

General Science And Abilities

CSS-2020

Question # 5

a) What do you know about Hepatitis? Describe its types and write down preventive measures?

Hepatitis:

Hepatitis is a medical condition characterized by inflammation of the liver. This condition can be self-limiting or can progress to fibrosis (scarring), cirrhosis or liver cancer. Hepatitis viruses are the most common cause of hepatitis in the world but other infections, toxic substances (e.g alcohol, certain drugs), and autoimmune diseases can also cause hepatitis.

Types of Hepatitis:-

The five main viral classifications of hepatitis, A, B, C, D, and E. Different type of virus is responsible for each type of viral hepatitis. These five types are of a greatest concern because of the burden of illness and death they cause and the potential for

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outbreaks and epidemic spread. In particular, type B and C lead to chronic diseases in hundreds of million of people and together, are the most common cause of liver cirrhosis (a condition in which liver is scarred and permanently damaged) and cancer.

According to world health organization (WHO) 354 million people currently live with chronic hepatitis B and C globally.

i- Hepatitis A: ~~Virus~~

Hepatitis A is the result of an infection with the hepatitis A virus (HAV). This type of hepatitis is an acute, short-term disease. It is spread through contaminated food or water, or through a close contact with an infected person. People typically recovered fully from hepatitis A, without any long term liver damage.

ii- Hepatitis B:-

Hepatitis B is caused by Hepatitis B virus. It can be

transmitted with the blood or other body fluids of an infected person. This can happen through sexual contact, sharing needles or other drug paraphernalia, or from mother to child during childbirth.

Hepatitis B can range from acute (short term) to chronic (long-term), and chronic infection can lead to serious liver complications.

iii- Hepatitis C:-

Hepatitis C is caused by hepatitis C virus, and it is primarily transmitted through contact with infected blood. This can occur through sharing needles or other drug paraphernalia, receiving contaminated blood transfusion or organ transplants, or through certain medical procedures. Hepatitis C often becomes a chronic infection and can lead to liver cirrhosis or liver cancer over time.

According to the center for disease control and prevention (CDC),

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approximately 2.4 million Americans are currently living with a chronic form of this infection.

iv- Hepatitis D:-

Hepatitis D, also known as the delta Hepatitis, is caused by the Hepatitis D virus, which is dependent on hepatitis B virus (HBV) to replicate. This means that HDV infection can only occur in individual who are already infected with HBV or are simultaneously exposed to both HBV and HDV.

HDV is considered to be the most rare and severe form of viral hepatitis. The presence of HDV can worsen the course of HBV infection, leading to more severe liver damage compared to HBV alone. Globally, HDV affects almost 5 percent of people with chronic hepatitis B.

v- Hepatitis E:-

Hepatitis E is caused by the hepatitis E virus. Hepatitis E

is a water borne disease that results from exposure to the hepatitis E virus (HEV). It is mainly found in areas with poor sanitation and typically results from ingesting fecal matter that contaminated the water supply. According to CDC, this disease is uncommon in the United States. Hepatitis E is usually acute but can be particularly dangerous in pregnant women. Excess alcohol consumption can cause liver damage and inflammation. This may also be referred to as alcoholic hepatitis.

→ Preventive Measures:-

Preventive measures for hepatitis includes:

i- Vaccination:

Vaccines are available for hepatitis A and hepatitis B. Vaccination is an effective way to prevent these types of viral hepatitis and is recommended for individuals at risk.

as a routine vaccination.

ii- Practice Safe hygiene:-

Washing hands thoroughly with soap and clean water before handling food, after using the restroom, or after coming into contact with potentially contaminated objects can help prevent the spread of hepatitis A and other infections.

iii- Safe Sex Practice:-

Using barrier methods ~~such as~~ during sexual activity can reduce the risk hepatitis B and other sexually transmitted infections. ~~It is~~

iv- Needle Safety:-

Avoid sharing needles, syringes or other drug paraphernalia, as this can transmit hepatitis B, C and other blood borne infections.

If someone use drugs, seeking help from healthcare professional for safer drug use practices.

v- Blood and Medical precautions

Ensuring that medical and

dental equipments are properly sterilized and that blood and other bodily fluids are handled safely, can help to prevent the transmission of hepatitis C and other blood borne infections.

vi-Safe food and water:

Practice good food and water hygiene, such as consuming properly cooked food, avoiding raw or undercooked shellfish, and drinking clean water from reliable sources. This can help to prevent hepatitis and other food or water-borne infections.

