frac{R+d}{R} = \frac{1+\alpha_B\,\Delta T}{1+\alpha_C\,\Delta T}$$



$$1+\frac{d}{R} = 1+(\alpha_B-\alpha_C)\,\Delta T$$

$$R = \frac{d}{(\alpha_B-\alpha_C)\,\Delta T} \quad ; \quad R \propto \frac{1}{\Delta T}$$

(87) **(1).** According to given problem, $\frac{1}{2}mv^2 = as^2$

$$v = s\sqrt{\frac{2a}{m}}, \text{ so, } a_R = \frac{v^2}{R} = \frac{2as^2}{mR}$$

Furthermore as

$$a_t = \frac{dv}{dt} = \frac{dv}{ds}\times\frac{ds}{dt} = v\frac{dv}{ds}$$

$$a_t = \left[s\sqrt{\frac{2a}{m}}\right]\left[\sqrt{\frac{2a}{m}}\right]$$

$$a_t = \frac{2as}{m} \quad \left[\because v = s\sqrt{\frac{2a}{m}} \text{ and } \frac{dv}{ds} = \sqrt{\frac{2a}{m}}\right]$$

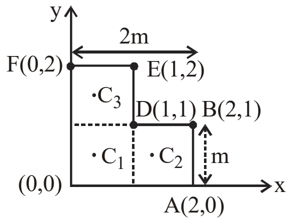
Acceleration

$$a = \sqrt{a_R^2 + a_t^2} = \sqrt{\left[\frac{2as^2}{mR}\right]^2 + \left[\frac{2as}{m}\right]^2}$$

$$= \frac{2as}{m}\sqrt{\left(1+\frac{s^2}{R^2}\right)}$$

(88) **(1).** Choosing the x and y axes as shown in the figure. The coordinates of the vertices of the L-shaped lamina is as shown in the figure. Divide the L-shape lamina into three squares each of side 1m and mass 1 kg ($\because$ the lamina is uniform).

By symmetry, the centres of mass C_1, C_2 and C_3 of the squares are their geometric centres and have coordinates.



$C_1\left(\frac{1}{2},\frac{1}{2}\right)$, $C_2\left(\frac{3}{2},\frac{1}{2}\right)$ and $C_3\left(\frac{1}{2},\frac{3}{2}\right)$

respectively. The coordinates of the centre of mass of the L-shaped lamina is

$$X_{CM} = \frac{m_1x_1 + m_2x_2 + m_3x_3}{m_1 + m_2 + m_3}$$

$$= \frac{1\times\frac{1}{2}+1\times\frac{3}{2}+1\times\frac{1}{2}}{1+1+1} = \frac{5}{6}\text{m}$$

$$Y_{CM} = \frac{m_1y_1 + m_2y_2 + m_3y_3}{m_1 + m_2 + m_3}$$

$$= \frac{1\times\frac{1}{2}+1\times\frac{1}{2}+1\times\frac{3}{2}}{1+1+1} = \frac{5}{6}\text{m}$$

(89) (1). The ranking is (d) > (a) = (c) > (b)
In the starting situation, the waves interfere constructively. When the sliding section is moved out by 0.1 m, the wave going through it has an extra path length of 0.2 m = $\lambda/4$, to show partial interference. When the slide has come out 0.2 m from the starting configuration, the extra path length is
0.4 m = $\lambda/2$, for destructive interference. Another 0.1 m and we are at $r_2 - r_1 = 3\lambda/4$ for partial interference as before. At last, another equal step of sliding and one wave travels one wavelength farther to interfere constructively.

(90) (3). The ranking is c > a = b > d. The total flux is proportional to the enclosed charge:
3Q > Q = Q > 0.

(91) (1). **(92) (2).**
(93) (2). **(94) (2).**
(95) (1). **(96) (1).**
(97) (3). **(98) (3).**
(99) (3). **(100) (2).**
(101) (3).

(102) (2). Hemichordata does not have Notochord
Platyhelminthes are acoelomate.
Coelenterata all are aquatic mostly marine some fresh water.

(103) (2). **(104) (3).** **(105) (2).**
(106) (3). **(107) (2).** **(108) (1).**
(109) (1). **(110) (1).** **(111) (4).**
(112) (2). **(113) (2).** **(114) (2).**
(115) (2). **(116) (4).** **(117) (1).**
(118) (4). **(119) (4).** **(120) (3).**
(121) (1). **(122) (3).**

(123) (4). The pancreas is responsible for the regulation of blood glucose levels. Glucose is stored in the liver in the form of glycogen. In response to low blood glucose, the pancreas releases glucagon, which causes glycogen in the liver to enter the bloodstream as glucose.

