

Question No: 2

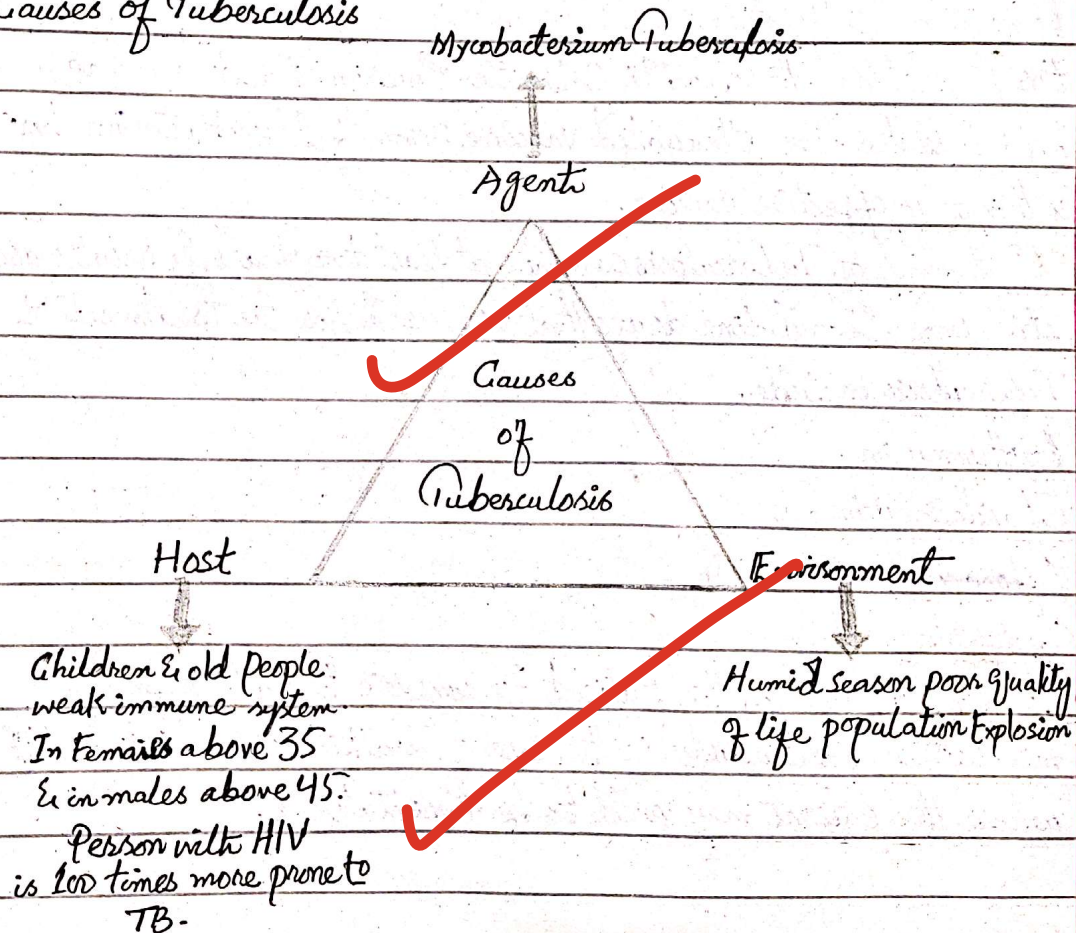
(A) What is the Tuberculosis & Hepatitis? Explain briefly.

Ans:- Tuberculosis

- Understanding Tuberculosis

Tuberculosis (TB) is a bacterial respiratory infection primarily affecting the lungs but can also affect the intestine, bones, joints, lymph nodes, skin & other tissues of the body. According to the World Health Organisation TB is the second most killer infectious disease after Covid-19, leaving even HIV & AIDS behind. The infection has been responsible for around 1.3 million deaths worldwide.

- Causes of Tuberculosis



- Symptoms of Tuberculosis

Symptoms of Tuberculosis don't show up in the patient having latent Tuberculosis. Only the people active TB exhibit the symptoms of the infection that include.

1. Prolonged cough sometimes with blood.
2. Fatigue.
3. Chest pain.
4. Weakness.
5. Night Sweats.
6. Weight loss.
7. Fever.

- Prevention & Treatment of Tuberculosis

For prevention, the bacilli Calmette-Guérin (BCG) vaccine, which is the live attenuated vaccine form of *Mycobacterium bovis*, is the only effective vaccine.

Treatment of Tuberculosis can take at least two years, & results are still poor. Second-line drugs that are used for the treatment of Tuberculosis include

1. Azithromycin.
2. Clarithromycin.
3. Ofloxacin.
4. Cycloserine, etc.

It is necessary for the patient to complete the full course of medication, particularly in the case of multi-drug resistance TB where the patient may need to be hospitalized.

