

## GSA

### Section-I

#### Q no # 3

a)

#### Buses

These are the electrical wires through which CPU communicates with other parts of computer.

A bus consists of a set of parallel lines. The capacity of computer bus depends on the number of lines of DATA in it. A bus with 16 line carries 16 bits of data.

System buses are used to connect the main components of a computer such as main memory.

These are part of mother board

They have normally

Internal buses connect all the internal components of a computer to the mother board.

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External buses are made of electronic pathways that connect the different external devices such as printers to the computer.

## Types of buses

### 1- Data bus

A data bus can transfer data to and from the memory of computer, or into or out of CPU that acts as engine of the device.

It can also transfer data between two computers.

### 2- Address Buses

An Address bus is a computer bus architecture. It is used to transfer the data between devices. These devices are identified by the hardware address of physical memory.

The address is stored in the form of binary numbers to

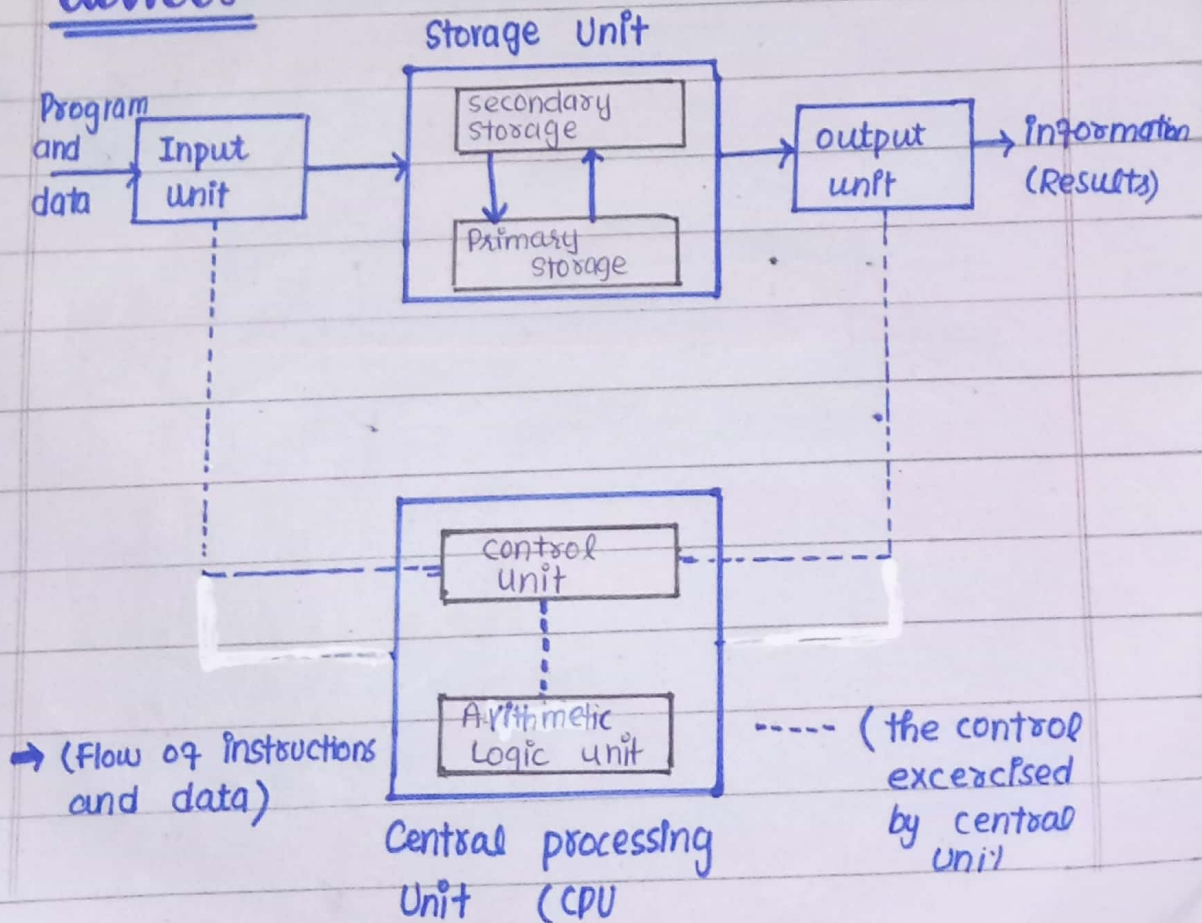
enable the data bus access to memory.

