# N 714

Seat No. ☐☐☐☐☐☐

2025  XII  27 1100      – N 714 –      SCIENCE & TECHNOLOGY PART I (71)

## (REVISED COURSE)

Time : 2 Hours        (Pages 4)        Max. Marks : 40

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## --- MODEL ANSWER ---

**Q.1(A) Choose the proper alternative and fill in the blanks:**     **5**

**(1)** Ans. (c) will move along a straight line tangential to the circular path.

**(2)** Ans. (d) Democritus

**(3)** Ans. (a) Specific heat of object

**(4)** Ans. (d) direction

**(5)** Ans. (c) zinc

**(B) Attempt the following:**     **5**

**(1) Find the odd one out:**     **1**

Ans. Sodium

**(2) State 'True' or 'False', if 'False' correct it:**     **1**

Ans. False

**(3) Write the correlated terms:**     **1**

Ans. Newton

**(4) Name the following:**     **1**

Ans. Latent heat of fusion

**(5) Answer the following in one line:**     **1**

Ans. Farsightedness or hypermetropia

**Q.2(A) Give reasons:(Any Two)**          **4**

**(1)** Ans. 1. While going from left to right within a period, the atomic number increases one by one, meaning the positive charge on the nucleus increases by one unit at a time.

2. The additional electron gets added to the same outermost shell.

3. Due to the increased nuclear charge the electrons are pulled towards the nucleus to a greater extent and thereby the size of the atom decreases.

**(2)** Ans. 1. Joule is a very small unit and the energy consumption in day to day life is very large i.e. it comes in figures of $10^6$ to $10^8$.

2. Thus, to reduce the complexity of handling such large figures, a bigger unit i.e. kWh is use for the measurement of electrical energy and it is related to joule as

1 kWh = $3.6 \times 10^6$ J

3. Hence, the energy reading commercially became simpler by using this bigger unit instead of joule.

**(3)** Ans. 1. In the electrolysis of alumina, graphite rod is used as anode.

2. During the electrolytic reduction of alumina, aluminium is produced at the cathode and oxygen gas is evolved at the anode.

3. This gas reacts with the graphite rods (anode) and forms carbon dioxide.

$C + O_2 \rightarrow CO_2$ (g)
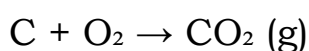
4. Thus, the graphite rods are continuously eroded.

5. Hence, the graphite rods i.e. anodes be replaced from time to time during the electrolysis of fused alumina.

**(B) Answer the following:(Any Three)**          **6**

**(1)** Ans. R =?

P = 100 W

I = 3 A

R = P / $I^2$

R = 100/ 3 X3 = 11.11 Ω

The value of the resistance is 11.11 Ω.

**(2)** Ans. Rays travelling parallel to the principal axis of concave lens diverge after refraction in such a way that they appear to be coming out of a point on the principal axis. This point is called the principal focus of the concave lens.

**(3)** Ans. (i) One

(ii) Carbon dioxide

**(4)** Ans. i. Elements in period 3: $_{14}$S, $_{15}$P

ii. Electronic configuration:

$_{14}$S : 2, 8, 4

$_{15}$P : 2, 8, 5

**(5)** Ans. There are three types of telescopes are orbiting around the earth:

i. Optical Refractive Telescope

ii. Optical Reflecting Telescope

ii. Radio Telescope

Telescopes are placed out into space to get a clearer and brighter image of the Universe.

## Q.3  Answer the following:(Any Five)                                       15

**(1)** Ans. (i) The masses of the objects are $m_1$ and $m_2$.

(ii) The distance between the two centers is "d".

(iii) The gravitational force (F) between them would be,

$F = G\, m_1 m_2 / d^2$

$$F \,\alpha\, \frac{m_1 m_2}{d^2}$$

$$\therefore F = \frac{G m_1 m_2}{d^2}$$

(iv) Gravitational constant is proportionality constant. It does not depend upon the nature and size of the bodies and also irrespective

of the nature of the medium between two bodies; hence it is called universal constant.