Question #5 (b)

Differentiate between Middle Latitude cyclones and Tornadoes?

Middle latitude cyclones and tornadoes are both weather phenomenon, associated with atmospheric ~~distribution~~ disturbances, but they have distinct characteristics and occur under different conditions. Difference

between them is given as:-

Middle latitude Cyclones | Tornadoes

1- Size and Scale

Middle latitude cyclones are also known as extratropical cyclones or low-pressure systems, are large-scale weather systems that typically span hundreds of kilometers.

They are commonly observed in the middle latitudes, between approximately 30° and 60° north and south.

Tornadoes are much smaller and more localized compared to middle latitude cyclones. They are characterized by a rapidly rotating column of air that extends from a thunderstorm cloud to the ground.

The size of the Tornado can vary ranging from a few ~~kilometers~~ meters to several hundred meters in width.

2- Formation

These cyclones form along the boundaries of contrasting

Tornadoes usually form within severe thunderstorms, particularly

Middle latitude cyclone

air masses, often between warm and cold air masses. The interaction of these air masses leads to the development of a low-pressure system, which is characterized by counterclockwise rotation in the northern hemisphere and clockwise rotation in the southern Hemisphere.

Tornadoes

in regions where warm, moist air interact with cooler air masses. The intense updrafts and wind shears within these storms can lead to the development of a rotating mesocyclone, which can then produce a tornado.

3. Duration

Middle latitude cyclones can persist for several days to a week, gradually moving across the earth's surface. They are often associated with changes in weather patterns and can bring a variety of weather

Tornadoes are relatively short-lived and typically last for minutes to hours. They move rapidly across the ground, with an average speed of about 30 miles per hour (48 km

Middle latitude Cyclone

Tornadoes

conditions, such as rain, snow, high winds and temperature fluctuations.

per hour), but some tornadoes can exhibit erratic or slow movement patterns.

4. Intensity and damage

while middle latitude cyclones can generate strong winds and cause significant disruptions, their overall impact is typically spread over a large area. The severe weather associated with these cyclones such as, blizzards or heavy rainstorms, can result in property damage, transportation delays and power outages.

Tornadoes are known for their destructive powers. They can produce extremely strong winds, often exceeding 100 miles per hour (161 km per hour) in the most severe cases, it exceeds over 200 miles per hour (322 km per hour). Tornadoes can cause severe damage to structures, uproot trees and pose a significant risk to human life and society.

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In conclusion, middle latitude cyclones are large-scale weather systems that last for several days affecting broad areas with various weather conditions. Tornadoes on the other hand, are localized, short lived, and highly destructive atmospheric phenomenon associated with several thunderstorms.

Q #5 (c)

What is Open System Interconnections (OSI) and describe its layers?

Open System Interconnections:-

The open system interconnection model is a conceptual framework that standardizes and defines the functions and interactions of communication systems. It was developed by the International organization for standardization (ISO) in the late 1970's to facilitate interoperability between different computer systems and network protocols. The OSI model

consists of seven layers, each responsible for specific task in the process of data transmission.

→ Layers of the OSI Model:

1- Physical Layer:-

The physical layer is responsible for the transmission of raw data bits over the physical medium, such as cables or wireless signals. It deals with the electrical, mechanical and physical aspects of data transmission.

2- Data Link layer:

The data link layer provides error-free transmission of data frames between two directly connected nodes. It detects and corrects errors, control data flow, and organizes data into frame for reliable transmission.

3. Network layer:

The network layer is responsible for addressing, routing, and forwarding data packets

across multiple networks. It establishes logical connections, determines the best path for data transmission, and handles congestion control.

4. Transport layer:

The transport layer ensures reliable delivery of data between end systems. It breaks down data from the upper layers into smaller layer segments, handles acknowledgments and retransmissions, and manages flow control and error recovery.

5. Session layer:-

The session layer establishes, maintains and terminates communication session between applications. It provides mechanisms for synchronization, checkpointing and recovery during data exchange.

