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05d.

General knowledge - I
General science & Ability.

part II.

Section # 1

Question #04

a)

Pesticides:

A pesticide is any substance or mixture of substances intended for preventing, destroying, repelling or mitigating any pest. Pest can be defined as any organism that causes economic losses to mankind. These include insects, weeds, rodents & worms etc.

Herbicides:

An agent, usually chemical, for killing or inhibiting the growth of unwanted plants, such as residential or agricultural weeds & invasive species. Herbicides also commonly known as weed killers.

Ceramics:

Ceramics is an organic non-metallic solid made up of clay that have been shaped & then hardened by heating to high temperature. For example: tiles, bricks, plates, glass, wares, automobiles, airplanes, etc.

(c) Radar: uses radio waves, specifically micro-waves, for its operation

Sonar: uses sound waves, typically in ultra-sonic range to navigate & locate objects underwater.

Lidar: Employ laser light to measure distance & create detailed, 3 dimensional maps of environment.

Mobile phones: uses radio wave for wireless communication

Thermistors: Resistors whose resistances changes significantly with temperature. They do not use waves.

(d) Advantages of AI:

- 1- AI is more efficient. It can perform repetitive task, analyze large data sets & execute complex computation faster than human.
- 2- AI system can achieve high level precision & accuracy, reducing errors commonly associated with human tasks.
- 3- AI system can allow continuous operation ~~etc~~ & responsive B2C customer services.

4- AI plays important role in criminal justice
e.g. face recognition, predictive policing,
pattern recognition, text analysis, biometric
analysis etc.