(v) If the mass of one of the objects is doubled, then the gravitational force between them will also become double.

(vi) The value of 'G' is $6.673 \times 10^{-11}$ Nm²/ kg² in SI unit.

**(2)** Ans. we know,

$$n = \frac{c}{v}$$

$$= \frac{3 \times 10^8}{1.5 \times 10^8} = 2$$

so the absolute refractive index of the medium is 2

**(3)** Ans. $P_1 = 100$ W, $P_2 = 60$ W, V= 220 V, I =?

Therefore, $I = P/V$

$P = VI$

Therefore, $I_1 = P_1/V$ and $I_2 = P_2/V$

Current in the main conductor, $I = I_1+I_2$ (parallel connection) = $P_1/V+ P_2/V = P_1+P_2/V = 100 + 60/220 = 160/220= 0.727$ A = nearly 0.73 A

**(4)** Ans. Mass of Ice = 2 kg = 2000 g

Thus, Mass of water at 20°C = 2 kg.

Specific Heat Capacity of Water = 1Cal /g °C

Change in temperature (Δt) = (20 - 0)

= 20 °C

Thus, Amount of heat energy required to convert water at 20° to 0° C

= mass × Specific Heat Capacity × Change in temperature

= 2000 × 1 × 20

= 40000 cal

Latent Heat of Fusion of Ice = 80 cal/g.

Amount of Heat Energy Required to convert water into ice at 0°

= mass × Latent Heat of Fusion

= 2000 × 80

= 160000 cal

Thus, Total Heat Energy = 160000 + 40000

= 200000 cal.

Let the Mass of the Ammonia be m g.

We know the Latent heat of Vaporization of Ammonia = 341 cal/g.

By the Principle of Calorimetry,

Heat Given By m g of ammonia in Vaporization = Heat taken by the Water to change into Ice.

⇒ m × 341 = 200000

⇒ m = 200000/341

⇒ m = 586.51 gm

Thus, the mass of the ammonia required is 586.51 grams.

**(5)** Ans. i) Refracting telescope.

Ii) It is used to view distant objects clearly in their magnified forms.

Iii) Objective lens has larger diameter and larger focal length so that maximum amount of light coming from distant object can be collected.

**(6)** Ans. More reactive :- Li, Na,Mg, Ca

Less reactive:- Cu

Moderately reactive:- Zn, Fe

**(7)** Ans. Stages involved in launching of satellite through a space shuttle are as follows:

i. The space shuttle is set vertical on the ground with booster rockets, fuel tank and a satellite to be launched placed on top of it. This is represented in figure B.

ii. The space shuttle is launched and taken to desired height with the help of booster rockets. These rockets are then detached from the space shuttle. This is represented in figure C.

iii. After reaching the desired height, fuel in the fuel tank is used to impart the specific velocity (critical velocity) to the shuttle and then the tank is detached from it. This is represented in figure A.

iv. When the satellite starts moving with the critical velocity, the space shuttle is detached from it and returns to the earth, while satellite starts orbiting in its designated orbit. These stages are represented in figures E and D respectively.

Thus, the correct sequence of the stages can be represented as:

$B \rightarrow C \rightarrow A \rightarrow E \rightarrow D$

**(8)** Ans. i) Dispersion of light: The process of separation of light into its component colours while passing through a medium is called the dispersion of light.

Ii) Red colour

iii) Violet colour

## Q.4 Answer the following:(Any One) 5

**(1)** Ans. 1. In any chemical equation, if the number of atoms of the elements in the reactants is same as the number of atoms of the elements in the products then such an equation is called a balanced equation.

2. Law of conservation of mass

3. If the number of atoms of each element is not the same on the two sides of an equation then such an equation is called an unbalanced equation.

4. The property required for balancing is the law of conservation of mass in which the total mass of each of the elements in the reactants is same as the total mass of each of the respective elements in the products.

**(2)** Ans. a) A-Ethanol, B-Ethanoic acid

b) Ethyl ethanoate

c) Esterification reaction

d) Gasohol

e) Vineger

**....All The Best....**