GK - 03

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QUESTION : 01

Explain working principle of optic fiber and enlist importance.

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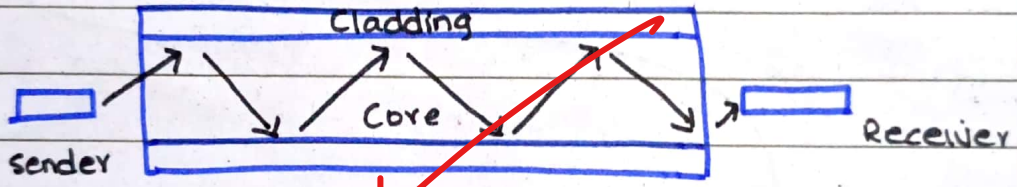
OPTICAL FIBER :

Optical fibre is defined as;

The medium and technology associated with transmission of information along the path of light of hollow sphere of glass or plastic.

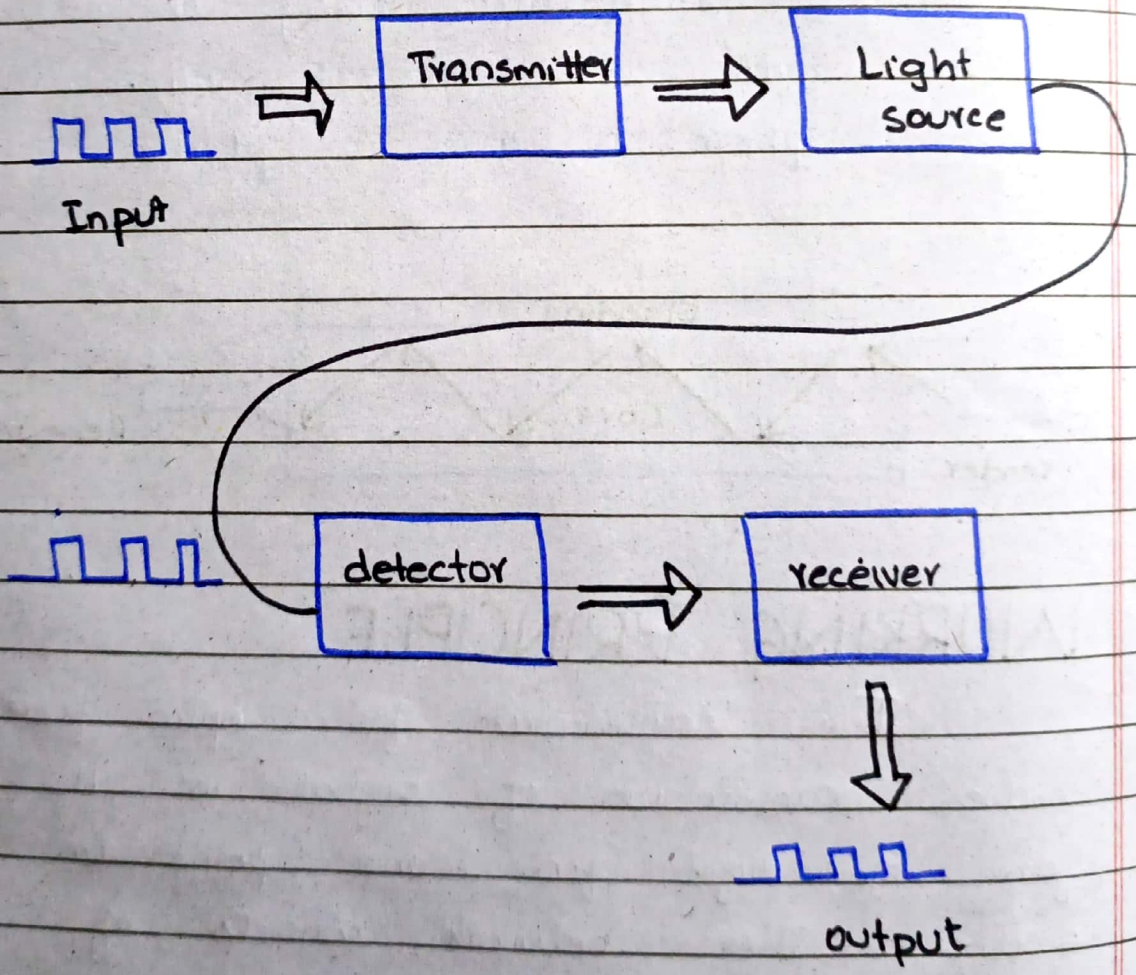


WORKING PRINCIPLE = Total internal Reflection

The transmission from optic fibre invdues transmission of signals in the form of light from one point to anothes. The network consists of transmitting and receiving circuitary, light source and detectors.

