

General Science and Ability  
Part II, Section A

Q.5(c) Optical fiber

Optical fibres consists of strands of pure glass which are as thin as human hair. It transmits light from one point to another.

Construction of optic fibre

It is made up of two parts.

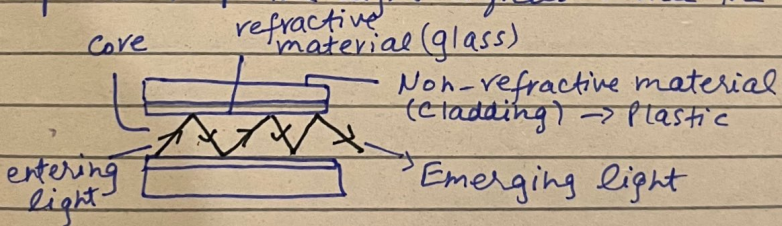
(i) Core

(ii) Cladding

**Core:** It is the central part of optic fibers, having a very high density and high refractive index. It is made up of glass.

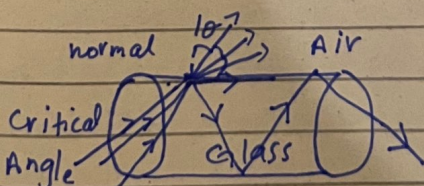
**Cladding:**

Cladding is made up of non-refractive index commonly plastic and wrapped around core. It has low density and low refractive index. It helps to keep the light signals inside the core



How optic fiber transmitt electromagnetic radiation.

Optic fiber works on the principle of total internal reflection of light rays.



## Critical angle:

It is angle of incidence after which angle of refraction becomes equal to  $90^\circ$ . After the critical angle the total internal reflection takes place.

Total internal reflection is the principle through which electromagnetic radiations are transmitted at the core-cladding boundary.

## Q 5 a. Networking and Internet Standards

### Networking

Computer Network is a digital telecommunication network which allows nodes to share resources.

The computing devices exchange data with each other using connection between nodes also called as data links. Data link are established over cable media such as wires or optic cables or wireless media such as WiFi.

The best known computer network is the Internet.

It has enormous applications such as access to the world wide web, shared use of application and storage servers, use of email and instant messaging applications.

### Internet Standard

An internet Standard (STD) is a specification approved by Internet Engineering Task force (IETF). Such standard helps to promote a consistent and universal use of internet worldwide.

They allow interoperation of hardware and software from different sources which allow internet to function.

## Q.5(b) Artificial Intelligence.

It refers to the simulation of human intelligence in machines that are programmed to think like humans and mimic their actions. Commonly referred to as AI. Artificial Intelligence (AI) makes it possible for machines to learn from experience, adjust to new inputs and perform human-like tasks. The term AI was first coined in 1956.

Some Applications include

- (i) Speech Recognition
- (ii) In Industries such as manufacturing
- (iii) Chat GPT
- (iv) In medical field such as diagnostics of diseases.

### Pros of AI

- It reduces human error.
- It allows for quick decision making.
- It automates repetition

### Cons of AI

1. It causes job loss
2. It lacks the ability to be creative
3. It lacks ability to integrate ethical principles.

## Q.5 Bioavailability of Nutrients

Bioavailability of nutrients refers to the degree to which food nutrients are available for absorption and utilization to the body.

The amount of a nutrient in a food that the body may ultimately use to perform specific physiological functions.

Several factors influence the bioavailability of a nutrient. They include

- (1) Digestion
- (2) Absorption
- (3) Distribution

Physiological conditions and age and sex determines the amount of nutrient a body needs for absorption and retention. For example, a pregnant woman needs more vitamins and minerals. Growing children have more requirement of iron as compared to older and males.