### 3- Control buses

A control bus is a computer bus that is used by the CPU to communicate with devices that are contained within the computer. This occurs through physical connections such as cables or printed circuits.

Its main objective is to minimize the lines that are needed for communication.

### Diagram of input & output devices.



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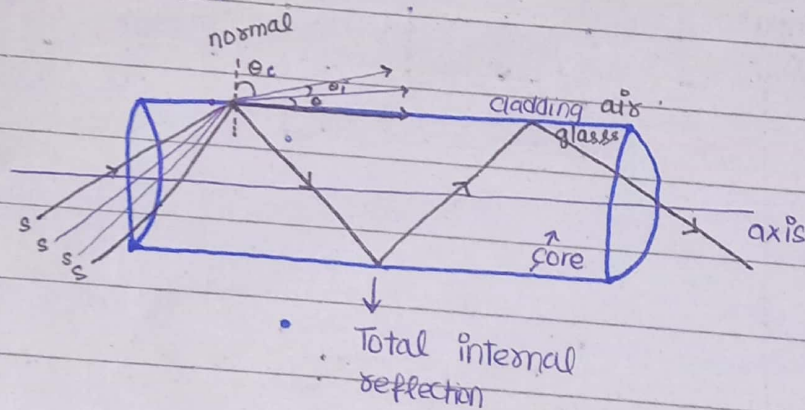
## b) Optics

Optics deal with the study of behaviour and properties of light including its interaction with matter.

### Working of Optical fibre

Optical fibre is a thin strand of glass or plastic that carries transmits data as light signals.

It works on the principle of Total internal Reflection.



S = Source of light

$\theta_c$  = critical angle

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When light source is introduced into the core at one end of fibre, it hits the core-cladding boundary at certain angle and undergoes total internal reflection.

This means it bounces back completely into core instead of escaping into cladding. The repeated total internal reflection effectively traps the light ray within the core, therefore none of the light escapes.

**Normal** is a reference line through which angle is measured

### **Critical angle**

It is angle of incidence at which angle of reflection becomes  $90^\circ$

### **Total internal Reflection.**

Total internal reflection takes place when the angle of incidence is greater than critical angle.

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### c- i- Hypocenter

Hypocenter is the point within the earth where an earthquake or underground explosion originates. It is a place below the center of the earth where the initial energy release takes place.

### ii- Annual lunar eclipse

During an annual ~~total~~ lunar eclipse moon does not cover the entire disc of the sun, so that a ring of sunlight surrounds the shadow of the moon.

### iii- Epicenter

Epicenter is the point on the surface of earth directly above the hypocenter. It is the point where energy release or ruptures takes place before earthquake.

#### iv - Magma

It is the mixture of molten and semi-molten rocks inside the earth's surface. It is formed by the melting of rocks in the lithosphere.

#### v - Dark matter

Dark matter is invisible. It emits no light or energy and thus cannot be detected from conventional sensors and detectors.

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d-

## Big Bang

a) Big Bang is a prevailed cosmological model for universe's origin and evolution

b) It is considered as a theory of birth of the universe.

c) The Big Bang is estimated to have occurred about 13.8 billion years ago.

d) The universe is continuously expanding and, according to current observations,

## Big Crunch

a) Big crunch is a hypothetical theory, which says universe will collapse ultimate into singularity.

b) It deals with how the universe might end.

c) The exact timing of Big depends on the nature of dark energy and its influence on the universe's expansion.

d) The expansion would actually slowdown, stop and reverse due to



accelerating in its expansion.

the dominance of gravity

e) This theory is widely accepted by scientific community based on extensive facts

e) This is a speculative concept with several challenges.

## Calculation of age of Universe

The age of universe can be calculated in two ways

- a- By looking for oldest stars
- b- By measuring the rate of expansion of the Universe and extrapolating back to Big Bang.

Q# 05

## a) Formation of Cyclones

### Cyclone

It is a system of rotating winds around a low pressure core due to pressure gradient and Coriolis effect of spin of motion of earth.

### Formation

#### ① Pressure Gradient

The formation of a cyclone takes place in the presence of pressure gradient. change of pressure aids cyclones form.