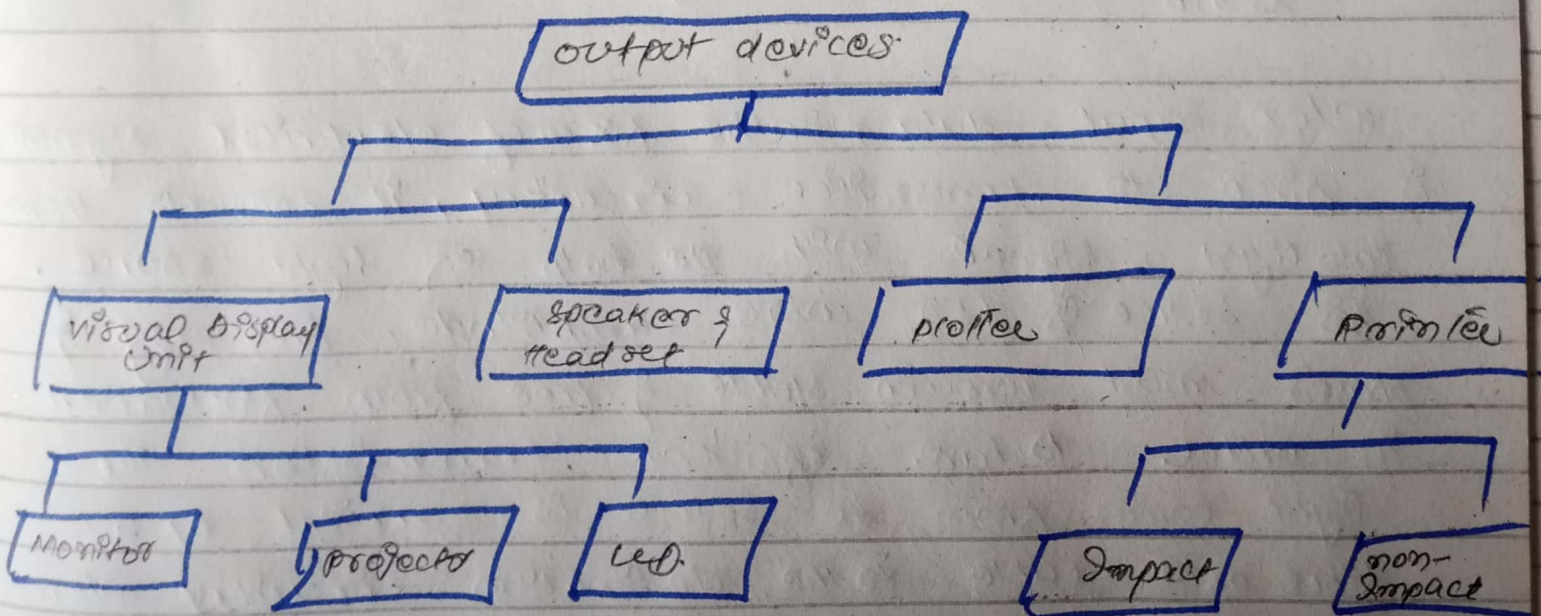
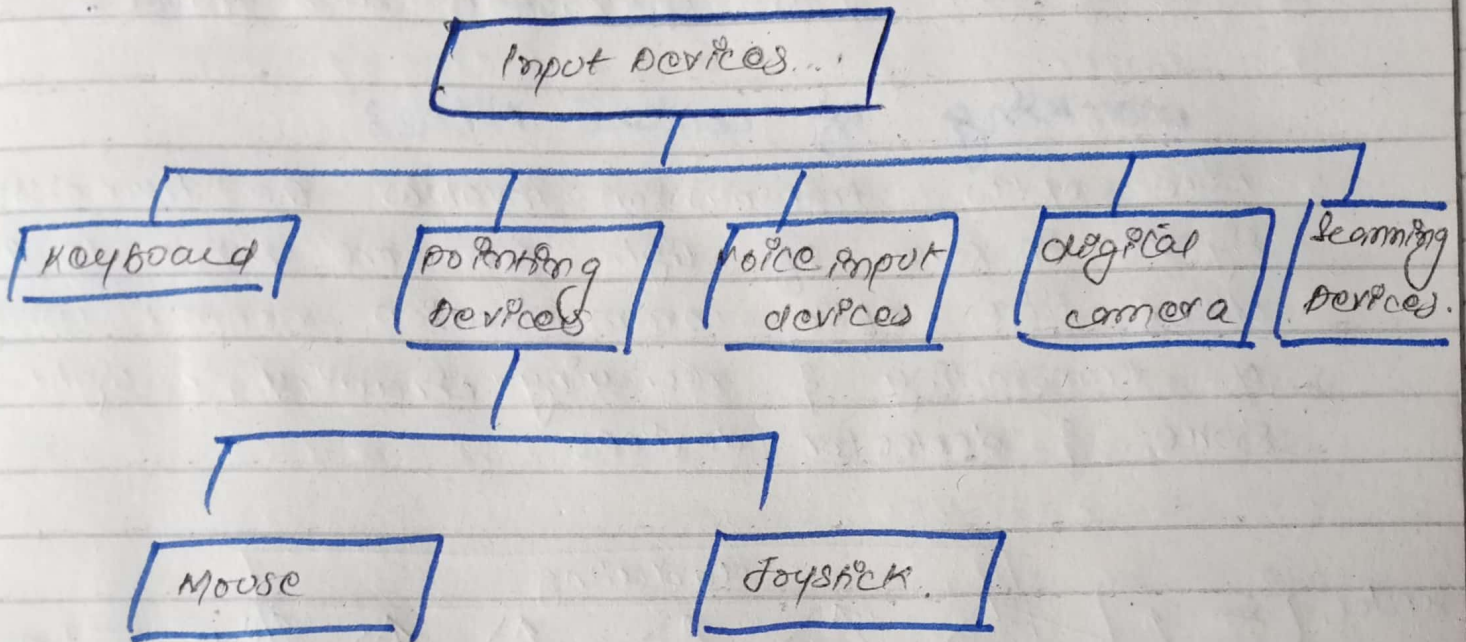
5- AI enables the development of innovative
technologies & applications such as self-driving
cars, personalized recommendations & advanced
medical diagnostics.

Disadvantages of AI

- 1- Automation driven by AI can lead to job displacements.
- 2- AI lacks true creativity & intuition struggling with tasks that require genuine human understanding, innovation & emotional intelligence.
- 3- security concerns like creation of deepfakes, cyberattacks & manipulation of AI algorithms for harmful purposes.
- 4- over reliance on AI system, especially in critically area like healthcare or finance; raises concerns about system failure, errors or manipulations that could have serious consequences.

