MS-CIT
World-class Comprehensive Computer Course

Model Answer
Set- I
Std. – 10th EM/Semi
Subject – Science I

MKCL KLiC Courses
Gateway to Knowledge Lit Careers

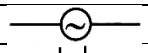
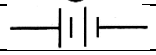
Time : 2 Hrs. **Marks : 40**

Q.1 (A) Choose the correct alternative from the given options:

1. b) yellow
2. c) foci
3. c) electric motor
4. c) different
5. c) at $2F_1$

Q.1 (B) Answer the following.

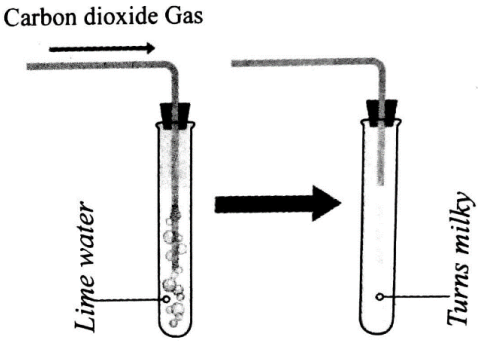
1. false
2. Mass.
   Mass is a scalar quantity while remaining are vector quantities.
3. Velocity changes
   *[**Explanation**: In reflection, light travels in same medium hence its velocity remains same. In refraction, light travels in different medium hence its velocity changes.]*
4.

Group A		Group B	
i)		a)	Alternating current
ii)		b)	Batter

5. EDUSAT

Q.2 (A) Give scientific reasons: (Attempt any two)

1. i) On heating, lime stone ($CaCO_3$) decompose to form calcium oxide and carbon dioxide gas.
   ii) When this CO_2 gas is passed through freshly prepared lime water [$Ca(OH)_2$] carbon dioxide gas reacts with lime water to form white precipitate of calcium carbonate.
   [$Ca(OH)_2$] (aq) + CO_2(g) → $CaCO_3$ + H_2 O(1)]
   Therefore, the lime water turns milky.

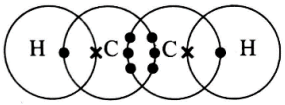


2. i) The retina in our eyes is made of different cells viz., rod-shaped and cone-shaped.
   ii) The rod shaped cells respond to intensity of light and send the information to brain. While cone shaped cells send information of different colours of light to the brain.
   iii) Rod like cells are sensitive for faint light also, whereas, the conical cells do not respond to faint light. Hence, one can sense colours only in bright light.
3. i) Fuel in the launch vehicle forms the major part of the total weight of the launch vehicle.
   ii) As a result, the vehicle has to carry large amount of weight in the form of fuel with it.
   iii) For the launch vehicles with more than one stage, the fuel in the first stage is used to give the initial thrust to the vehicle. After this fuel is exhausted, the empty fuel tank along with the engine is detached from the main body of the vehicle. This reduces weight of the vehicle step by step.
   Hence, it is beneficial to use satellite launch vehicles made of more than one stage.

Q.2 (B) Answer the following. (Any 3)

1. Structural formula of C_2H_2 : $\boxed{H-C\equiv C-H}$

   Electron-dot structure without showing circles: H :C ⋮⋮ C : H
   Electron-dot structure showing circles:



• Electron of carbon
× Electron of hydrogen

2. 1) Methanol (CH_3OH) the lower homologue of ethanol which is poisonous and consumption of even

small quantity of methanol can affect vision and at times can be lethal.
2) Therefore, to prevent the misuse of ethanol, it is mixed with the poisonous methanol. Such ethanol is called as denatured spirit.
3) A blue dye is also added to it, so that it is easily recognized.

3. ***Given:*** Specific heat of water (c) = 1 kcal/kg °C, Mass (m) = 5 kg, Change in temperature (ΔT) = 100 – 20 = 80 °C
To find: Heat energy (Q)
Formula: Q = m c ΔT
Calculation: According to principle of heat exchange, Energy supplied to water = Energy gained by water From formula,
$Q = 5 \times 1 \times 80 = 400$ kcal
Ans: Heat energy necessary to raise temperature of water is 400 kcal.

