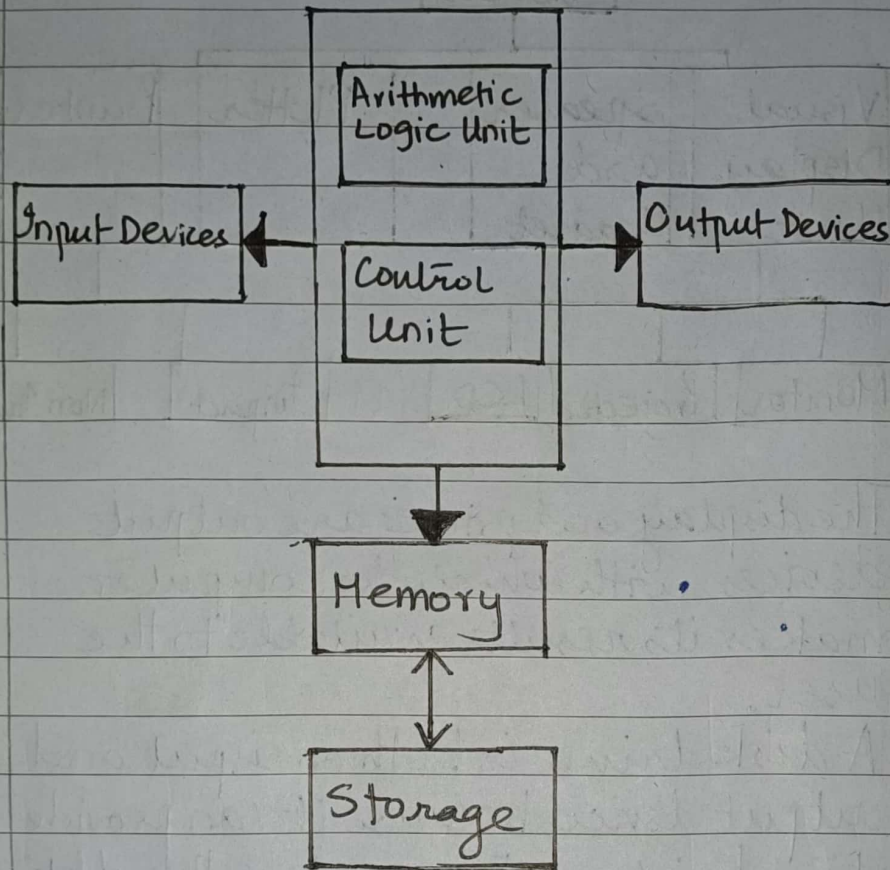
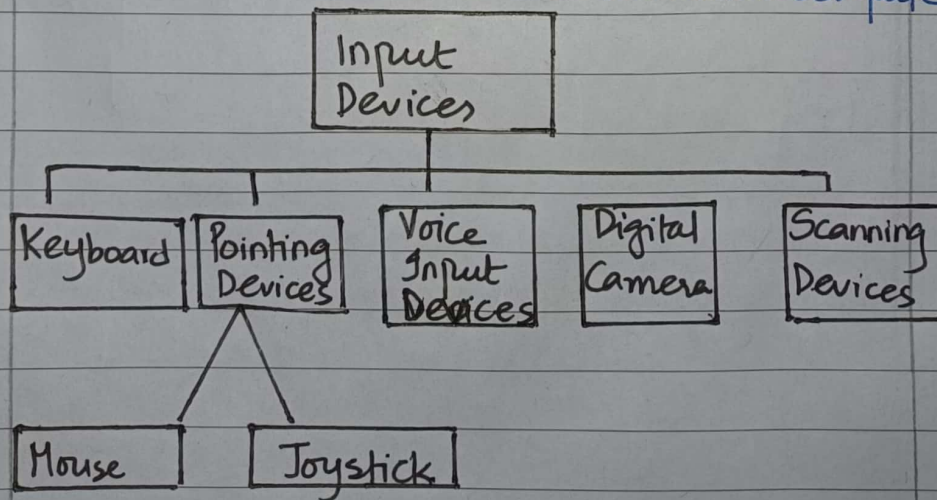