Hepatitis

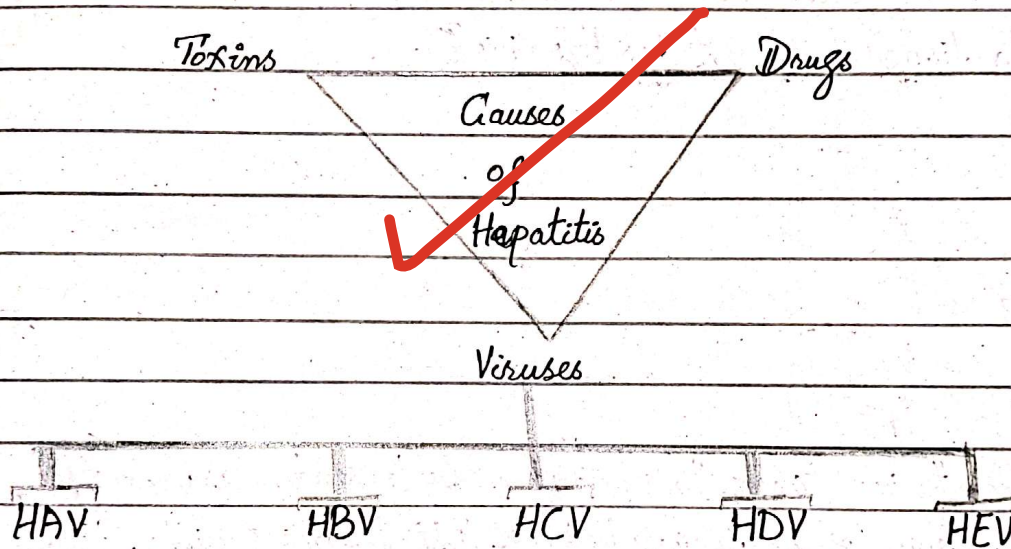
- Understanding Hepatitis

Hepa: liver; itis: Inflammation

Hepatitis is the inflammation of the liver mainly caused by any of the half a dozen of viruses & noninfectious agents leading to multiple health problems, some of which can be fatal.

- Causes of Hepatitis

There are five main strains of the hepatitis virus.



- Symptoms of Hepatitis

Symptoms & their intensity in Hepatitis may vary from one type to another, the general symptoms include.

1. Jaundice.
2. Abdominal Pain.
3. Liver Eng^{lax}ement.
4. Fatigue.
5. Low Grade Fever.

6. Loss of Appetite.

- Prevention & Treatment of Hepatitis

For prevention, vaccines of all type of Hepatitis are available except Hepatitis C. To prevent from HGV virus, patients are advised to avoid used syringes, ensure safe hygiene practices, & implement blood safety strategies.

As far as treatment is concerned, Hepatitis A, B, & E donot require proscribed treatment, they generally resolve on their own. Hepatitis C is mostly treated with antiviral drugs. However, there is no established treatment for Hepatitis D.

(B) Explain the mechanism of Fiber optic cable for signal. Explain its construction.

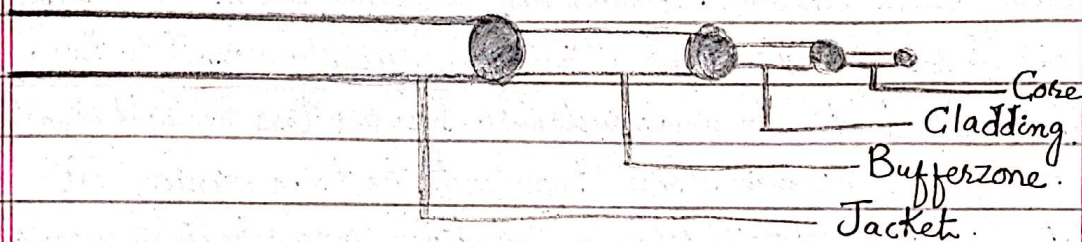
Ans- Define Optical Fiber

Since the invention of the photo phone by Alexander Graham Bell, transmission of signals via a beam of light became possible. Using this idea, optical fibre originated as a device that is used to transmit carrier waves using light or photon particles. The thin strands of optical fibre make the fibre cables' transmission capacity far greater than other modes of communication, such as copper wire & metallic wires, with much wider bandwidth capability. As a result, it is used in the form of different cables & is being utilized in numerous fields of life.

• Structure of Optical Fiber

Structurally, optical fiber consist on.

1. Core: thin glass centre of the fibre where light travels. The Core has a diameter of $10\mu\text{m} - 200\mu\text{m}$.
2. Cladding: plastic outer optical material surrounded by core. The refractive index of the cladding is less than that of the core which is a must conditions for the working of the Optical Fiber.
3. Buffer: A polymer layer surrounded by cladding.
4. Jacket: It coats the whole optic fiber.



• Mechanism of Action of Optical Fiber.

The propagation of light in an optical fibre requires that light should be totally confined within the fibre & not escape from it. This can be done by.