6. Presentation layer:-

The presentation layer handles data formatting, encryption, compression, and data conversion.

It ensures that data sent by one system can be understood by another system.

7- Application layer:

The application layer provides interface and protocols for communication between end-user applications and the underlying network. It includes protocols for specific applications such as email (SMTP), File transfer (FTP) and web browsing (HTTP).

Overall, the OSI model provides a standardized reference for understanding and implementing communication protocols, enabling interoperability and seamless data transmission between different systems and networks.

Q #05 (d)

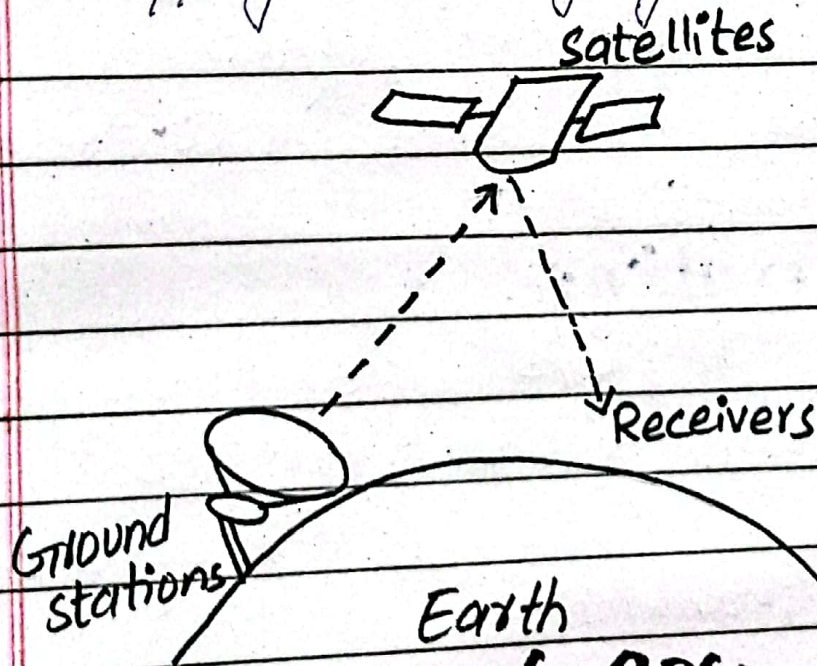
What is GPS? How does it work?

GPS:-

GPS, which stands for Global positioning system, is a navigating

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and positioning system, that utilizes a network of satellites to provide accurate location and time information anywhere on earth. It was developed by United States Department of Defense and became fully operational in the 1990's. GPS has since become widely used in various applications, including navigation, mapping, surveying, and tracking.



→ Working of GPS:-

- The GPS works through the following steps:-

1- Satellite Network:-

The GPS system consists of constellation of satellites

orbiting the earth. Currently, there are approximately 30 operational GPS satellites. These satellites are placed in specific orbits to ensure global coverage.

2. User Receivers:-

A GPS Receiver is a device that receives signals from multiple GPS satellites. This can be a standalone handheld device, a smartphone, a car navigating system, or any other device with GPS functionality.

3. Trilateration:-

The GPS receiver picks up signals from at least four GPS satellites simultaneously. These signals contain information about the satellite's location and the precise time the signal was transmitted.

4. Time measurements:-

The GPS receiver measures the time it took for the signals to travel from each satellite to

the receiver. Since, the speed of light is known, the receiver can calculate the distance between itself and each satellite based on the time delay.

5- Position Calculation:

By knowing the distance to at least four satellites, the GPS receiver can perform trilateration calculations to determine its precise position in three dimensional space (latitude, longitude and altitude).

6- Error Corrections:-

To improve accuracy, the GPS receiver also take into account factors that can introduce errors, such as atmospheric delays and clock discrepancies. It uses additional data including ephemeris and almanac data transmitted by satellites, to correct for these errors and refine the position calculation.

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7- Display and Navigation:

Once the GPS receiver has calculated the user's position, it can display the co-ordination, map the location and provide navigation instruction to a desired destination.

Overall, GPS is a remarkable system that enables precise and real time positioning information by utilizing satellite signals and trilateration calculations. Its widespread use has revolutionized navigation and positioning in various fields and has become an integral part of modern technology.