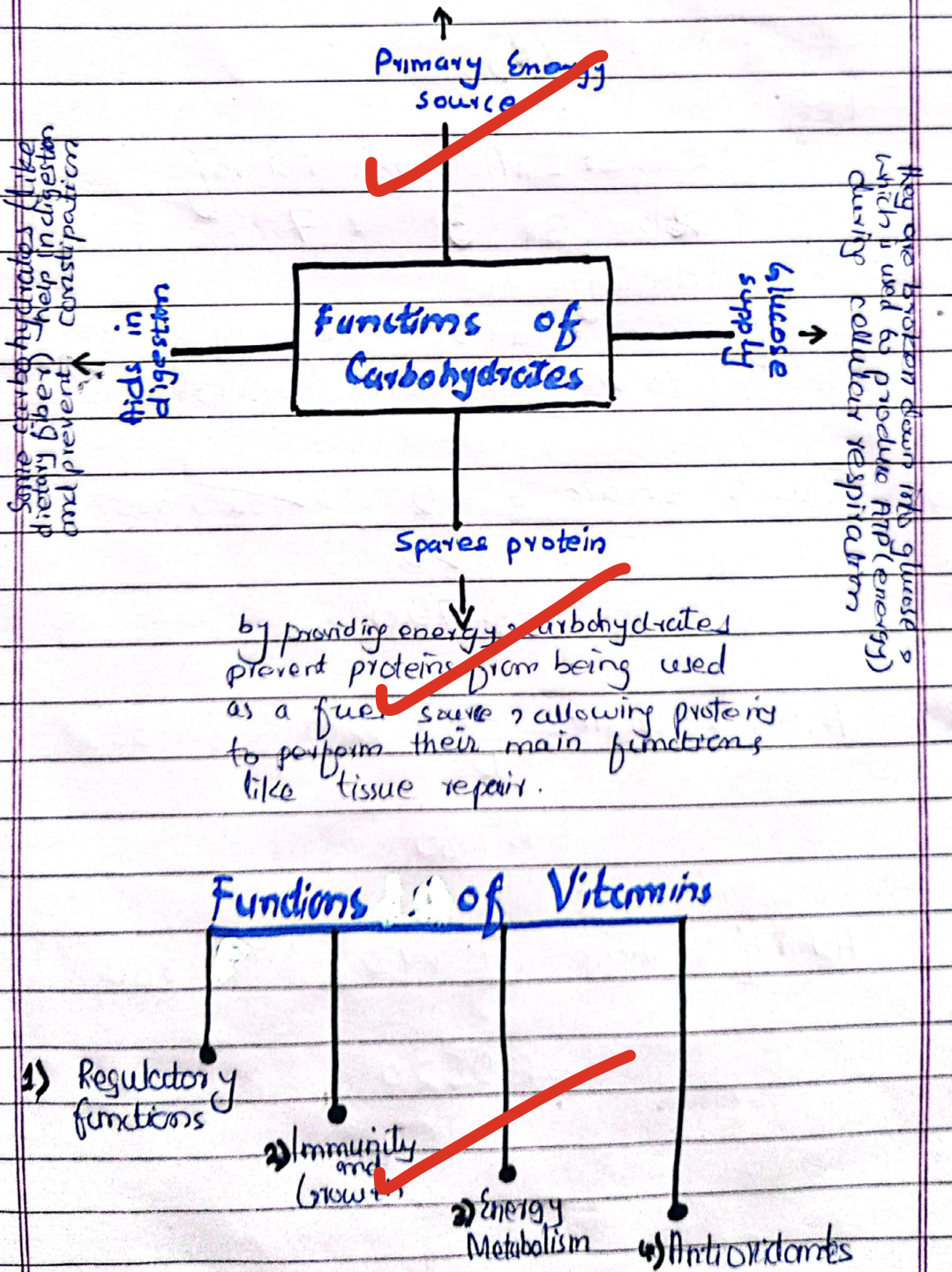
DATE: __/__/____ (CSS-2024)

SECTION A
QUESTION #4

(a)



Functions of Vitamins

1) Regulatory functions
2) Immunity and Growth
3) Energy Metabolism
4) Antioxidants

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1. **Regulatory functions:**

