

QUESTION 1

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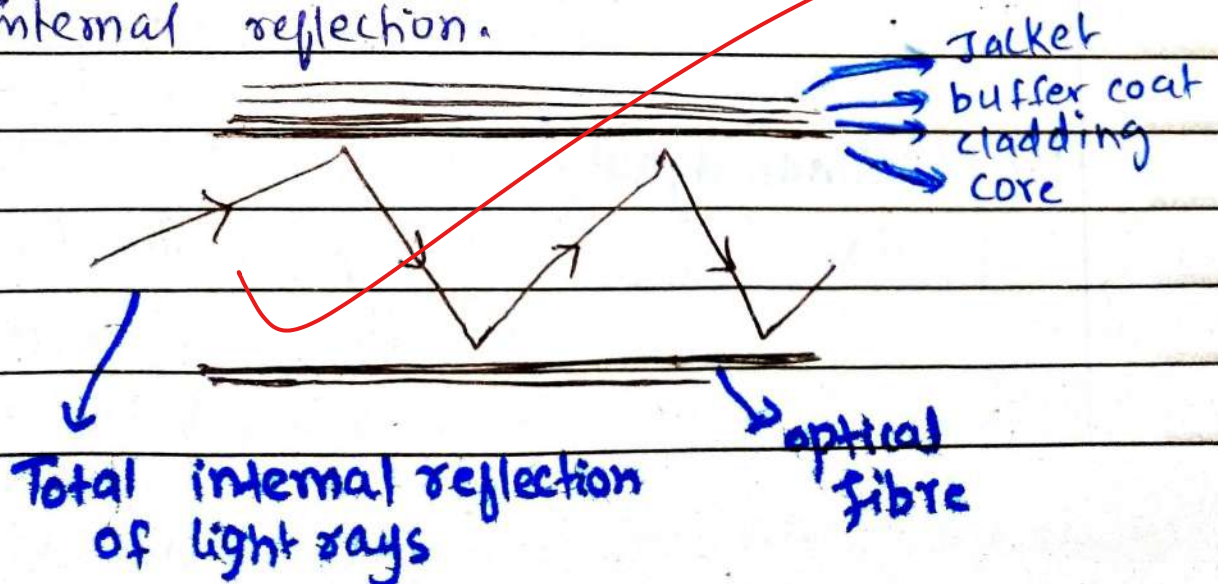
- A. Explain the working principle of optical fibre.
Enlist the main importance of optic fibre.

Optical fibre

Optical fiber is a thin transmission line that has increased the capacity and speed of transmission of signals. It is as thin as human hair. Through the use of total internal reflection, electrical signals are ~~transmit~~ transmitted with maximum capacity. It has replaced the conventional copper or metallic wires.

Working Principle Of Optical fibre

- It works on the principle of total internal reflection.



(i) Light Propagation



The light rays are entered into the optical fibre. It is made of glass layer.

(ii) Total internal reflection



The signals are totally reflected due to cladding layer present above the glass fiber, which prevents outside reflection of radiations.

(iii) Signal transmission

The signal is transmitted at higher speed due to reduced diameter of the transmission line.

(iv) Minimal signal loss

The design of optical fiber allows the signals to propagate with minimal loss and at higher speed in minimal amount of time.

Importance of optical fibres

- ① It has replaced the conventional wires, such as metallic and copper wires.
- ② optical fibres is used in radar system
- ③ It is also used in local area network (LAN) and wide area network.
- ④ It is used in satellites, missile launching and space operation.
- ⑤ It is used in military operation and their deployments also use optical fiber because of its security advantage.
- ⑥ Optical fibres are ~~used~~ widely used in telecommunication networks such as TV, cell network, offices, colleges and universities, etc.