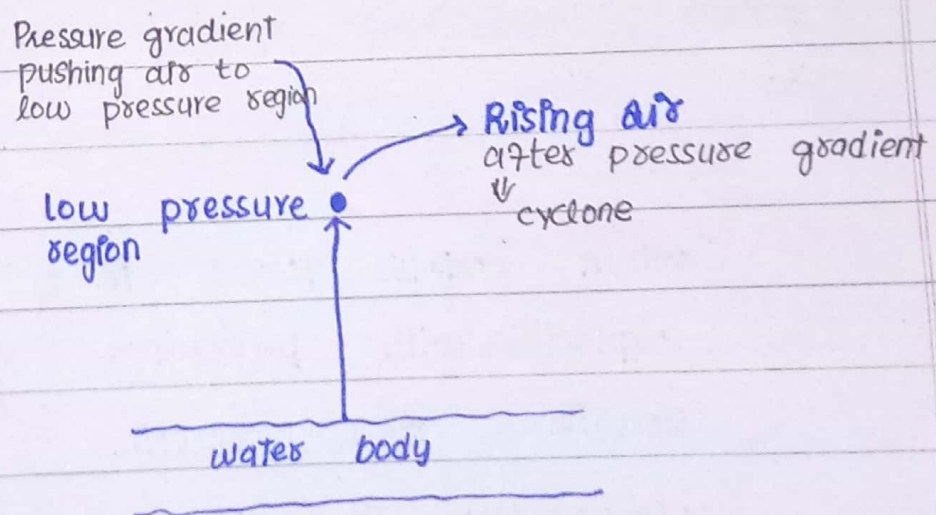
How change of pressure occurs?

Water from a water body gets evaporated. Water changes from liquid into gas. As water also heats the air above the air expands and rises, creating a zone of low pressure at the surface.

↳ Surrounding air with natural higher pressure gets towards low

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zone by a force known as pressure gradient. This force pushes air from ~~low~~ high to low pressure zone. The steeper this pressure gradient, the stronger the push becomes. In essence, a steeper pressure gradient signifies a more rapid drop in pressure over a shorter distance. This steeper slope translates to a more forceful push of air inwards, which plays a crucial role in intensifying the wind within a developing cyclone.



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## 2- Coriolis effect

Coriolis force: A force which tends to move the objects to the right in the northern hemisphere and left to the southern hemisphere.

After pressure gradient, air got deflected by Coriolis force. The deflection arises due to spinning of earth around its axis. The deflection of air masses by Coriolis force is called Coriolis effect.

It not only deflects air but dictates the rotational direction and shapes the characteristics cyclone circulation that define these powerful storms.

"When Coriolis force is coupled with pressure gradient then resulting phenomenon is called cyclone."

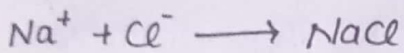
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b) Difference between

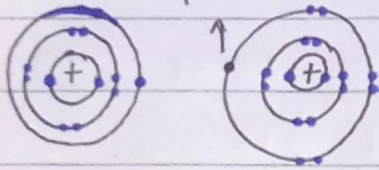
Ionic bond

i- Ionic bond is formed by the complete transfer of electrons from one atom to another.

example



908 transfer to Na



11 Na

17 Cl

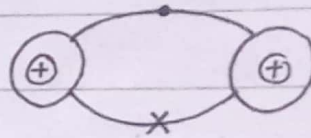
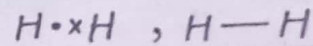
ii- They exist in solid state.

iii- They have high melting and boiling points

Covalent bond

i. Covalent bond is formed by mutual sharing of electrons between two atoms

example



Hydrogen gas (H<sub>2</sub>)

ii- They exist in all three state, solid, liquid, gas

iii- They have low melting and boiling points

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iv- They are soluble in water.

v- This bond is non-directional

substance in result

They are generally insoluble in water

This bond is directional

## C7- Uses of Gamma rays

i- Gamma rays are used for the sterilization of medical equipments, food and pharmaceutical products.

ii- They are used in radiation therapy.

iii- They are used to detect flaws in metal castings and welds

iv They are used to kill cancer cells

## Uses of X-rays

i- X-rays are used to create images of bones and internal organs.

ii- They are used to examine teeth and jawbones

iii- In security scannings X-rays are used to avoid potential threats

iv- In order to inspect cracks or defects without damaging external part of materials in industry x-rays are used.

## Uses of Radio waves

i- Radiowaves are used for communication applications, including radio, TV broadcasting, cell phones etc.

ii- They are used in global positioning system (GPS) to navigate and determine locations.

iii- They are used in Radar system to detect and track the position and movements of objects such as aeroplanes, weather systems and ships.

iv- They are also used in medical treatments to heat body tissues and for killing cancer cells.

