

SECTION A

QUESTION # 4

(a)

main fuel for body, especially for the brain and muscles during physical activity.

Primary Energy source

Some carbohydrates (like dietary fiber) help in digestion and prevent constipation

Aids in digestion

Functions of Carbohydrates

Glucose supply

They are broken down into glucose which is used to produce ATP (energy) during cellular respiration

Saves protein

by providing energy, carbohydrates prevent proteins from being used as a fuel source, allowing proteins to perform their main functions like tissue repair.

Functions of Vitamins

1) Regulatory functions

2) Immunity and growth

3) Energy Metabolism

4) Antioxidants

1. Regulatory functions:

Vitamins regulate various biochemical processes in the body. For Example: Enzyme functions (Vitamin B), hormone synthesis (Vitamin D), Gene expression (Vitamin A), immune responses (Vitamin C and E) etc.

2. Immunity and Growth:

They are also essential for maintaining immune function, growth and development. Vitamin C boosts immunity and Vitamin D helps in bone health.

3. Energy Metabolism:

B-Complex vitamins play a key role in converting the food into energy.

4. Antioxidants:

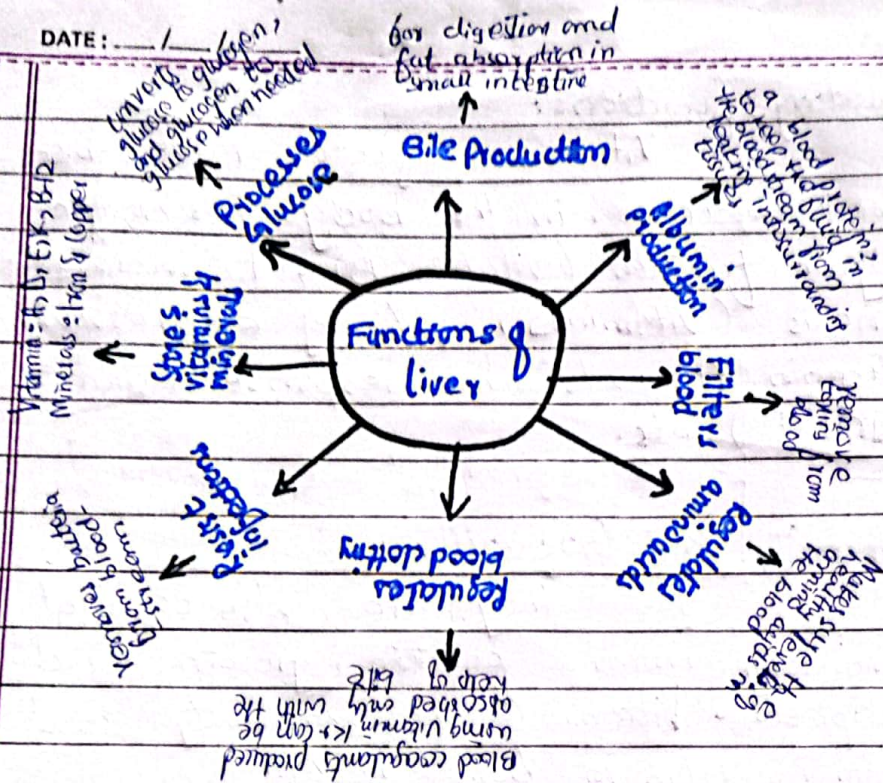
Vitamins like A, C and E protect the body from oxidative stress by neutralizing free radicals.

(b)

Functioning of Liver:

