

QUESTION 2(A) Satellite

A satellite is a natural or artificial object that revolves around any celestial body. The natural satellite like moon that orbits around earth. Artificial satellites are launched into space for various purposes like weather forecasting, and communication networks.

How a satellite is launched?

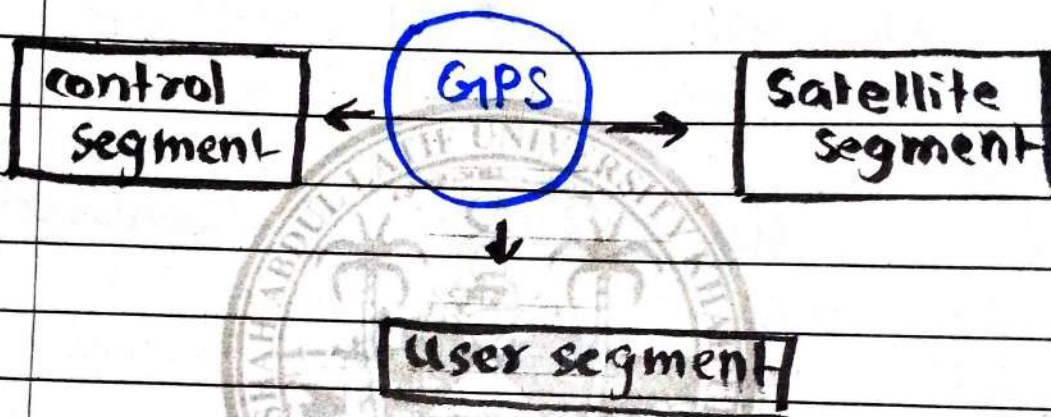
Humans launch satellite into space with the help of rockets. These rockets produce a thrust energy and overcome earth's gravity and air resistance. When rocket reaches target place, they launch satellites into their orbits where satellites start moving around earth. One such example is GPS satellite.

Global Positioning System (GPS)

GPS is a system of constellation of 24 satellites that revolve in 6 orbits and take 12 hours for one complete rotation around earth. GPS system is used to detect precise location, time and speed of particular object present on the surface of earth.

Working principle of GPS

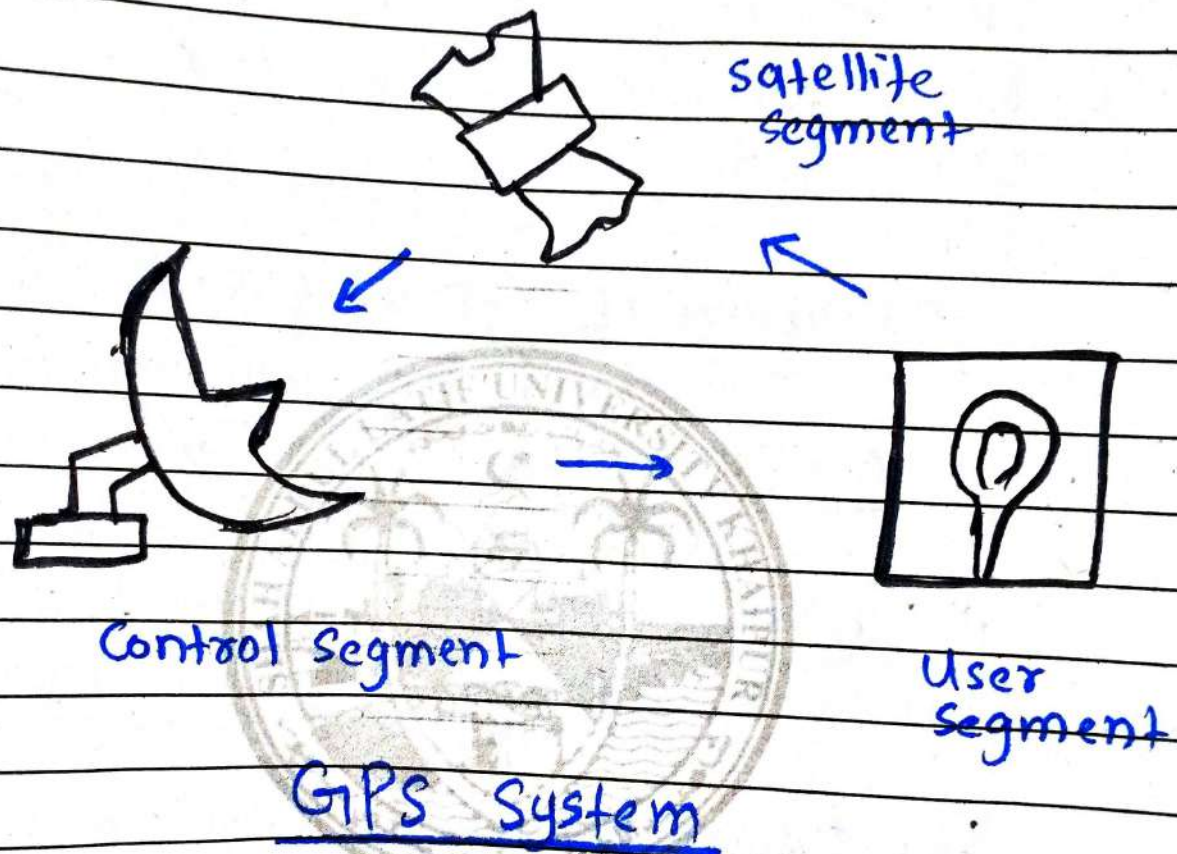
GPS system works on the principle of radio frequency waves that gathers data and form 2D or 3 dimensional image of the particular object. It consist of three parts.