Question 5

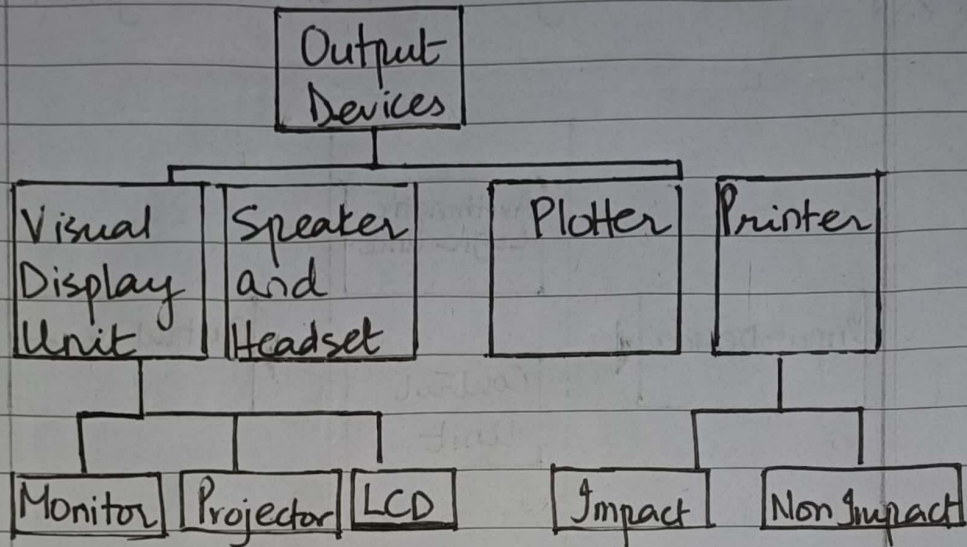
(a) Schematic Diagram of a Computer System



Input Devices : Permit the computer, ^{user} to communicate with the computer



Output Devices : can be in hard or soft copy.



The display and printer are output devices with which the computer makes its results available to the user.

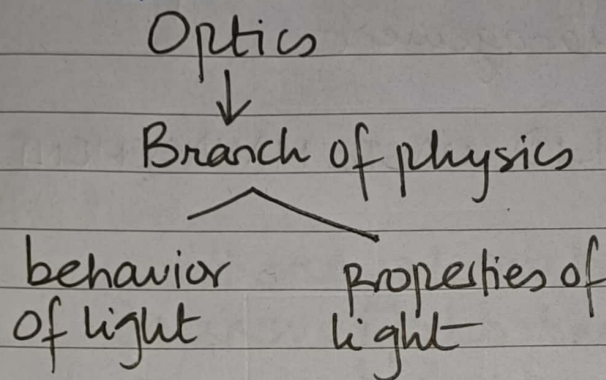
A disk drive is both an input and output device because it can provide stored information or store the data after processing.

(b) Define optics. How does an optical fibre work?

I

OPTICS

It is the branch of physics that studies the behaviour and properties of light, including its interactions with matter and the construction of instruments that use or detect it.



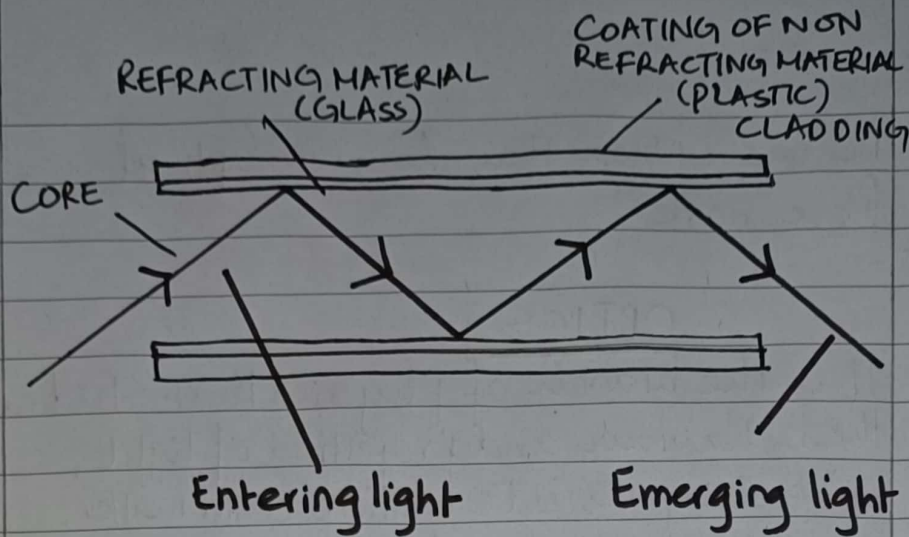
II (a)

OPTICAL FIBRE

Optical Fibre refers to the medium and the technology associated with the transmission of information as light pulses along a hollow glass tube or plastic wire or fibre.

(b) Working of fibre Optics - Total Internal Reflection

When light enters or hits glass at a really shallow angle of less than 42 degrees, it reflects back in again.