(124) (2). **(125) (4).**
(126) (2). **(127) (1).**
(128) (3). **(129) (1).**
(130) (3). **(131) (3).**
(132) (1). **(133) (2).**
(134) (3). **(135) (2).**
(136) (2). **(137) (4).**
(138) (2). **(139) (4).**
(140) (3). **(141) (3).**
(142) (3). **(143) (4).**
(144) (3). **(145) (2).**
(146) (3). **(147) (4).**
(148) (4). **(149) (2).**

(150) (4). Mitochondrial DNA, or mDNA, is circular and self-replicating, which allows the mitochondria to be semi-autonomous. Mitochondria are capable of synthesizing some of their own proteins and can replicate via binary fission. However, mitochondria are not entirely independent from the rest of the cell, as many of their components (e.g., ribosomes) are produced in the nucleolus of the cell, along with the other ribosomes.

(151) (4). **(152) (4).**

(153) (1). Crossing over, the exchange of DNA segments between pairs of homologous chromosomes, occurs in prophase I of meiosis. In the first round of meiotic cell division, two haploid cells are formed.

(154) (1).

(155) (1). An enzyme's specificity is determined by the three-dimensional shape of its active site. Regardless of which theory of enzyme specificity we are discussing (lock and key or induced fit), the active site determines which substrate the enzyme will react with.

(156) (2). **(157) (1).**

(158) (3). Mesophyll, the tissue that forms the interior of the leaf and carries out photosynthesis, is derived from ground tissue. The other two types of plant tissue are vascular and dermal.

(159) (4). Meiotic recombination, which accompanies sexual reproduction, is carried out by protists, fungi, plants, and animals. Monera (prokaryotes) do not undergo meiosis.

(160) (2). Only translation utilizes tRNA, which is the molecule that carries amino acids and binds to the mRNA codons on the ribosome.

(161) (4). The adrenal medulla is a gland that responds to stress and creates a lasting response on the sympathetic nervous system, which none of the other options have an effect on.

(162) (4). During pollination, pollen sticks to the stigma A and then germinates and grows down the style C in order to reach the ovule D to achieve fertilization.

(163) (3). A point mutation refers to a DNA mutation where a single base is changed. A frameshift mutation occurs when bases are inserted or deleted, and the entire reading frame changes. The example shows an insertion that results in a frameshift.

(164) (2). DNA in the cell's nucleus is a template for mRNA, which carries the information to the ribosome for translation. The new translated protein is further modified at the ER and Golgi body, respectively.

(165) (3). Deoxygenated blood enters the heart from the rest of the body via the anterior vena cava and then enters the right atrium. From there, blood is pumped into the right ventricle and into the lungs to become reoxygenated. Reoxygenated blood is then pumped into the left atrium from the lungs and into the left ventricle, where it is then pumped out into the rest of the body via the aorta.

(166) (4). Genetic information is stored in the form of DNA. DNA is composed of nucleotide base pairs, which are read as codons. Several codons compose one gene. Multiple genes are organized onto one chromosome.

(167) (3). The phyla Mollusca and Arthropoda do not exhibit radial symmetry; they are bilaterally symmetrical. Phylum Porifera demonstrates an asymmetrical body plan. Phylum Cnidaria does exhibit radial symmetry; however, this group lacks any skeletal form, leaving the only possible correct answer to be Echinodermata.

(168) (4). When homologous chromosomes fail to segregate during meiosis, the resulting gametes either lack that chromosome or possess an extra copy. This phenomenon is known as nondisjunction.

(169) (4). Wilting of plants is caused by decreased turgor pressure due to a lack of water in the central vacuole. Uptake of water by the vacuole causes it to expand and exert pressure on the cell wall.

(170) (4). Only in bryophytes is the haploid gametophyte the dominant generation.

(171) (1). Monocots have scattered vascular tissue within their stems, leaves with parallel venation, and fibrous roots. Netlike veins and taproots are features of dicots.

(172) (1). The cotyledons of a dicot seed form the first "leaves" of the germinating plant. These are not true leaves, but they are capable of photosynthesis.

(173) (2). $FADH_2$ and NADH are formed by reduction of FAD and NAD^+ in the Krebs cycle. These reduced compounds carry electrons to the cytochrome proteins of the mitochondrial membrane.

(174) (2). **(175) (1).** **(176) (1).** **(177) (2).**

(178) (2). Fasciculated root is a type of adventitious root. In this case, roots are swollen which occur in clusters from lower nodes of stems, e.g., *Asparagus, Dahlia*, etc.

(179) (1).

(180) (3). The given floral diagram is of Family Liliaceae. This family is a characteristic representative of monocot plants. Most plants of this family are good ornamentals, source of medicine, vegetables and colchicine.