1) Satellite segment; It is the constellation of satellites present in space, orbiting around earth. These satellites gather information of the objects.

2) Control segment; It consists of processing units. The supreme command center is present United States Air force base. The other 4 monitoring segments are present at different regions like two are present in Atlantic ocean, one in pacific and one in Indian ocean.

(3) User segment ; There are millions of users on earth. They use GPS in their mobile phones. In this way data monitoring and detection takes place with GPS.



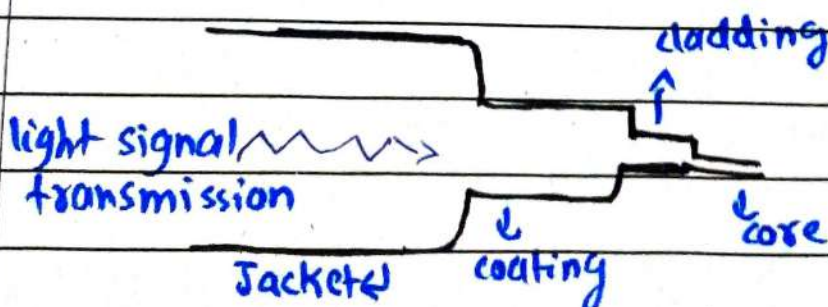
(B) Optical Fibre

Optical fiber is made up of optically pure glass that transmit signal waves with the help of light waves. It is very thin thread like material that efficiently carries transmission signals with light signals.

Structure of optical fiber

It is made up of following components:

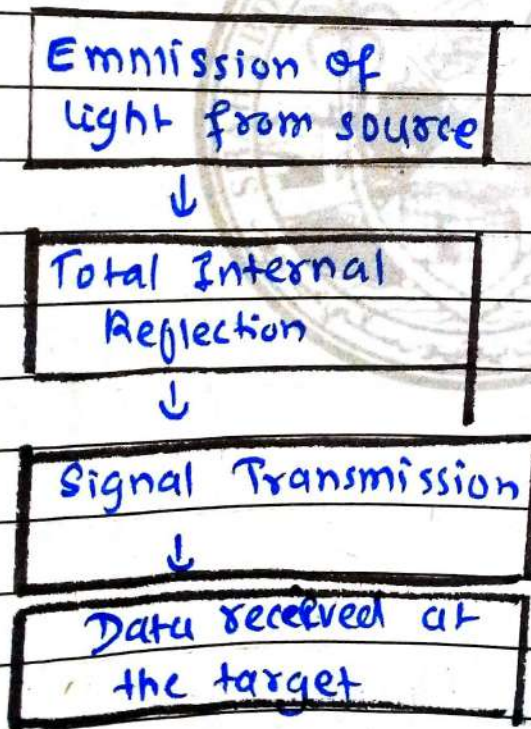
- (i) Core: Core is made up of pure glass material in which light signal propagates.
- (ii) Cladding: cladding is composed of glass or plastic that has lower refractive index as compared to core.
- (iii) Buffer coating: It is also made up of some glass or plastic. Coating provides protective shield to the core and cladding to allow efficient signal transmission without disruption.
- (iv) Outer jacket: The outer jacket protect the whole fiber system.