Vitamins regulate various bio-chemical processes in the body. For Example: Enzyme function (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 maintaing 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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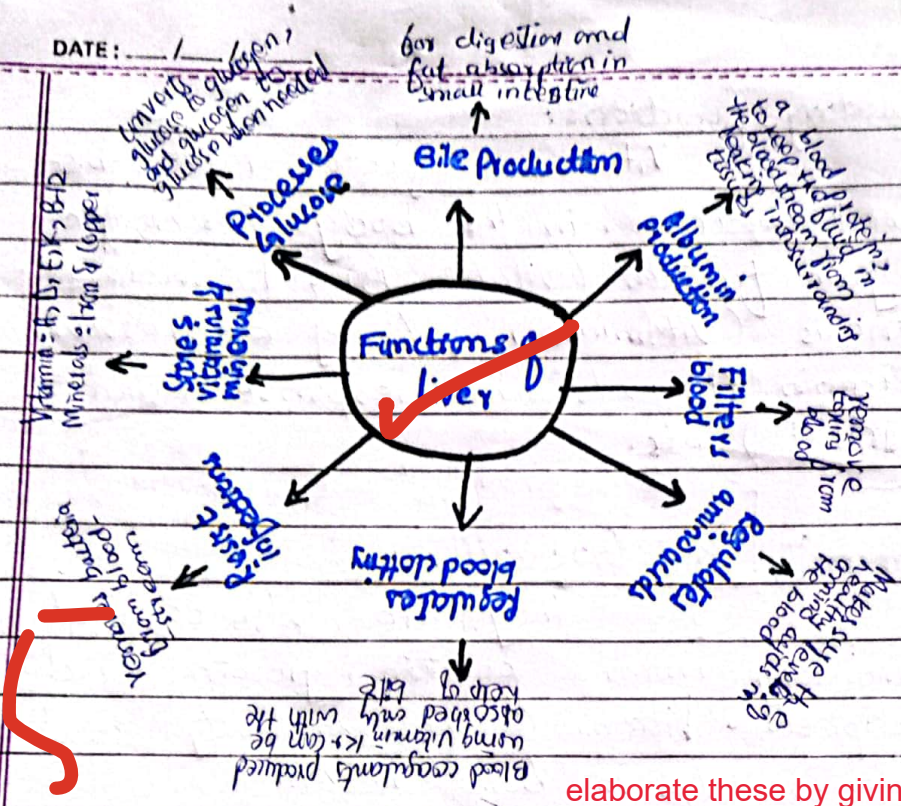

elaborate these by giving paras.

Functioning Of Pancreas:

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

Exocrine Function

produce digestive enzymes, which are released into small intestine through pancreatic duct.

- **Amylase** → starch to maltose
- **Sodium bicarbonate** → neutralizes the acidic nature of chyme during digestion
- **Lipase** → fats to fatty acids
- **Trypsinogen** (inactive form) → Trypsin (active form) → proteins to polypeptides

Endocrine Function

Contain cluster cells called islets of Langerhans which release hormones directly into the blood.

- **Alpha cells** → glucagon → raises blood sugar level
- **Beta cells** → insulin → lowers blood sugar level
- **Delta cells** → somatostatin → regulates insulin and glucagon

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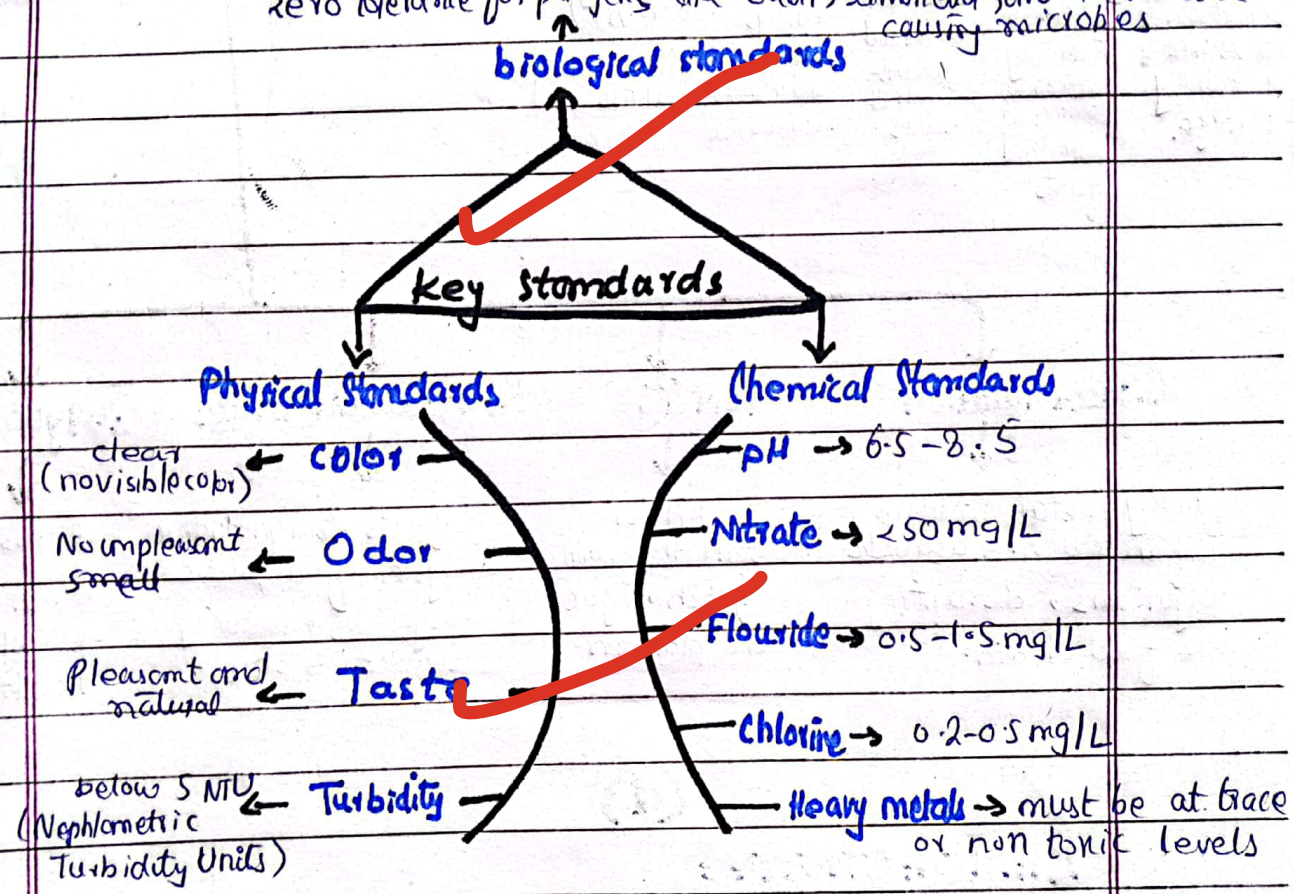
(c)