Working PTO

When the input in the form of electrical signals is given to the transmitter circuitary, it converts them into light signal. The LED source is efficient for transmission. The light beam from the source is carried by fibre optic cable to the final circuitary, where the information is transmitted back to receiver circuit.



The receiver circuit comprises of photo detector along the electronic circuit capable to measure frequency and

magnitude of optic fibre.

IMPORTANCE OF OPTIC FIBRE

Sustainable Technology

The fibre optic consumes less and low energy than the copper cables. It reduces carbon emission in communication networks.

Telecom companies like AT & T are upgrading networks to optics by reducing energy consumption by 60%.

Bandwidth Capacity

Optic fibre have massive bandwidth for high internet speed and voice services over single infrastructure.

Electromagnetic Interference

Fibre optics can work very efficiently even in any outside noises because they are immune to electromagnetic interference.

Tensile Strength

They are more flexible and can resist corrosive elements.

Long Connectivity

The single mode fibre optics transmit data over long distance with minimal signal loss.

Energy Efficient

The minimal signal losses, results in less power and reducing operational costs.

Secure Medium

Fibres are most secure mediums for carrying sensitive data as they do not radiate electro-magnetic energy.

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QUESTION : 01

(B)

CELL PHONE COMMUNICATION :

Cell phone is a telecommunication device that uses radio waves over a networked registered area, enabling calls to transmit wirelessly. It comprises of various parts like RAM ROM, antenna, battery microphone, speaker, circuit board and LCD.

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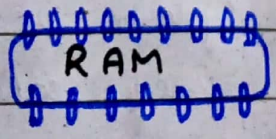
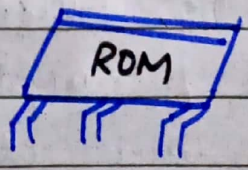
QUESTION : 01

(D)

DIFFERENTIATION

RAM	ROM
Definition	
Random Access Memory is a temporary memory that stores data	Read Only Memory is permanent memory that stores essential programs.
Function	
Provides fast temporary storage for activities	Stores firmware and system instruction for booting
Volatility	
Volatile memory, when power is off, data is lost	Non-volatile, data remains even when power is off.
Cost	
More expensive due to high speed and capacity	ROM is cheaper because of limited functionality
Types	





Types	
Dynamic RAM (DRAM)	PROM, EPROM,
Static RAM (SRAM)	EEPROM, Flash ROM
Capacity	
Typically larger (4GB, 8GB, 16GB, 64GB)	Smaller in size (GBs or MBs)
Examples	
Running games, browsers, software applications calculator etc	Storing computer BIOS, smartphone firmware

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QUESTION : 01

(C)

SATELLITE :

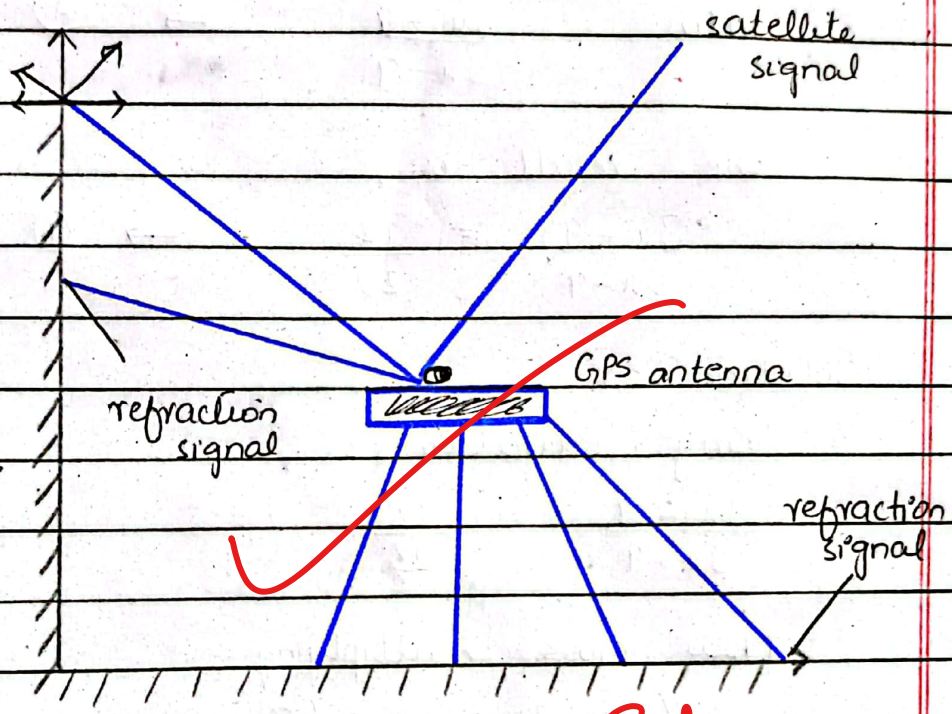
Satellite is an object that orbits around a large eliptical or circular body in space. The first satellite was launched by Soviet on October 4, 1957 named 'Sputkin 1', and 'Sputlin 2' a month later. Satellites can be natural like moon or artificial that are man-made objects.