(C) Discuss different methods of Solid Waste Management.

SOLID WASTE MANAGEMENT

I

“Solid wastes are the discarded leftovers of our advanced consumer society...”

[Jimmy Carter]

Solid Waste Management (SWM) refers to the systematic management of the generation, collection, transfer, treatment, recycling, recovery and disposal of solid waste.

II

The activities associated with the management of municipal solid waste can be grouped into the following,

(a) Waste generation

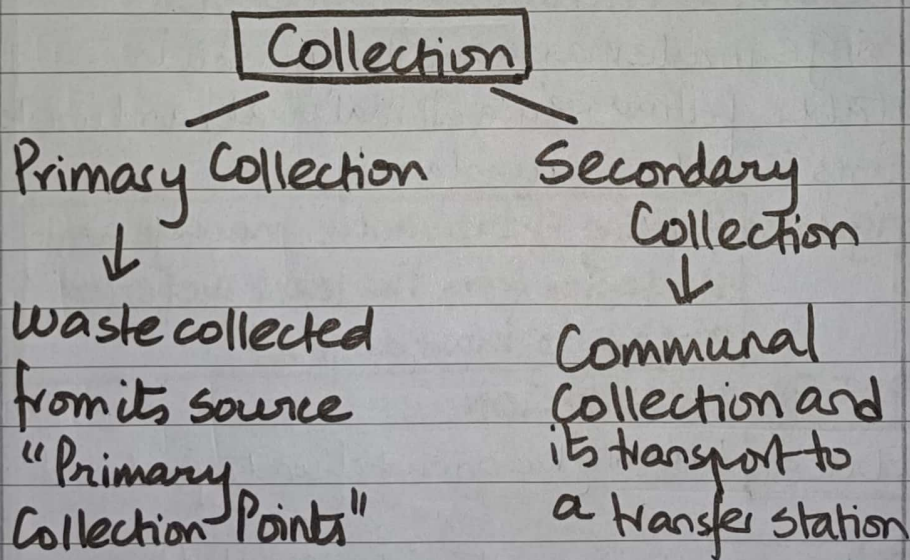
Waste generation encompasses activities in which materials no longer considered of value are either thrown away or gathered together for disposal.

(b) Waste handling and sorting, storage and processing at the source

These are activities associated with the management of wastes until they are gathered or placed in bags or storage containers for collection.

(c) Collection

This includes the gathering and transport of solid wastes and recyclable materials through two stages,



- (d) Sorting, processing and transformation
- (e) Transfer and Transport
- (f) Waste Disposal - final placement of solid waste

Transfer and Transport

(i) Transfer of wastes from the secondary collection point to the larger transfer point

(ii) Subsequent transport of the wastes, usually over long distances to a processing or disposal site

III

Waste Hierarchy Concept

No single waste management approach is suitable for managing all materials and waste streams in all circumstances

figure: Ranking of the various management strategies from the least preferred at end to most at first

MOST FAVOURED OPTION

REDUCE Lowering the amount of waste produced

↳ **REUSE** Using materials repeatedly

↳ **RECYCLE** Using materials to make new products

↳ **RECOVERY** Recovering energy from waste

↳ **LANDFILL** safe disposal of waste to landfill

Least favoured option

(d) Distinguish GPS & GIS.

GLOBAL POSITIONING SYSTEM (GPS)

It is a satellite based navigation system made up of a network of 24 satellites.

Working of GPS

GPS satellites circle the earth twice a day in a very precise orbit and transmit signal information to earth.

GIS is an Integrating Technology

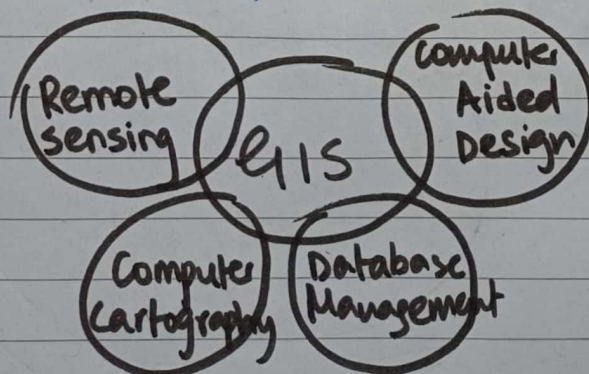
Geographic information systems have served an important role as an integrating technology. With GIS it is possible to,

map

↓
model

↓
query

↓
analyse large quantities of data in a single database.



