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B.Sc. PART- III [Botany Hons.]
PAPER- VII, GROUP- C

(i) ECOSYSTEM - CARBON CYCLE.

Ecosystem - Carbon cycle

Carbon is the most abundant element as it occurs in every organic substance. It forms 49% of the dry weight of organic matter. Carbon is only next to water in abundance. It occurs as free carbon dioxide in atmosphere and dissolve carbon dioxide in hydrosphere. The amount is 6×10^{14} kg in atmosphere (29%) and about 145×10^{14} kg (71%) in the hydrosphere which is mostly oceanic. The two constitute cycling pool of carbon. The reservoir pool is lithosphere. The latter has 2.8×10^{21} kg. of carbon as graphite, carbonate, shells, skeleton and fossil fuels. There are three types of fossil fuels - coal, petroleum and natural gas.

Circulation

- (1) Addition → carbon dioxide is being added to the cycling pool of atmosphere and hydrosphere through two processes.
- (i) Biological process → All living organisms produce CO_2 through respiration. carbon trapped in organic matter is released as $CH_4 \rightarrow CO_2$ during its decomposition.

(ii) Non-biological process → combustion or burning of biomass and fossil fuels produce carbon dioxide. Nearly 6×10^{12} kg of CO_2 is being added to atmosphere through combustion of fossil fuels.

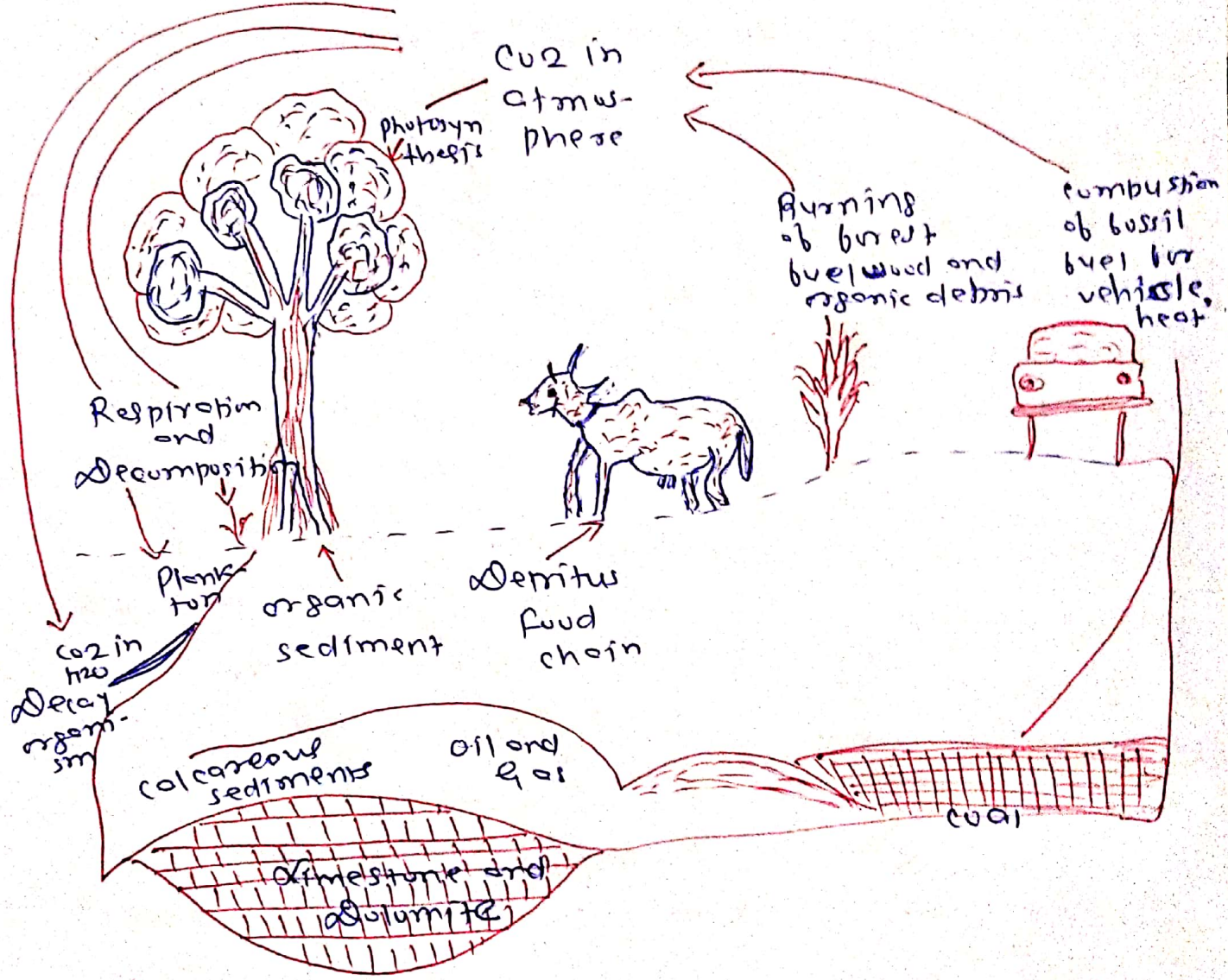


Figure - Diagrammatic model of carbon cycle.