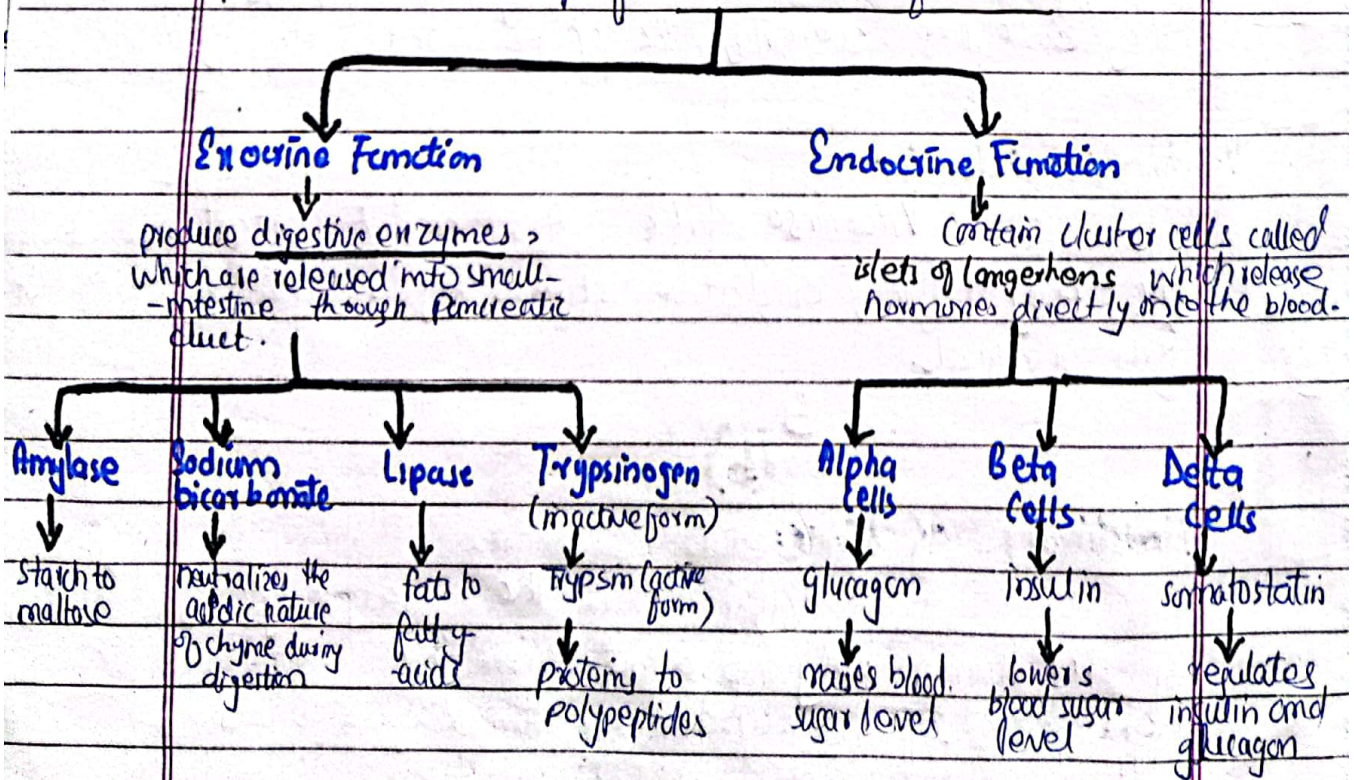
Liver is the largest gland of the human body present in the upper right side of the abdomen. It plays a vital role in metabolism, detoxification and digestion. Some of the main functions of liver are:

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• Functioning Of Pancreas:

Pancreas is a gland organ that lies behind the stomach. It performs 2 main functions.