Question 4

(a) Pesticides

Pesticides are chemical substances that are meant to kill pests.

Herbicides

Herbicides are used to destroy unwanted vegetation; they are a substance that is toxic to plants.

Insecticides

An insecticide is a type of pesticide that is used to kill insects.

Ceramics

A ceramic is an inorganic, non-metallic solid material comprising metal, non-metal or metalloid atoms primarily held in ionic and covalent bonds.

Two types of Ceramics

Crystalline

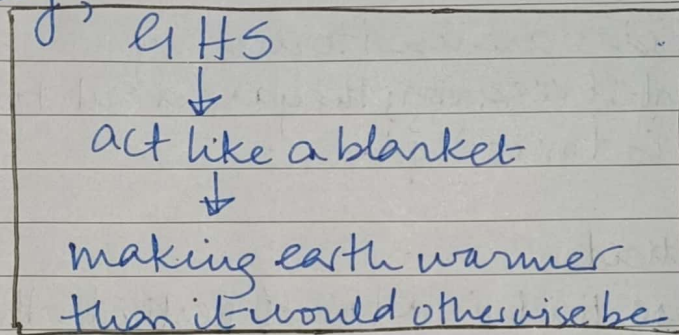
↓
not amenable to a great range of processing

Non crystalline

↓
Glass, tend to be formed from melts

Green House Effect

Greenhouse gases (GHGs) like water vapour (H_2O), Carbon Dioxide (CO_2) and Methane (CH_4) absorb energy, slowing or preventing the loss of heat to space. In this way,

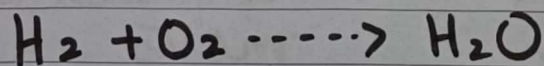


This process is known as greenhouse effect.

(b) Explain the bonding in water molecule

Elements that make water

Water is formed when two atoms of hydrogen combine with one atom of oxygen.



Covalent Bonds

Covalent bonding joins the elements that make water. This involves the sharing of a pair of valence electrons by 2 atoms.

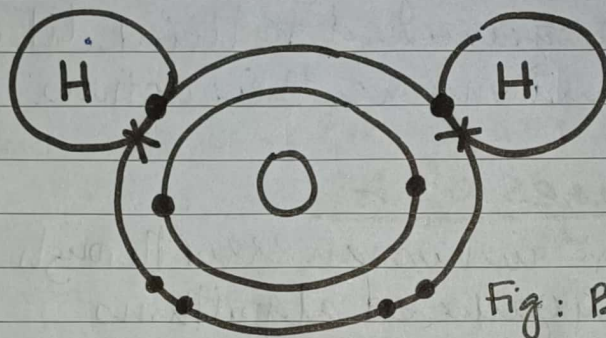


Fig: Bonding in water

Each hydrogen atom is covalently bonded to oxygen through a shared pair of electrons.

- (C). What types of waves are used in RADAR, SONAR, LIDAR, Mobile Phone and Thermistors?

RADAR

Uses radio waves in its object-detection system.

SONAR

Uses sound waves to explore and map the ocean.

(d) Advantages and disadvantages of AI

Artificial Intelligence - Machine Learning based

Artificial Intelligence is the simulation of human intelligence in machines that are programmed to think like humans and mimic their actions.

Advantages of AI

- (i) Reduction in human error through previously gathered algorithms
The decisions taken by AI in every step is decided by information previously gathered and a set of algorithms that are specific. When programmed properly, these errors can be reduced to null.
- (ii) Digital Assistance to deliver user-requested content
AI helps some of the most technologically advanced companies engage with users using digital assistants which eliminates the need for human personnel.
- (iii) New Inventions
In practically every field, AI is the driving force behind numerous

innovations that will aid humans in resolving majority of challenging issues.

Example - Detecting breast cancer at an early age through AI tools

Disadvantages of AI

(i) The data stored in AI database is mostly biased. Studies show that a significant amount of data stored in AI machines and its processing is skewed to a certain discourse.

Example - Western discourse and data which can lead to racial discrimination and unsatisfactory solutions for the rest of the world

(ii) Replacing human resource means hampering employment opportunities. It is said that every AI machine replaces 4 human personnel. This leads to jobs lost and difficulties for human survival.

Section II

Question 6

a. Let, x be the length of shorter piece.

Longer piece, will be $4x$.