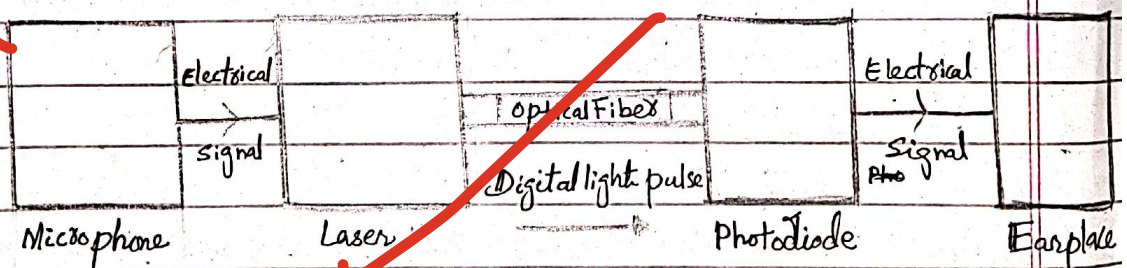
1. Total internal reflection.
2. Continuous Refraction.

A fibre optic communication system consists of three major components.

1. A transmitter that converts electrical signals to light signals.
2. An optical fibre for guiding the signals.

3. A receiver that captures the light signals at the other end of the fibre & reconverts them to electric signals.

First, an input device, for example, the microphone, converts sound (like a person's voice) into an electrical signal. The electrical signals are then sent to a transmitter, which includes a light source like a semiconductor laser or LED. The transmitter modulates the light waves digitally. Here, a pulse of light represents the number 1, & the absence of light represents the number 0. This digital light pulse is then sent into the optical fibre. The optical fibre carries the light signals over long distances. Despite being made of ultra-pure glass, light signals gradually become dim over long distances. To maintain the signal strength, devices called repeaters are placed at intervals (typically around 30 km, but up to 100 km in newer systems). These repeaters the light signals to ensure they remain strong throughout the transmission. At the end of the optical fibre, a photodiode converts the light signals back to electrical signals. These electrical signals are then amplified & decoded, if necessary, to reconstruct the original signals. Finally, the electrical signal is sent to an earpiece, which converts it back into sound.



3. ~~Answer~~

(G) Explain the Difference b/w Middle latitude Cyclones & Tornadoes

Ans → Characteristics	Mid-latitude Cyclones	Tornadoes.
Define	Middle latitude cyclones is the dominant weather system in middle & high latitudes (at 30 to 60 degree), equator characteristics of rapidly swirling air masses around a low pressure core, which results in stormy & often destructive weather.	A tornado is a small but intense vortex of spinning column of air associated with the strong updraft of an intense thunderstorm that extends b/w the earth's surface & a cloud. It is also called whirlwind or dust devil.
Formation	Middle-latitude cyclones are the result of the dynamic interaction of warm tropical & cold polar air masses at the polar fronts.	Tornadoes form when warm, humid air collides with cold, dry air.
Rotation	Clockwise in the southern hemisphere & counter-clockwise in the northern hemisphere.	It also has the same rotation in both hemispheres.
Measuring scale	The scale for measuring cyclones is called the Beaufort scale & Saffir-Simpson scale.	The scale used for rating the strength of tornadoes is called the Fujita (F) & Enhanced Fujita (EF) scale.

Circumference

They have a wide circumference

They have a small circumference.

Diameter

Diameter 200km.

Diameter 300-400 yards

Duration

They last for 3 to 10 Days.

They last for less than 10 minutes.

(1) What is difference between the ionic & covalent bonding? Give examples.

Ans: Characteristics	Ionic Bond	Covalent Bond
Definition	The bond that is formed due to the electrostatic attraction b/w oppositely charged ions is called Ionic bond.	A bond that is formed by the sharing of electron pairs b/w atoms is called a covalent bond.
Electron Interaction	Electrons are transferred from one atom (usually a metal) to another (usually a non-metal).	Electrons are shared either equally (non-polar) or unequally (polar), b/w atoms.
Bond Formation	Formed when one atom loses electrons (becoming a cation) & another gains electrons (becoming an anion).	Formed when two atoms come together to share electrons.
Electronegativity Difference	Electronegativity Difference among the elements forming ionic bonds is usually greater than 1.7, hence, are polar.	Electronegativity Difference among the elements forming covalent bonds is less than 1.7, hence, the bond is non-polar.
Bond Strength	Generally ^{stronger in} exists in solid state, crystalline forms due to the lattice structure of ions, but can be disrupted in aqueous solutions.	Can range from weaker (single bonds) to very strong (triple bonds), depending on the number of shared electrons pairs.

State at Room Temperature	Generally exists in solid state; many ionic compounds form salts.	It can be solids, liquids or gases & depends on the molecular structure & size.
Solubility	Generally exists in a solid state; many ionic compounds form salts.	Can be soluble or insoluble, depending on polarity.
Electrical Conductivity	Compounds with ionic bonding are good conductors when molten or in aqueous solution due to the free-moving ions.	Compounds with covalent bonding are typically poor conductors in all states; molecules do not have free-moving charged particles.
Examples	Sodium chloride (NaCl) Magnesium oxide (MgO) etc.	Water (H ₂ O) Methane (CH ₄) carbon dioxide (CO ₂).

good answers!!!!