4. The given figure shows formation of mirage.
i) In summer, the air near the hot road or desert surface has very high temperature and hence it becomes lighter than the cool air above it.
ii) As, the density of air goes on decreasing with increase in height above the surface, the refractive index of air increases.
iii) Hence, the direction of light rays coming from a distant object keeps changing according to laws of refraction.
iv) This makes the light rays coming from distant object appear to come from an image of the object inside the ground as shown in the figure. This is called mirage.
v) Thus, formation of mirage is the effect of changing refractive index in the atmosphere

5.

	High earth orbits	**Low earth orbits**
i)	Height from the earth's surface for these orbits is greater than or equal to 35780 km.	Height from the earth's surface for these orbits is between 180 km and 2000 km.
ii)	Satellites revolving in these orbits take around 24 hours to complete one revolution around the earth.	Satellites revolving in these orbits take around 90 minutes to complete one revolution around the earth.
iii)	The satellites revolving in these orbits appear stationary with respect to earth.	The satellites revolving in these orbits do not appear stationary with respect to earth.
iv)	Critical velocity of satellites revolving in these orbits is higher than that of satellites revolving in low earth orbits.	Critical velocity of satellites revolving in these orbits is lower than that of satellites revolving in high earth orbits.
v)	Satellites revolving in these orbits can be used for carrying signals for telephone, television etc. and also in the applications like meteorology.	Satellites revolving in these orbits can be used for scientific experiments and atmospheric studies.
	Example: IBEX (Interstellar Boundary Explorer) revolves in this orbit.	**Example:** International space station and Hubble telescope revolve in these orbits.

Q.3 Answer the following questions. (Any 5)

1. i) The amount of heat energy absorbed at constant temperature by unit mass of a solid to convert into liquid phase is called the specific latent heat of fusion.
ii) The amount of heat energy absorbed at constant temperature by unit mass of a liquid to convert into gaseous phase is called the specific latent heat of vaporization.
iii) The ratio of actual mass of vapour content in the air for a given volume and temperature to that required to make the air saturated with vapour at that temperature is called the relative humidity.
2. Types of reactions with reference to oxygen and hydrogen are:
1. Oxidation reaction
1. The chemical reaction in which a reactant combines with oxygen or loses hydrogen to form the product is called oxidation reaction.
Eg. (i) C + O_2 C_2 (ii) Mg H_2 Mg + H_2
2. Oxidation also means losing one or more electrons. By losing electrons, the positive charge on an atom or an ion increases or the negative charge on them decreases. For example, in the conversion of ferrous sulphate to ferric sulphate, the net ion

reaction is $\underset{(Ferrous)}{Fe^{2+}}$ $\underset{(Ferric)}{Fe^{3+}}$

2. Reduction reaction

1. The chemical reaction in which a reactant gain hydrogen or loses oxygen to form the product is called reduction reaction.

Eg. (i) Vegetable oil (1) H_2(g) $\underset{Ni\ Catalyst}{\overset{60^0}{}}$ Vanaspati ghee(s)

(ii) O_3 + $\underset{light}{\overset{\Delta}{}}$ O_2 + [O]

2. Reduction also means gaining one or more electrons. By gaining electrons the positive charge on an atom or ion decreases or the negative charge increases.

Eg. $Ee_2\ O_3$ $\underset{oxidation}{\overset{reduction}{\rightleftharpoons}}$ Feo

3. a) When sulphur is burnt in air then sulphur dioxide gas is formed.
(i) Sulphur dioxide gas has no action on dry litmus paper.
(ii) Sulphur dioxide gas turns moist blue litmus paper to red (oxides of non metals are acidic in nature).
b) The balanced chemical equation is S(s) + O_2(g) → SO_2(g)