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## Section-II

Q no # 6

a) Solution

Radius of cylinder =  $r = 8\text{cm}$

height of cylinder =  $h = 15\text{cm}$

volume of cylinder =  $v = ?$

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

$$V = (3.14)(8)^2(15)$$

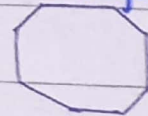
$$V = 3014.4\text{cm}^3$$

So, volume of cylinder is  $3014.4\text{cm}^3$

b) Solution

Octagon has 8 sides. To find angle of each side of octagon,

octagon



$$\text{Angle} = (n-2) \times 180^\circ / n$$

$n = \text{no. of sides}$

$n = 8$

$$\text{Angle} = (8-2) \times 180^\circ / 8$$

$$= (6) \times 180^\circ / 8$$

$$= 6 \times 22.5$$

$$\text{Angle} = 135^\circ$$

So, the angle of each side of Al-Aqsa Dome is  $135^\circ$



### (c)- Solution

$$\begin{aligned} \text{Length of Lake} = l &= 4.6 \text{ mile} \\ \text{as } 1 \text{ mile} &= 1.6 \text{ km} \\ &= 4.6 \times 1.6 \\ &= 7.36 \text{ km} \end{aligned}$$

$$\text{Width of lake} = w = 2.2 \text{ mile} = 3.52 \text{ km}$$

$$\text{Surface area of lake} = A = ?$$

$$\therefore A = l \times w$$

$$= 7.36 \times 3.52$$

$$= 25.9 \text{ square km}$$

$$A = 26 \text{ square km}$$

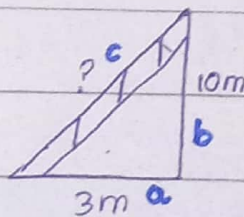
Area of lake is 26 sq km.

### (d)- Solution

$$\text{Base of ladder} = 3 \text{ m}$$

$$\text{Height of house} = 10 \text{ m}$$

$$\text{Hypotenuse} = ?$$



According to Pythagoras theorem

$$c^2 = a^2 + b^2$$

$$= (3)^2 + (10)^2$$

$$c^2 = 9 + 100$$

$$c^2 = 109$$

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Taking ~~square~~ <sup>under</sup> root on b.s

$$\sqrt{c} = \sqrt{109}$$

$$c = 10.4 \text{ meters}$$

so, the ladder is approximately 10.44 meters tall.

Q # 8

(a) -

### Formula of IQ

IQ can be calculated by following equation.

$$IQ = \frac{\text{Mental age}}{\text{Chronological age}}$$

$$IQ = \frac{MA}{CA}$$

### Factors affecting IQ

There are several factors that can affect IQ such as

- a) Genetics
- b) Environment
- c) Health

Q8

(c)

## Superintendent

The word superintendent has total 14 words, of which 05 are vowels (u, e, i, e, e)

$$\therefore \text{Probability} = \frac{\text{no. of ways of occurrence}}{\text{Total possible outcome}}$$

$$E = \frac{5}{14}$$

$$E = 0.35$$

So, probability of word that it is vowel is  $\frac{5}{14}$ .

- (d) -

Total amount = Rs. 4320

Zain, Aslam and

Ashraf's part in = 2 : 3 : 7

ratio

Total parts =  $2 + 3 + 7 = 12$

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$$\begin{aligned} \text{Zain's part} &= \left(\frac{2}{12}\right) \times 4320 \\ &= \text{Rs. } 720 \end{aligned}$$

$$\begin{aligned} \text{Aslam's part} &= \left(\frac{3}{12}\right) \times 4320 \\ &= \text{Rs. } 1080 \end{aligned}$$

$$\begin{aligned} \text{Ashraf's part} &= \left(\frac{7}{12}\right) \times 4320 \\ &= \text{Rs. } 2520 \end{aligned}$$

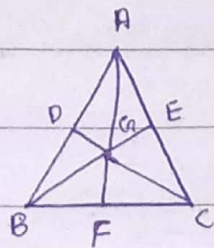
So, the distribution is

$$\text{Zain's part} = \text{Rs. } 720$$

$$\text{Aslam's part} = \text{Rs. } 1080$$

$$\text{Ashraf's part} = \text{Rs. } 2520$$

(b)



There are total 9 triangles in this equilateral triangle

$\triangle ABC$

$\triangle AGE$

$\triangle GEC$

$\triangle BDC$

$\triangle AGD$

$\triangle GDB$

$\triangle BEC$

$\triangle BGF$

$\triangle GFC$