### SECTION B

(a.) Let first part =  $3x$

third part =  $5x$

$\therefore$  Second part =  $\frac{5}{4}x$

Total amount = 370

$$3x + 5x + \frac{5x}{4} = 370$$

$$\frac{12x + 20x + 5x}{4} = 370$$

$$37x = 370 \times 4$$

$$x = 40$$

1st part =  $3x = 3 \times 40 = 120$

2nd part =  $\frac{5}{4} \times 40 = 50$

3rd part =  $5x = 5 \times 40 = 200$

Answer is Rs 120, Rs 50, Rs 200

b. Money required = 800

Borrowed from brother 20% =  $\frac{20 \times 800}{100}$

$$= 160$$

Remaining amount =  $800 - 160$   
 $= 640$

$$\text{Funded by mother i.e. } 30\% = \frac{30}{100} \times 640$$

$$= 192$$

Money already in Bank = 200

$$\text{Money needed} = 800 - 640 - 200 - 192$$

$$= 640 - 392$$

$$= \text{Rs } 248$$

(C.) Bag 1 : 3 red, 7 black balls

Bag 2 : 8 red, 2 black balls

Bag 3 : 4 red, 6 black balls

$$\text{Total red balls} = 3 + 8 + 4 = 15$$

Bag 3 : 4 red balls.

Probability it is drawn from bag 3:  $P = \frac{4}{15}$

$$P = \frac{4}{15} \text{ or } \frac{4}{15} \times 100 = 26.66\%$$

(d.) Traffic lights change

24, 36, 72

Simultaneously change at 8:20:00

interval of change

LCM of 24, 36, 72

$$\begin{array}{r|l} 2 & 24, 36, 72 \\ \hline 2 & 12, 18, 36 \\ \hline 3 & 6, 9, 18 \\ \hline 2 & 2, 3, 6 \\ \hline 3 & 1, 3, 3 \\ \hline & 1, 1, 1 \end{array}$$

L.C.M = 72

Signal change after every 72 seconds

i.e. 1 minute, 12 seconds.

Next change will take place at 8:21:12 a.m.

Q. 7 (a.) Ishaq need 6 hours =  $\frac{1}{6}$   
 Abbas need 4 hours =  $\frac{1}{4}$   
 Erfan need 8 hours =  $\frac{1}{8}$

Ishaq + Abbas =  $\frac{1}{6} + \frac{1}{4} = \frac{4+6}{24} = \frac{10}{24}$   
 For ~~set~~ <sup>every</sup> 2 hours =  $\frac{5}{12}$

For 1st 2 hours =  $2 \times \frac{5}{12} = \frac{5}{6}$

Now irfan comes works for 6 hours =  $\frac{1}{6}$   
 Ishaq + irfan =  $\frac{1}{6} + \frac{1}{8} = \frac{4+3}{24} = \frac{7}{24}$

For every hour =  $\frac{7}{24}$

Work remaining =  $\frac{1}{6}$

No. of hours to find work =  $\frac{1}{\frac{7}{24}}$

hour =  $\frac{\text{Progress}}{\text{Progress/hour}}$

$$\begin{array}{r} 34.28 \\ 7 \overline{) 240} \\ \underline{21} \phantom{0} \\ 30 \phantom{0} \\ \underline{28} \phantom{0} \\ 20 \phantom{0} \\ \underline{14} \phantom{00} \\ 60 \phantom{0} \\ \underline{56} \phantom{0} \\ 4 \phantom{0} \end{array}$$

$$\begin{aligned} &= \frac{4}{7} \\ &= \frac{4}{7} \times 60 \\ &= \frac{240}{7} = 34.28 \text{ min} \end{aligned}$$

After Abbas left

it requires 34.28 min to complete work

So total time for finish = 2 hours 34.28 min

Q. 7 (b) Area of farm =  $576 \text{ m}^2$   
4 sides of wall each side  
2 m on 3 sides =  $24 \text{ m}$   
3 m on 1 side

Area for 3 sides of wall =  $2 \times 3 \times 24$   
=  $144 \text{ Sq meters}$   
=  $144 \text{ m}^2$

Area On One side =  $24 \times 3 = 72 \text{ m}^2$   
Total =  $144 + 72 = 216$

Q. 7 (c) = 7 Students

Mode = 19. most repeated Value

Median = 19 value in the centre of  
all the other values  
Odd Number of Values

Mean = 19.2 (Average of all the  
Values) =  $\frac{\text{Sum of all}}{\text{Total}}$

Range = Highest - Lowest Values  
=  $21 - 18 = 3$

lowest range = 18

Highest = 21

Q. 5 (d) IQ measures how a intelligent  
a person is statistically.

Mental Ability Skill determines how  
well a person can apply their intelligence  
to different scenarios.