WORKING PRINCIPLE OF GPS

The Global Positioning System is a network / navigation system using satellites, receiver and alogsithms to synchronize exact location, velocity and time data.

TRILATERATION :

GPS works through a technique called trilateration, it collects signals from satellites to output location information. GPS device must be able to read signal from atleast four satellites.



A satellite broadcasts microwave signal which is picked up by GPS device and used to calculate distance. When satellite sends signal, it forms a circle with radius measured from GPS device to satellite. Same happens when second satellite is added but on addition to third satellite, device location could be determined with device intersection at all three points.

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QUESTION : 02

-A-

Smaller Number in Ratio :

Given :

$$\text{ratio} = 3:5 = \frac{3}{5}$$

subtracting 9 from each,

$$\text{ratio} = \frac{3x-9}{5x-9} \rightarrow (A)$$

the result is,

$$\frac{3x-9}{5x-9} = \frac{12}{23} \rightarrow (1)$$

Solution :

Using equation 1 ,

$$\frac{3x-9}{5x-9} = \frac{12}{23}$$

Now cross multiplying ,

$$23(3x-9) = 12(5x-9)$$

$$69x - 207 = 60x - 108$$

Substituting like terms ,

$$69x - 60x = -108 + 207$$

$$9x = 99$$

$$x = 11$$

Using value of x in A ,

$$= \frac{3(11)-9}{5(11)-9}$$

$$= \frac{33-9}{55-9} = \frac{22}{44}$$

Thus, smallest is (3)

3

Part - B

Shared Profit :

Given :

three partners shared profit,

= 5 : 7 : 8

time period of partnership,

= 14 : 8 : 7

To Find :

ratio of investments = ?

Solution :

The formula is :

$$\text{investment} \propto \frac{\text{profit}}{\text{time}} \rightarrow (1)$$

$$\text{investment} \times \text{time} = \text{profit}$$

$$I_1 = \frac{5}{14} \rightarrow (A)$$

$$I_2 = \frac{7}{8} \rightarrow (B)$$

$$I_3 = \frac{8}{7} \rightarrow (C)$$

Multiplying equations by common 56

$$= \frac{5}{14} \times 56 = 20$$

$$= \frac{7}{8} \times 56 = 49$$

$$= \frac{8}{7} \times 56 = 64$$

Thus, ratios are 20 : 49 : 64

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Part - C

Average Weight :

Given :

average weight of A, B, C
= 45 kg

average weight of A and B
= 40 kg

average weight of B and C
= 43 kg

Find :

weight of B = ?

Solution :

$A + B + C = 45$ kg

multiplying by sum total,

$A + B + C = 3(45) = 135$ → (1)

$A + B = 135 - C$ → (A)

$40 - 135 = -C$

$C = 95$ → (1)

Using eq (1) in A,

$B + C = 135$

$B = 135 - C$

$B = 135 - 95$

$\boxed{B = 40}$

135
95
0

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Part - D

Positive Number

Solution :

making equation from statement :

$$x + 17 = \frac{60}{x}$$

cross multiplying,

$$x^2 + 17x = 60$$

equating on one side,

$$x^2 + 17x - 60 = 0 \quad \rightarrow (1)$$

using quadratic equation,

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

putting values,

$a = 1 \quad b = 17 \quad c = -60$

$$x = \frac{-17 \pm \sqrt{(17)^2 - 4(1)(-60)}}{2}$$

$$= \frac{-17 \pm \sqrt{289 + 240}}{2}$$

$$= \frac{-17 \pm \sqrt{529}}{2} \qquad = \frac{-17 \pm 23}{2}$$

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$$x = \frac{-17 \pm 23}{2} \rightarrow (A)$$

separately solving the equations,

$$x = \frac{-17 + 23}{2}$$

$$x = \frac{6}{2} = 3$$

$$x = \frac{-17 - 23}{2}$$

$$= \frac{-40}{2} = -20$$

Thus,

the positive number is 3