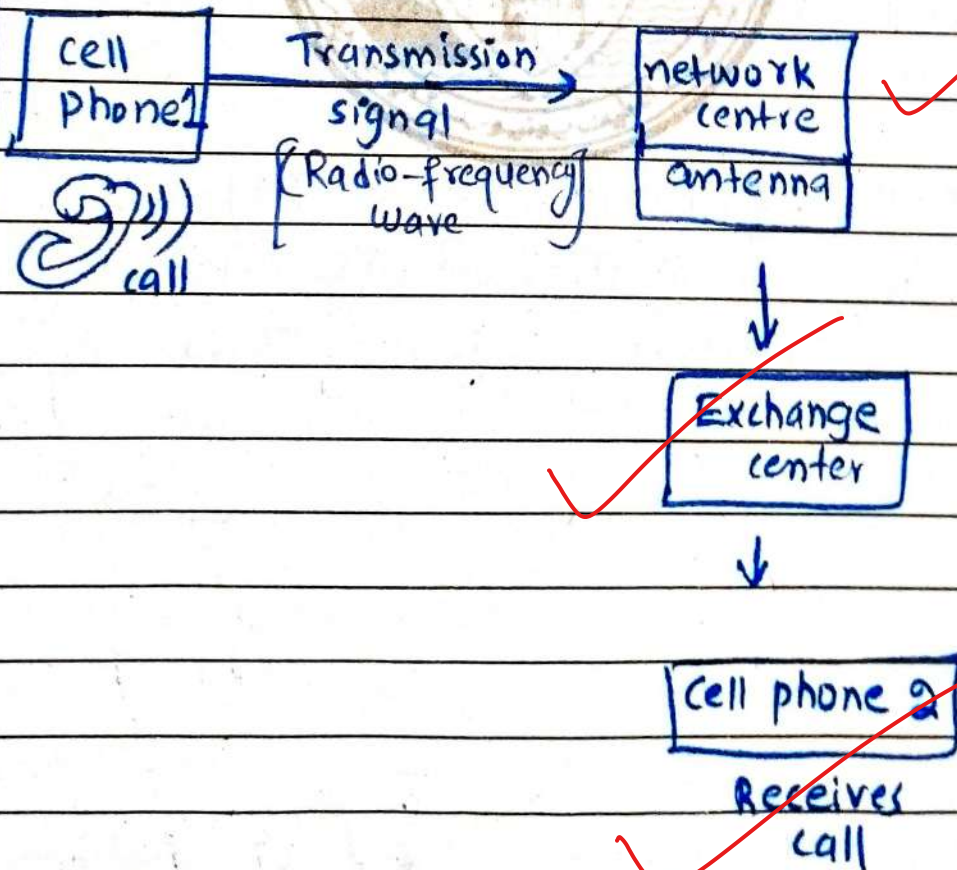
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b. Explain cell phone communication through a block diagram.

Cell Phone

cell phone is an electronic communication device that is portable and widely used nowadays. Previously, phone calls through audio were possible. Nowadays, with the invention of smart phones, many activities such as messaging, email, MMS, video calls, gaming, live streaming are performed on cell phones.

Cell Phone Communication



i) Radio waves

9

The above block diagram indicate how cell phone communication works. When a call is dialed on one cell phone radio frequency waves are generated.

These radio waves are received by network antenna which transmit them to the exchange centre, where signals are received by another network.

ii) Antenna

Cell phones have antenna that receive radio waves or broadcast them.

iii) Connectivity

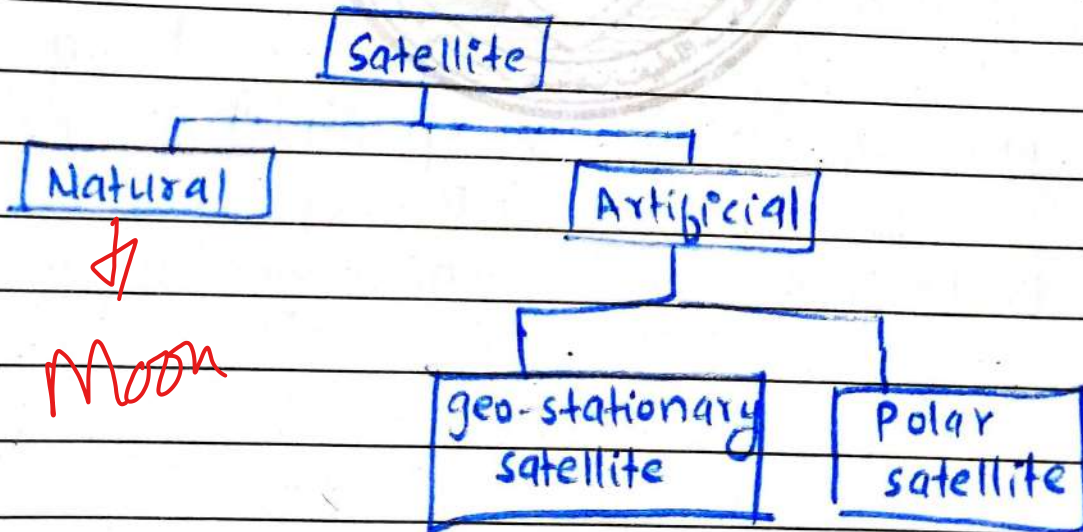
Connectivity of phone call depends upon network strength. If signal strength is sufficient on both sides then call is possible other no communication is possible.

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c. Briefly explain satellite. Define the working principle of GPS.

Satellite

Satellite is any planet or moon that revolves around any star or other planet. However, the word "satellite" commonly used for those machines that are launched into space through rockets. Satellite may be natural, such as earth, moon and there are artificial satellites such as International space station (ISS), geostationary satellite, chandra, Sputnik 1 etc.



Global Positioning System

Global positioning system (GPS) is a satellite based system that uses

24 Satellites that revolve around the earth every 12 hours. GPS is a free of cost system developed originally for military purpose but now it is used for civilian as well.

Working Principle

= Tri-lateralisation

GPS system depends on three segments.

