

Part-II

Section I

What is balanced diet?
C can result into what
human body?

Deficiency of vitamin A, B, C
type of imbalances in

Balanced Diet - It is a diet contains the right
amount of essential nutrients in it.

Micro-nutrients = required in large quantity

eg - Lipids / Fats

Proteins, Carbohydrates

Macro-nutrients = required in small amount.

eg - Minerals and Vitamins.

Deficiency of Vitamin A:

- Night blindness

- Immune System Impairment

- Skin Issues like Dry
Skin

- Impaired growth and
development -

Deficiency of Vitamin B: • Beri Beri

- Sore throat, redness and swelling of the lining of the mouth and throat, crack on the outside of the lips.
- Pellagra, numbness
- fatigue, weakened immune function, hair loss, depression
- birth defects
- risk factor for cardiovascular disease -
- balance issue -

Deficiency of Vitamin C:

- Scurvy
- Iron Absorption problem
- Weak Immune System
- Skin and Connective Tissue Issues.

(b) How CPU resembles with human brain in working?

Ans Processing and Decision Making

- CPU executes instructions and perform calculations, makes decisions on programmed logic -
- Processes information, make decisions, performs calculations based on sensory input / learned knowledge.

Memory Management

- CPU uses various types of memory e.g RAM to store and retrieve data for processing -
- Brain uses short-term and long-term memory to store and retrieve information -

Control and Coordination

- Software and Hardware components are used by computer to control and coordination -
- Nervous system control and coordinate the body of human -

Input and Output

- Receives input from devices (mouse, keyboard) and sends output to devices (monitor, printer) -
- Brain receives sensory information (sight, touch, sound) and sends output in the form of responses (speech) -

Error Handling and Learning

- CPU handles error through error-checking mechanism and update its processes via software updates -
- Brain is capable of learning from mistakes, adapting new information, forming new neural connections through experience -

Instruction Set and Programming.

- CPU: Operates based on set of instructions written in programming language - (code)
- Brain's function based on biochemical signals and neural pathways. Shaped by genes and experiences -

(d) Discuss working of optical fibers - What is GPS?

How 2D and 3D locations are measured by satellites?

Ans Working of optical fibers :-

- 1) Light Transmission: A light source injects light into the core of the optical fiber.
- 2) Signal Transmission: The light signals carries data encoded as variations in the light's properties such as phase, intensity, wavelength -
- 3) Propagation: As light travels through the core, it strikes the interface between the core and cladding at shallow angle, because cladding has a lower refractive index, the light is reflected back into the core. The reflection continues down the length of fiber -

Applications

- Sensors: to detect temperature, pressure and other environmental conditions -
- Medical: Used in endoscopy, imaging, light delivery for surgeries.
- Networking: Used in (LANs) and (SANs)

GPS: A satellite based navigation system that provides location and time information anywhere on earth. It was developed by US department of defense and is freely accessible to anyone with a GPS receiver.

It has three components -

- ① Space Segment
- ② Control Segment
- ③ User Segment

GPS accuracy can be affected by several factors like atmospheric condition, signals blockage by buildings or trees.

Applications of GPS are Navigation, Timing, Tracking, Geolocation Services, Surveying and Mapping.

How 2D and 3D locations are measured by satellite?

A receiver must be locked on the signals of at least three satellites to calculate a 2D position (latitude and longitude) and track movement. With four or more satellites in view, the receiver can determine the user's 3D position (latitude, longitude, altitude).

② Historical Intelligence in the new electricity -
Justification -

① Historical Impact of Electricity:

(1) Industrial Revolution: Electricity fundamentally changed industries, from manufacturing to transportation by powering machinery, production and improving efficiency.

(2) Improved Quality of life: The use of electric lighting, heating and appliances improved living standard and give ease.

(3) Innovations: The availability of electric power enabled countless new inventions and technological advancements - eg - computers, telecommunication etc.

AI's Transformative Potential

① Revolutionizing Industries

• New wave of automation through intelligent robots, predictive maintenance, optimized supply chains -

• Enhancing diagnostics, personalizing treatment plans and accelerating drug discovery.

- Improving fraud detection, automate trading, providing personalized financial advice.
- Self-driving cars, AI-optimized traffic management systems promise to reduce accidents and improve efficiency.

② Improving life quality-

- AI-powered assistants like Alexa, Google assistant manage daily tasks, providing information and control smart home devices.
- AI application detecting disease and personalized medicines are improving health outcomes.
- AI tools improve accessibility for disabled person, through speech to text and other assistive technology.

Parallels with Electricity:

- AI, like electricity bringing broader changes socially and economically.
- AI value increases as more data collected and more systems are interconnected, similarly value of electricity grew as electrical grids expanded and more devices were electrified.