Question #05.

(a) Block diagram of input & output devices:



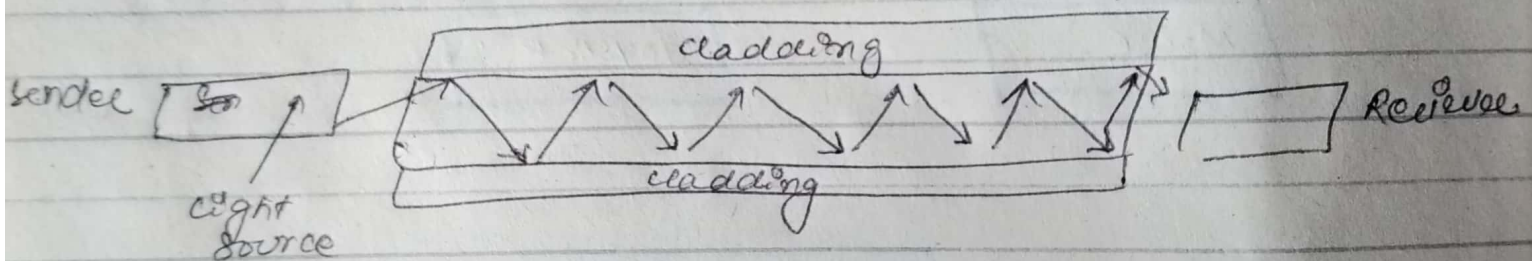
(b)

OPTICS:

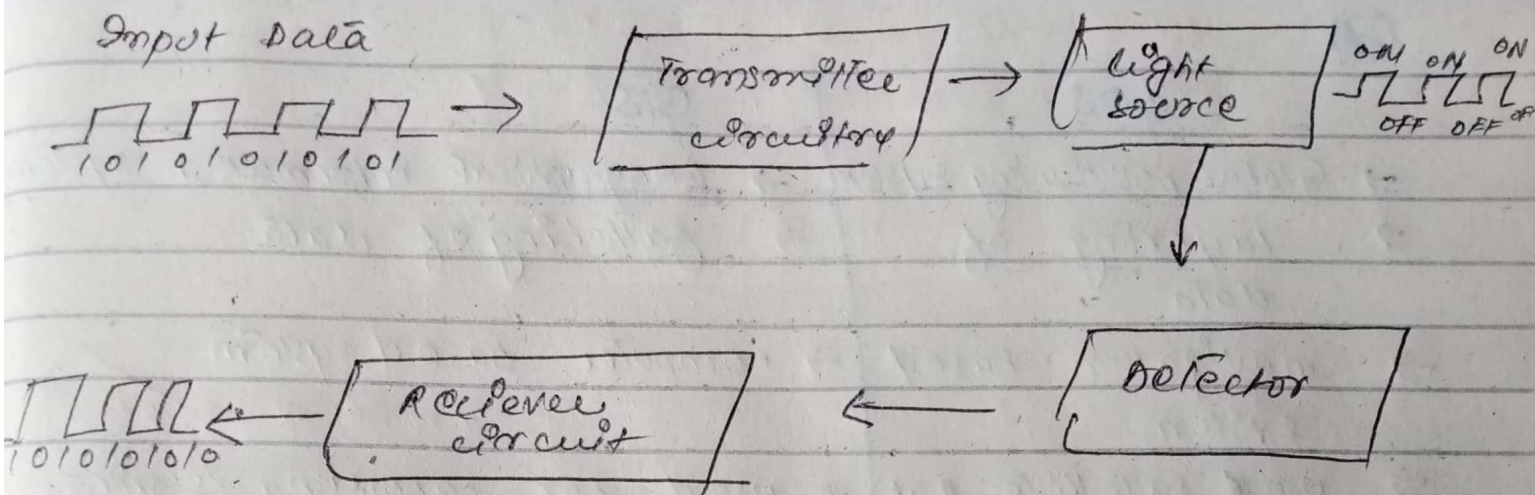
branch of physics that deals with the study of light & its interaction with matter.

working of optical fibre:

Fibre optic transmission involves the transmission of signals in form of light from one point to the other. Fibre optic communication network consist of transmitting & receiving circuitry, a light source & detector devices.