(i) Control segment

It consist of control centre at the United states air force that control and maintains working of GPS globally.

(ii) Satellite segment

It consist of constellation of satellites in space almost 24 in number.

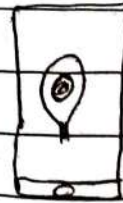
(iii) User segment

User segment contain millions of user's receivers. Through receivers antenna they detect exact location and time of a person.

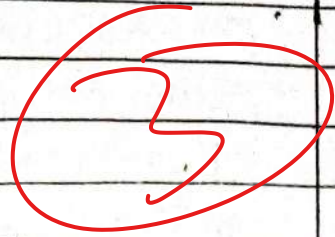
space station.

Control
unit

GPS



user segment



d. Differentiate between RAM and ROM.

RAM

ROM

① It is a volatile memory that is retained in the computer unit-11 it is connected electrically.

It is a non-volatile memory that doesn't depend upon whether computer is connected or not.

② It stands for Random access memory.

It stands for Read only memory.

③ It stores the information that is currently processed by the CPU temporarily.

It stores the information that is retained ~~perp~~ permanently for

basic functioning of
the computer.

(4) It can be read and
~~also~~ re-written

It can be read
only.

(5) It has high capacity
as compared to ROM

It has low
capacity.

(6) It is expensive as compared
to ROM

It is cheaper than
RAM

(7) It runs at higher
speed

It runs at ~~smaller~~
slower speed.



QUESTION NO 2

A.

let the numbers be $3x$ and $5x$

$$\text{Ratio} = 3x : 5x$$

if 9 is subtracted the new ratio is

$$12 : 23 \dots 1$$

Smaller number = ?

As the ratio after subtraction ;

$$3x - 9 : 5x - 9 = 12 : 23$$

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

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

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

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

$$9x = 99$$

$$[x = 11]$$

The value of x is ~~zero~~ 11

To find the smaller number, put value of "x"

$$3x = 3 \times 11$$

$$= 33$$

So, The smaller number is 33.

b.

$$\text{Profit ratio} = 5:7:8$$

$$\text{Time durations} = 14 : 8 : 7$$

in months.

$$\text{Investment ratio} = ?$$

As the profit ratio is equal to product of investment and time given.

Let there be investment as A, B, C .

$$\text{Profit ratio} = \frac{\text{Time} \times \text{Investment}}{\text{Ratio}}$$

$$5:7:8 = 14 \times A : 8 \times B : 7 \times C$$

we can also write

$$\frac{14 \times A}{8 \times B} = \frac{5}{7} \quad \text{and} \quad \frac{8 \times B}{7 \times C} = \frac{7}{8}$$

Simplifying,

$$\frac{A}{B} = \frac{5 \times 8}{7 \times 14} \quad \text{and} \quad \frac{B}{C} = \frac{7 \times 7}{8 \times 8}$$

$$\frac{A}{B} = \frac{20}{49} \quad \text{and} \quad \frac{B}{C} = \frac{49}{64}$$

The overall investment ratio will be:

$$20:49:64$$

5

c.

The average weight of A, B and C is 45 kg.

$$\frac{A+B+C}{3} = 45 \rightarrow \textcircled{i} \checkmark$$

The average weight of A and B is 40 kg.

$$\frac{A+B}{2} = 40 \rightarrow \textcircled{ii} \checkmark$$

The average weight of B and C is 43 kg.

$$\frac{B+C}{2} = 43 \rightarrow \textcircled{iii} \checkmark$$

From eq (ii) find value of 'A',

$$\frac{A+B}{2} = 40$$

$$A+B = 40 \times 2$$

$$A = 80 - B \rightarrow \textcircled{iv} \checkmark$$

From eq (iii) find value of 'C',

$$\frac{B+C}{2} = 43$$

$$B+C = 43 \times 2$$

$$C = 86 - B \rightarrow \textcircled{v} \checkmark$$

Put the value of 'A' from eq: (iv) and value of 'C' from eq (v) in eq (i)

$$A+B+C = 45$$

$$\underline{\quad\quad\quad}$$

$$3$$

Putting values,

$$\frac{80 - B + B + 860 - B}{3} = 115$$

$$166 - B + B - B = 45 \times 3$$

$$166 - B = 135$$

$$166 - 135 = B$$

$$B = 31 \text{ kg}$$

Hence, the weight of 'B' is 31 kg

d.

Let the positive number is 'x' when increased by 17 is equal to 60 times its reciprocal number. The equation is;

$$x + 17 = 60 \times \frac{1}{x}$$

$$x(x + 17) = 60$$

$$x^2 + 17x - 60 = 0$$

Factorize the equation,

$$x^2 + 20x - 3x - 60 = 0$$

$$x(x + 20) - 3(x + 20) = 0$$

$$(x - 3)(x + 20) = 0$$

thus $x = 3$ or $x = -20$

the positive number is 3