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).



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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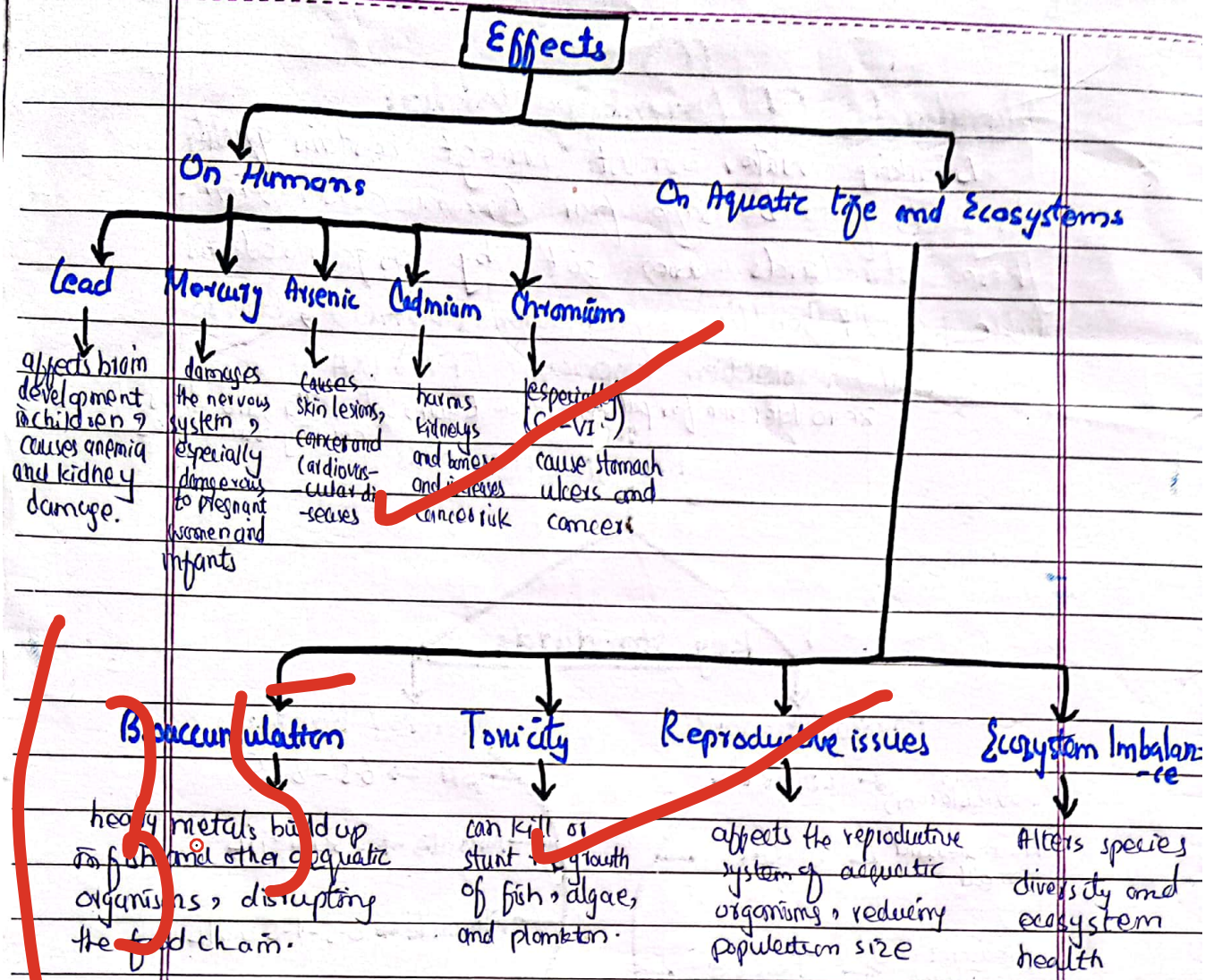

(d)

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

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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 un-decayed 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:

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

3.5

• 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.