When input data, in the form of electrical signal, is given to transmitter circuitry, it converts them into light signal with the help of light source. This source of LED whose amplitude, frequency & phases must remain stable & free from fluctuation in order to have efficient transmission. The light beam from the source is carried by a fibre optic cable to the destination circuitry where the information is transmitted back to electrical signal by a receiver circuit.



The receiver circuit consist of photo detector along with a appropriate electronic circuit which is capable of measuring magnitude, frequency & phase of optic field.

(4) Methods of Solid Waste Management:

- 1- Land filling: Disposal of waste in landfills is a traditional method. However, modern landfills incorporate liners & sys to capture & treat leachate & gases to reduce environmental contamination
- 2- Recycling: Recycling involves the collection & processing of material to create new products
- 3- Composting: organic waste can be composted to produce nutrient rich compost.
- 4- waste-to-energy: Technologies like incineration & gasification can be used to generate energy from waste.
- 5- Biological Treatments: Methods like anaerobic digestion involve the break down of organic waste by microorganism

(d)

GPS

- Global positioning system
- layering of data
- navigation based system
- used satellites that orbit the Earth to send information to GPS receiver that are on ground.

GIS

- Geographical information system
- gathering of data
- computer based system
- used for capturing, storing, analyzing & visualizing geospatial data.

SECTION - II

Question #06

a) shorter length piece = x

longer piece = $4x$

lengths sum = 300 ft.

$$x + 4x = 300$$

$$5x = 300$$

$$x = 60$$

$$\text{longer length} = 4x = 4 \times 60 = 240$$

b)

$$L = 2w + 3$$

$$p = 2L + 2w$$

In this case, the perimeter is given as 20 inches

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

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

$$20 = 6w + 6$$

$$6w = 14$$

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

$$\text{width} = \frac{7}{3} \text{ inches.}$$

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

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

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

$$w = \frac{7}{3} \quad l = \frac{23}{3}$$

c)

$$0.6x + 24 = x$$

$$x = \frac{24}{0.4}$$

$$x = 60$$

60 matches during the year.

d)

$$\frac{3x + 2}{2x + 6} \times \frac{1}{5}$$

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

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

$$7x = 14$$

$$x = 2$$

$$\begin{aligned} \text{1st number} &= 3x = 3 \times 2 = 6 \\ \text{2nd number} &= 2x = 2 \times 2 = 4 \end{aligned}$$

$$\text{Two numbers} = 6 \text{ \& } 4$$

Question #07:

$$\text{a) \% age attendance} = \left(\frac{\text{Number of seats occupied}}{\text{Total capacity}} \right) \times 100$$

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

$$= \frac{13}{16} \times 100$$

$$\% \text{ age attendance} = 81.25$$

$$\text{b) } \frac{\text{Person}_1}{\text{Days}_1} = \frac{\text{Person}_2}{\text{Day}_2}$$

$$\frac{30}{10} = \frac{80}{x}$$

$$30x = 800$$

$$x = \frac{800}{30}$$

$$\text{Days}_2 =$$

$$\frac{\text{Person}_2 \times \text{Total sugar}_2}{\text{Person}_1 \times \text{sugar per day}_1}$$

$$\text{Day}_2 = \frac{80 \times 320}{30 \times 40}$$

$$\text{Day}_2 = \frac{25600}{1200}$$

$$\text{Day}_2 = 21.33$$

c) $b = 5 \text{ km (south)} - 3 \text{ km (west)} = 2 \text{ km}$
Distance = $\sqrt{a^2 + b^2 + c^2}$

$$\text{Distance} = \sqrt{5^2 + 2^2 + 4^2}$$

$$\text{Distance} = \sqrt{45}$$

$$\text{Distance} \approx 6.71 \text{ km}$$

d)

$$V = \pi r^2 h$$

$$V = \pi (10)^2 \times 36$$

$$V = 3600 \pi \text{ cm}^3$$