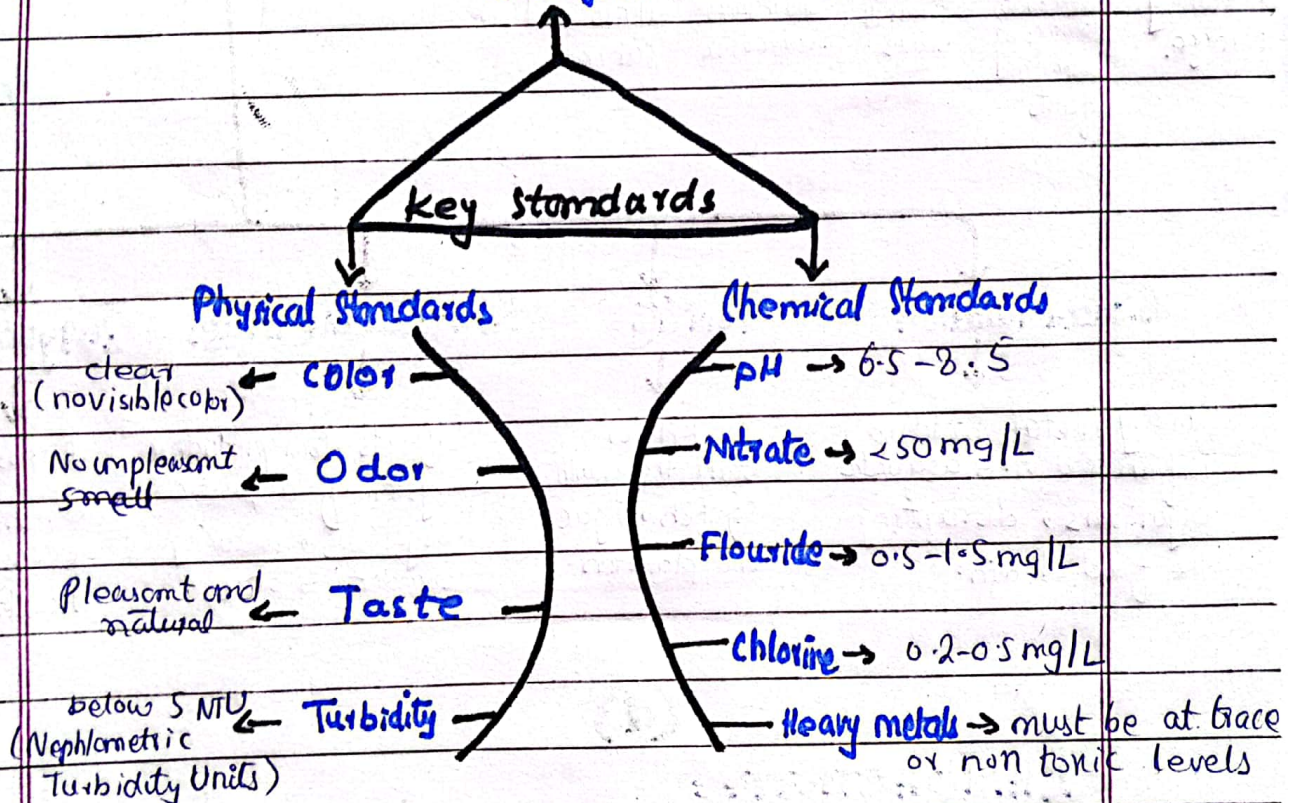
(C) Standards Of Drinking Water:

Drinking water must meet certain quality standards to be safe for human consumption.

These standards are set by organisations like World Health Organization (WHO), Environmental Protection Agency (EPA, USA).

Zero tolerance for pathogens like E.coli, Salmonella, and other disease causing microbes