Optical Fiber

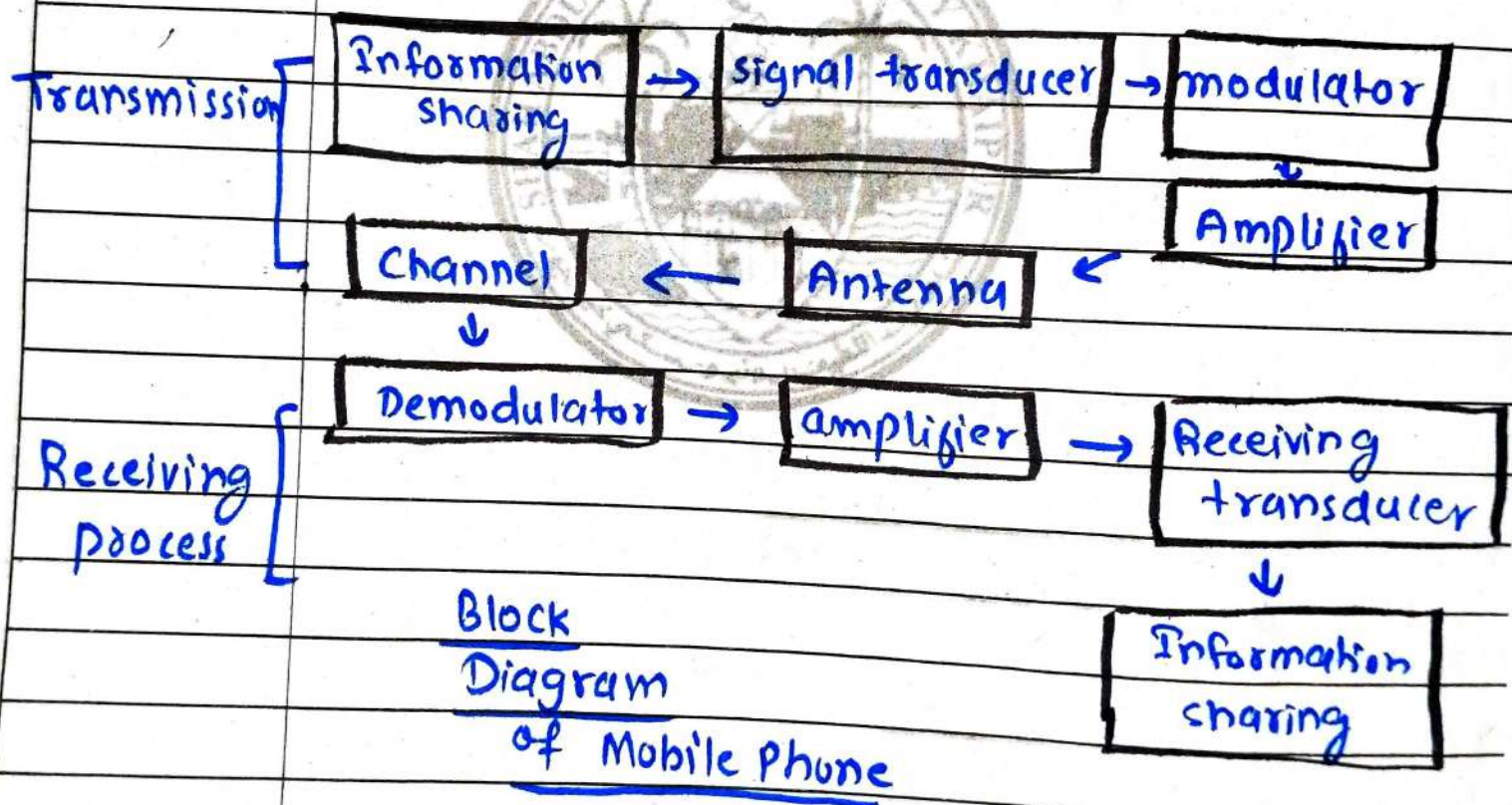
Working Principle of Optical Fiber: Total Internal Reflection

The optical fiber works on the principle of total internal reflection. The refractive index of core is greater than the outer cladding. Whenever light signal enters the core, it reflects at an angle less than the critical angle and this process confines the signal within the core. In this way, a signal transmission happens with high speed.



(c) Working of Cell Phone

Cell phone is a device that is used to make and receive phone calls when a person uses it in the surroundings of mobile tower. Cell phone works on the principle of radio-frequency waves propagation. It contains receiving and transmitting antenna that sends and receive radio waves.



When a person makes a call, the signal in the form of radio waves is released from the transmitting antenna. This signal waves is processed in the mobile tower. Then transmitted into the receivers area, where

the receiver's mobile antenna detects those waves. In this way a mobile phone works through radio wave transmission.

(0)

Short Notes

(a) RAM ; RAM stands for Random Access Memory. This kind of memory is stored in a computer for a short time or temporary phase as long as the computer is connected with the electricity source. This kind of data can be altered or retrieved. It is costly; works fastly; and efficiently according to user command.