② Utilisation → carbon is taken out of cycling pool of both atmosphere and hydrosphere by all photosynthetic organism or producers. The amount is 4×10^{13} Kg/yr. It is changed into organic matter (17×10^{13} Kg or 170 billion tonnes) through the process of photosynthesis. Oxygen is released as byproduct (9×10^{13} Kg). A part of latter is reutilised by even plants in their respiration. A healthy forest area picks up 8000 Kg. of carbon (as 30,000 Kg of CO_2) and releases 10,000 Kg. of oxygen per hectare per annum.

Organic matter synthesized by producers is partially consumed by them in their respiration. A major part enters the food chain. Herbivores obtain their requirement of food from plants. From herbivores, fixed carbon passes into primary carnivores and so on. Organic excretions and organic remains of all organisms are made of carbon. They are acted upon by decomposers which release carbon back to atmosphere and hydrosphere.

Output and Input

A part of carbon is being removed from the cycling pool and passing into lithosphere as skeleton, shells, fossils, formation and sedimentation of carbonate.

e.g; limestone. Similarly a small part of lithospheric carbon is passing into cycling pool through withering of carbonate containing rocks, treatment of carbon containing ores, volcanic eruption and hot springs.

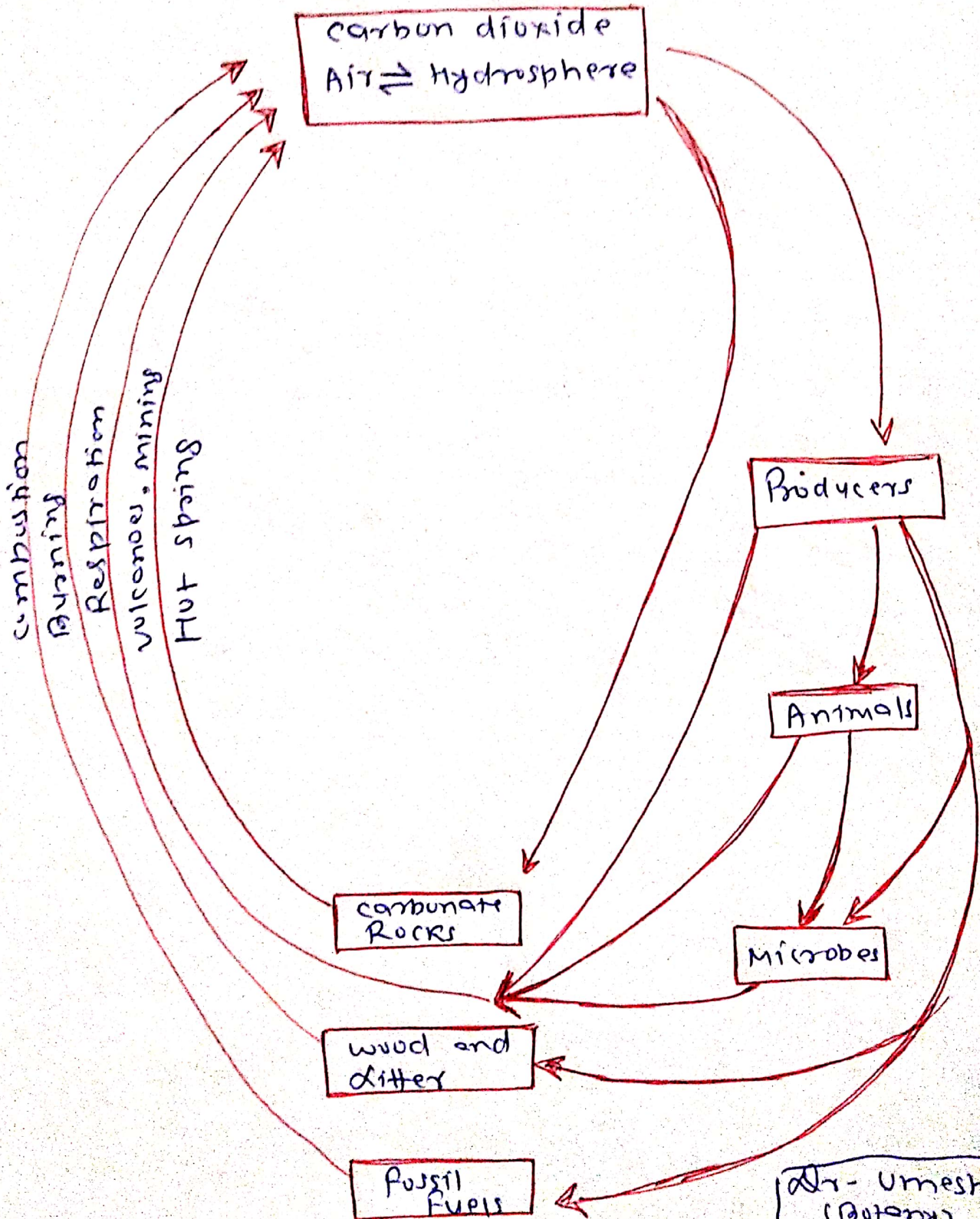


Figure - carbon cycle

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