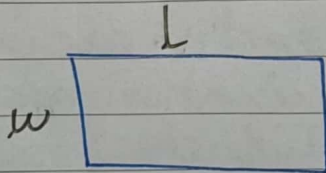
$$\begin{aligned}x + 4x &= 300 \\5x &= 300 \\x &= 60\end{aligned}$$

$$\boxed{\text{Shorter piece} = 60 \text{ ft}}$$

$$\text{Longer piece} = 60(4)$$

$$\boxed{\text{Longer piece} = 240 \text{ ft}}$$

b.



$$L = 3 + 2(w) \quad \text{--- (1)}$$

$$\text{Perimeter} = 20 \text{ inches}$$

$$\text{Perimeter of a rectangle} = 2L + 2w$$

$$20 = 2L + 2w \quad \text{--- (2)}$$

→ So we have 2 simultaneous equations and will solve them for the dimensions.

$$l = 3 + 2w$$

$$20 = 2(3 + 2w) + 2bw$$

$$20 = 6 + 4w + 2w$$

$$20 = 6 + 6w$$

$$14 = 6w$$

$$w = \frac{14}{6}$$

$$w = \frac{7}{3}$$

$$l = 3 + 2\left(\frac{7}{3}\right)$$

$$l = 3 + \frac{14}{3}$$

$$l = \frac{9 + 14}{3}$$

$$l = \frac{23}{3}$$

dimensions of the rectangle are:

$$\begin{array}{l} \text{length} = \frac{23}{3} \text{ inches} \\ \text{width} = \frac{7}{3} \text{ inches} \end{array}$$

c. Let total matches played = x

$$\text{won: } \frac{60}{100} \times x$$

lost: 24 matches

$$x - \frac{60x}{100} = 24$$

$$\frac{100x - 60x}{100} = 24$$

$$40x = 2400$$

$$x = \frac{2400}{40}$$

$$x = \frac{2400}{40}$$

$x = 60$ matches were played in total

d. $3 : 2$

$$3x : 2x$$

$$3x + 2 : 2x + 6 = \frac{4}{5}$$

$$\frac{3x + 2}{2x + 6} = \frac{4}{5}$$

$$5(3x + 2) = 4(2x + 6)$$

$$15x + 10 = 8x + 24$$

$$15x - 8x = 24 - 10$$

$$7x = 14$$

$$x = 2$$

$$\begin{aligned} \text{First number is } & 2(x) \\ & = 2(2) \\ & = \underline{4} \end{aligned}$$

$$\begin{aligned} \text{Second number is } & 3(x) \\ & = 3(2) \\ & = \underline{6} \end{aligned}$$

Question 7

a. Percentage = $\frac{\text{occupied seats} \times 100}{\text{total seats}}$

$$= \frac{325}{400} \times 100$$

$$= \frac{325}{400} \times 100$$

$$= 325$$

b. 30 persons - 40 kg - 10 days
80 persons - 320 kg - x

$$30 \times 320 \times x = 80 \times 40 \times 320 \times 10$$

$$9600x = 10240$$

$$x = \frac{10240}{9600}$$

$$x = \frac{10240}{9600}$$

$$x = \frac{1024}{960}$$

$$\lambda = \frac{1024}{960}$$

$$\lambda = \frac{512}{480}$$

$$\lambda = \frac{256}{240}$$

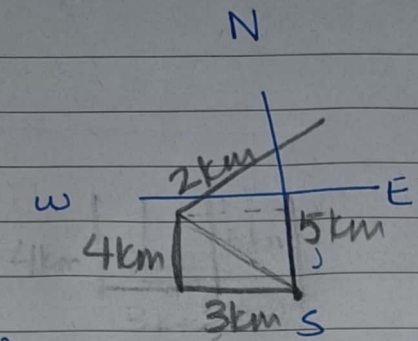
$$\lambda = \frac{128}{120}$$

$$\lambda = \frac{32}{30}$$

$$\lambda = \frac{16}{15}$$

$$\lambda =$$

(C.)



Pythagorean theorem: $(\text{hypotenuse})^2 = (\text{base})^2 + (\text{perpendicular})^2$

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

$$16 + 9 = x^2$$

$$25 = x^2$$

$$x = 5 \text{ km}$$

(d) Volume of cylinder $= \pi r^2 h$

$$\text{Volume} = \pi (10)^2 (36)$$

$$\text{Volume} = \frac{22}{7} (10)^2 (36)$$

$$\text{Volume} = \frac{22}{7} (100) (36)$$

$$= \frac{22 (3600)}{7}$$

$$= \frac{79200}{7}$$

$$\begin{array}{r} 1031 \\ 7 \overline{) 79200} \\ \underline{7} \\ 09 \\ \underline{7} \\ 20 \\ \underline{21} \\ 10 \\ \underline{7} \\ 30 \end{array}$$