Q4:

(a) Write a note on liver juice "Bile"?

Ans Bile is a yellow-green fluid produced by liver and stored in gallbladder - Plays role in digestion and absorption of fats and fat-soluble vitamins in the small intestine - The liver continuously produces bile, approx 600-1000 ml per day - Bile helps to eliminate cholesterol from the body - Bile acts as excretion of waste products that the liver processes. Conditions like hepatitis or cirrhosis can affect bile production and secretion, impacting digestion and overall health - It is also essential for overall metabolic balance.

(b) Role of kidney in excretion -

- Blood enters the kidney through the renal arteries and is filtered in the capillaries - This process removes waste products, toxins, excess substances from bloodstream while retaining necessary components like proteins & cells - As filtered fluid passes through the renal tubules, essential substances like ions, glucose are absorbed back into the bloodstream - The renal tubules also secrete additional waste products and excess ions into the filtrate from the surrounding capillaries, which helps in maintaining the body's

acid-base balance. The final waste products are collected in the renal pelvis and transported to bladder via ureters. The bladder stores urine until it is excreted from the body through the urethra. The kidney regulates the body's water balance, this process helps maintain proper hydration. Kidney manage the levels of sodium, calcium, potassium in the blood, which is essential for nerve functions, muscle function and cellular function. Kidney also helps maintain pH balance of blood by excreting hydrogen ions. It filters out toxins and drugs from blood, which are excreted in the urine.

④ Discuss different methods of Solid waste Management →

① Landfilling Waste is buried in large excavated areas known as landfills.

Advantages

- Simple and Cheap
- can handle large amounts of waste.
- can be designed to capture methane gas for energy.

② Incineration Waste is burned at high temperature to reduce its volume and sometimes to generate energy.

Advantages

- generate energy.
- decreases the need for landfill space.
- Reduces waste volume.

Disadvantages: High costs, as pollution from emissions, needs best technology to manage byproducts.

3) Recycling: Waste materials are processed and converted into new products.

Advantages: Reduces raw materials need, saves energy and reduces landfill use.

Disadvantages: Not all materials can be recycled effectively, can be expensive without market demand.

4) Sanitary landfills: A more advanced landfill with engineered systems to manage gas emissions.

Advantages: Better environment, reduce ground-water contamination.

Disadvantages: Expensive, requires management, potential long-term environmental impact.

5) Vermicomposting

Organic waste is decomposed by earthworms to produce rich compost -

Advantages

- Environment friendly
- Reduces organic waste -

Disadvantages

- Requires space and time
- Pest issues
- Not suitable for all organic waste -

Q4(a) Define terms

Anemia

A problem of not having enough healthy red blood cells to carry oxygen to the body's tissue.

Appendicitis

It is inflammation of your appendix, a finger-like pouch attached to your large intestine.

Myopia

A vision condition in which an object close to the eye is seen clearly whereas farther away appears blurred.

Isetones

Section = II

Q6 (d) (i) Superintendent (ii) white

(b)

Ques: Discount amount = $80 \times \frac{15}{100} = 80 \times 0.15 = 12$ Dollars

Subtract discount from original price

Price after discount $80 - 12 = 68$ dollars

Sales tax amount = $68 \times \frac{10}{100} = 68 \times 0.1 = 6.8$ Dollars

Add sales tax to the discounted price:

$$\text{Final Price} = 68 + 6.8 =$$

$$74.8 \text{ dollars}$$

So final price is = \$74.80.

(c)

Ans

Calculate the travel time

$$\text{Travel time} = \frac{\text{Distance}}{\text{Speed}} = \frac{47 \text{ km}}{36 \text{ km/hr}}$$
$$= \frac{47}{36} \text{ hrs} = 1.667 \text{ hours}$$

$$1 \text{ hr} + 0.667 \text{ hrs} \times 60 \text{ min/hr} = 1 \text{ hr} + 10 \text{ min}$$
$$= 1 \text{ hr and } 10 \text{ min}$$

Add the travel time to the departure time

Departure time: 4:00 pm

$$\text{Arrival time} = 4:00 \text{ pm} + 1 \text{ hr and } 10 \text{ min} = 5:10 \text{ PM}$$

(Q.1) (b)

Ans: Let the age of 3 boys be: $3x$, $5x$, $7x$

Calculate total age of 3 boys = 15 yrs

$$\text{Total age} = 3 \times 15 = 45 \text{ yrs}$$

Equation

$$3x + 5x + 7x = 45$$

$$15x = 45$$

$$x = \frac{45}{15} = 3$$

$$3x = 3 \times 3 = 9 \text{ years}$$

So youngest boy age is 9 years

11, 13, 17, 19, 23, _____,

It's a sequence of prime numbers
Therefore, the next number is 29