4. ***Given:*** Focal length (f) = 10 cm, object distance (u) = - 25 cm, height of the object (h_1) = 5 cm
To find: Image distance (v), height of the image (h_2)
Formulae: i. $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$ ii. $\frac{h_2}{h_1} = \frac{v}{u}$
Calculation: From formula (i),

$\frac{1}{10} = \frac{1}{v} - \frac{1}{-25}$

∴ $\frac{1}{v} = \frac{1}{10} - \frac{1}{25} = \frac{5-2}{50}$

∴ $\frac{1}{v} = \frac{3}{50}$

∴ v = 16.7 cm

As the image distance is positive, the image formed is real. From formula (ii),

$\frac{h_2}{5} = \frac{16.7}{-25}$

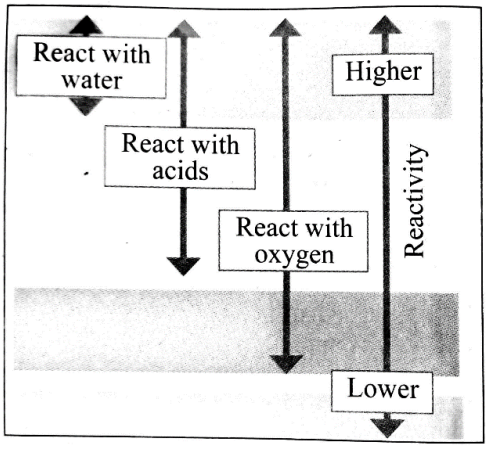
∴ h_2 = - $\frac{16.7}{25} \times 5 = -\frac{16.7}{5}$

∴ h_2 = **- 3.3 cm**

The negative sign indicates that the image formed is **inverted.**

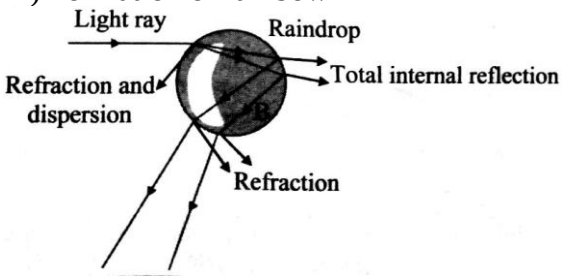
Ans: The **real, inverted** image of height **3.3 cm** is formed at **16.7 cm.**

5. 1. Reactivity of all metals not the same.
2. The relative reactivities of all metals are determined by the displacement reaction of metals with solutions of salts of other metals.
3. The arrangement of metals in the increasing or decreasing order of reactivity is called the reactivity series of metals.
4. Scientists have develop the reactivity series by performing many experiments of displacement reaction.
5) Based on their reactivity, metals are classified as highly reactive metals. Moderately reactive metals and less reactive metals.



Reactivity series of metals

6. i) The natural process shown in the figure is formation of rainbow.
   ii) The phenomena observed in this process are refraction, internal reflection and dispersion of light.
   iii) Formation of rainbow



7. i) Centripetal force
   ii) Acceleration due to gravity
   iii) Height from surface of earth
8. 1) The phenomenon is known as structural isomerism.
   2) The compounds are called as isomers.
   3) The number of carbon compounds increases due to the isomerism observed in carbon compounds.

Q.4 Answer the following questions. (Any 1)

1. a) The elements O, B, C, N, Be and Li belongs to the second period.
   b)

Elements	Li	Be	B	C	N	O
Atomic radius (pm)	152	111	88	77	74	66

   c) yes, the arrangement matches with the arrangement of the second period of the modern periodic table.
   d) The size of an atom is indicated by its radius. Hence, Lithium (Li) with atomic radius 152 is the biggest atom and Oxygen (O) with atomic radius 66 is the smallest atom.
   e) From the above arrangement of elements with their atomic radii, we find that the atomic radius (or atomic size) decreases on moving from left to right in a period of the periodic table.
2. i) The direction of force exerted on the current carrying conductor can be determined using Fleming's left hand rule.
   ii) Electric motor operates using this rule.
   iii) Working of electric motor:
   iv) Devices which work using electric motor are fans, mixers, washing machines, pumps.