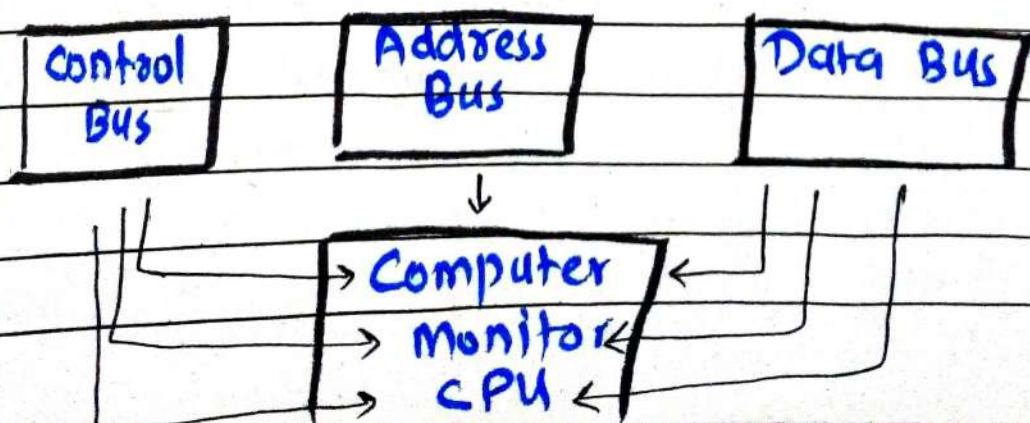
ROM; ROM stands for read only memory. This kind of data or information is stored in the computer and can't be removed even if the electricity source is disconnected. ROM works slowly as compared to RAM. It is trained for the purpose of basic processes like starting or shutting down of the computer. It is cheap as compared to RAM.

(b) Software: Software is the programming data present in computer used for processing, analyzing and working of special procedures. It directs the computer about different function about how to do, when to do and what to do.

Hardware: Hardware include all those components of computer that are tangible such as monitor, mouse, keyboard, C.D, hard-drive and central processing unit (CPU).

(c) Computer Bus:

Computer buses are the parallel lines present in CPU that may be composed of metal, copper or other materials. These computer buses transmit information within computer's components internally. The computer buses also transmit signal between computer and external devices such as loudspeaker, and printers etc.



QUESTION - 1

(A)

The numbers containing 1 or 9 as the unit digits are 1, 9, 11, 19, 21, 29, 31, 39, 41, 49, 51, 59, 61, 69.

The total numbers are 14 in ~~the~~ quantity.

To find percentage of these numbers, we use percentage formula.

$$\%age = \frac{\text{Given numbers}}{\text{Total numbers}} \times 100.$$

$$\%age = \frac{14}{70} \times 100$$

$$\%age = 20\%$$

Hence, the numbers containing 1 or 9 as their unit digits are 14 and their percentage of numbers is 20%.

(B)

Data: 5% of A + 4% of B is $\frac{2}{3}$ of 6% of A + 8% of B

Ratio of A : B = ?

Writing the equation according to the statement;

$$5\%A + 4\%B = \frac{2}{3} (6\%A + 8\%B)$$

Solving the percentages in above equation.

$$\frac{5}{100}A + \frac{4}{100}B = \frac{2}{3} \left(\frac{6}{100}A + \frac{8}{100}B \right)$$

$$0.05A + 0.04B = \frac{2}{3} (0.06A + 0.08B)$$

$$0.05A + 0.04B = 0.04A + 0.053B$$

$$0.05A - 0.04A = 0.053B - 0.04B$$

$$0.01A = 0.013B$$

$$\frac{A}{B} = \frac{0.013}{0.01}$$

$$\frac{A}{B} = \frac{1.3}{1}$$

Hence, the ratio of $A:B = \underline{1.3:1}$.

(C) Data:

proportions of money in A, B, C, D = 5:2:4:3

the C gets 1000 more than D.

B's share = ?

As C gets 1000 more than D

$$C = 1000 + D$$

$$C - D = 1000 \rightarrow (1)$$

The proportions of A, B, C, and D in terms of 'x' are 5x, 2x, 4x, 3x respectively.

putting the value proportion of C and D in eq. (1)

$$C - D = 1000$$

$$4x - 3x = 1000$$

$$x = 1000$$

So, For to find proportion of B's share,

$$B's \text{ share} = 2x$$

$$= 2(1000)$$

∴ putting value of 'x'

$$B's \text{ share} = 2000$$

Hence, the share of B is 2000.

(D) Data

40% of number is equal to two-third of another number.

Ratio of 1st number : 2nd number

Let the numbers be x and y

$$40\% \text{ of } x = \frac{2}{3} y$$

$$\frac{40}{100} x = \frac{2}{3} y$$

$$\frac{x}{y} = \frac{2}{3} \times \frac{100}{40}$$

$$\frac{x}{y} = \frac{5}{3}$$

So, the ratios of $x : y = 5 : 3$