biological standards

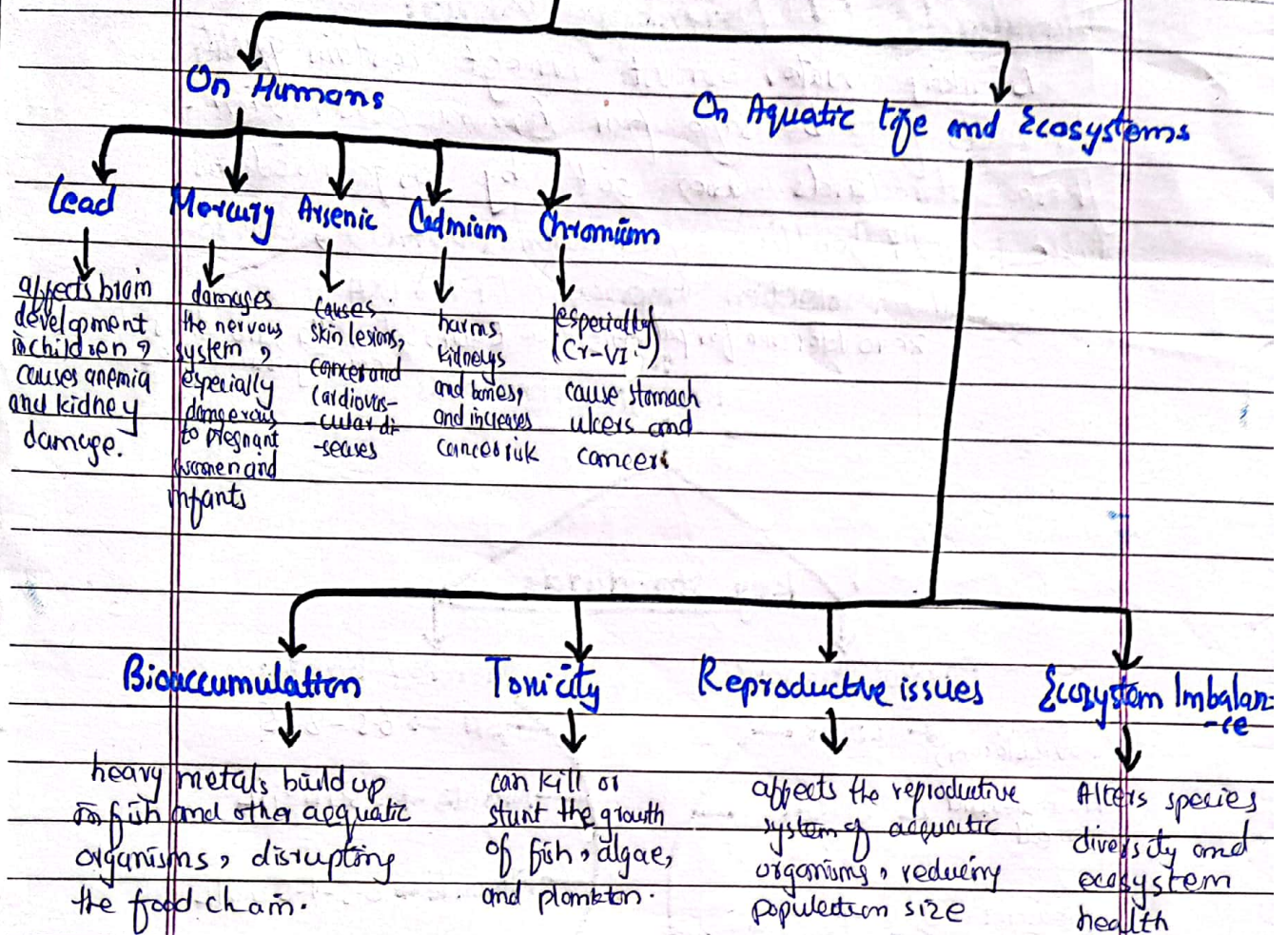


Effects Of Heavy Metals On Living Organisms:

Heavy metals such as lead (Pb), mercury (Hg), Arsenic (As), Cadmium (Cd) and chromium (Cr) are toxic even in small levels. Their presence in drinking water can cause serious health and environmental problems.

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Effects



(d)

RADIOACTIVITY:

Radioactivity is the spontaneous emission of radiations from the unstable nucleus of certain atoms. This happens when the nucleus breaks down (decays) to become more stable, releasing energy in the form of particles or electromagnetic waves (such as alpha, beta, or gamma rays). This process is natural for some elements and man-made in nuclear

reactions.

• Laws Of Radioactivity

Law of Spontaneity

radioactive decay occurs spontaneously and cannot be influenced by external conditions like temperature, pressure or chemical reactions

Law of Constant Probability

every radio-active element has a constant probability of decaying per unit time. this means rate of decay is proportional to the number of undecayed atoms present.

$$\frac{dN}{dt} = -\lambda N$$

where,

N = number of undecayed nuclei

λ = decay constant

Law of Exponential decay

Number of undecayed nuclei decreases exponentially over time.

$$N(t) = N_0 e^{-\lambda t}$$

where,

N_0 = initial number of nuclei

t = time

e = Euler's number (≈ 2.718)

Law of Half-Life

the half-life is the time required for half of radio-active nuclei in a sample to decay. It is constant for a given isotope and is given by =

$$T_{1/2} = \frac{0.693}{\lambda}$$

• Two Radioactive Elements:

1. Uranium (U-238)

2. Radium (Ra-226)

These elements naturally emit radiation, and are used in nuclear energy, medicine and scientific research.