



Mahindra University Hyderabad

École Centrale School of Engineering
End-semester Regular Examination

Program: B. Tech.

Branch: All

Year: I

Semester: I

Subject: Earth & Environmental Sciences (CE1101)

Date: 27-12-2022

Time Duration: 3 Hours

Start Time: 9:00 AM

Max. Marks: 100

Instructions:

- 1) Read questions carefully and answer to the point.
- 2) Each question carries twenty marks.
- 3) Assume any non-trivial data wherever needed.

Q1. A) Match the following.

[10 M]

*	1. Pangea	A. Consumption (2) (9)
*	2. Sulfur cycle	B. Methane (5)
*	3. Albedo	C. Weathering (6)
*	4. Impact	D. Benioff zone (8)
*	5. Permafrost	E. Garbage patch (10)
*	6. Regolith	F. Volcanoes (7)
*	7. Basaltic	G. Paleomagnetism (11)
*	8. Earthquake	H. Acid rain (2)
*	9. Carbon dioxide	I. Ocean crust (1)
*	10. Gyre	J. Aerosols (2) (3)

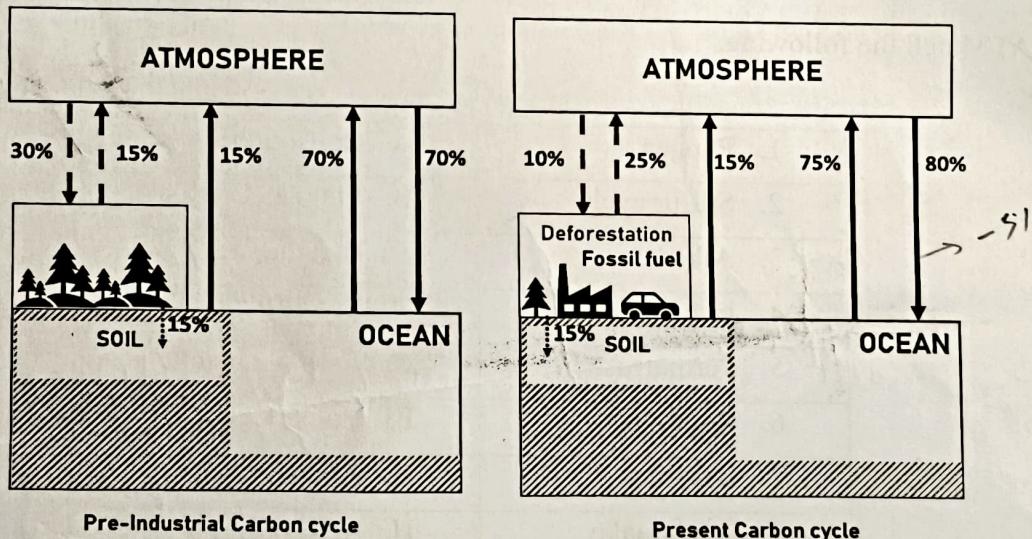
B) State, whether true or false.

[10 M]

1. The energy released by fusion reactions in the Sun is in the form of UV-Visible rays. F
2. Most tsunamis are generated by subduction zone-related earthquakes. T
3. The more hydrogen ions in the water, the more rapidly chemical weathering occurs due to hydrolysis and dissolution. T

4. The melting of the ice sheet does not affect the sea level. T
5. Deep currents are driven horizontally and vertically by wind and Coriolis force. T
6. Convergence in a cyclone causes a rising updraft of air and with it clouds and probably precipitation. T
7. The Coriolis effect is the most significant force in the equator and polar regions. F
8. Water vapor decreases with an increase in altitude T
9. Hydrosphere has little or no role in the P cycle. F
10. The maximum concentration of ozone is in the middle stratosphere. T

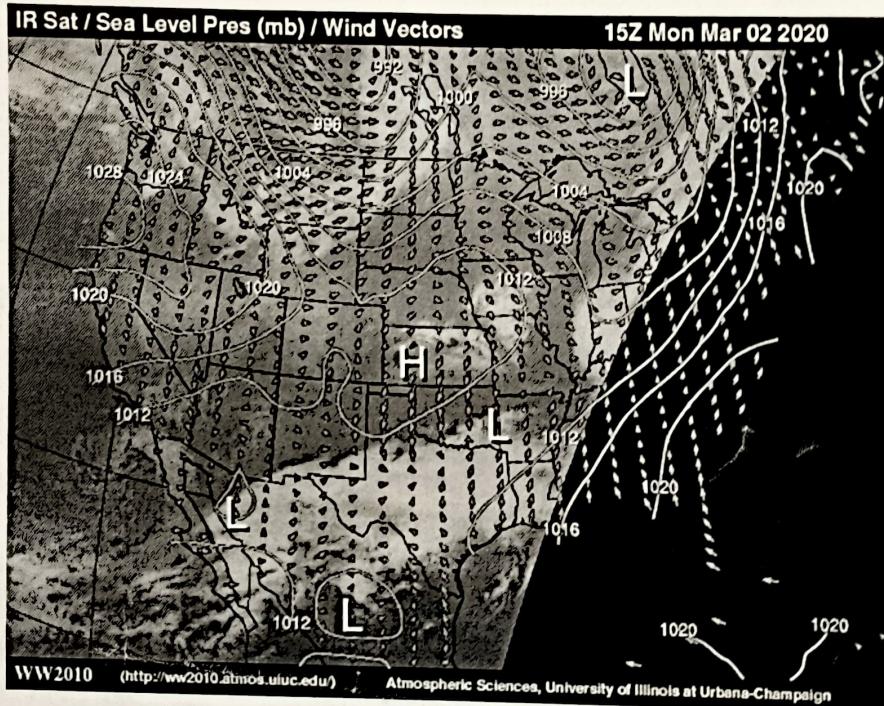
Q2. The global carbon cycle at pre-industrial and present periods is presented in box models. Answer the following questions with calculations [20 M]



- a.** Was atmospheric CO₂ in a steady state during pre-industrial times and the present period?
- b.** How did the initial atmospheric CO₂ form? What happened to atmospheric CO₂? What are the major sinks of CO₂ in the pre-industrial and present carbon cycles?
- c.** How much input and output of CO₂ had been changed between the pre-industrial and present carbon cycle? What happens to the pH of the seawater and life when the levels of atmospheric CO₂ increase due to human activity?
- d.** How does the change in atmospheric CO₂ levels affect the climate?

- Q3.** The map below depicts sea-level pressure and surface wind vectors. The contours represent pressure contours (isobars) in millibars. The isobars have an interval of 4 millibars. Wind vectors show wind direction and wind speed. The wind speed is directly related to the distance between the isobars. In the background, infrared satellite data shows the cloud patterns over the region. Answer the following questions based on the map.

[20 M]



- a. Find out which hemisphere is the given region located in based on the wind direction at low-pressure and high-pressure areas. Calculate the highest-pressure difference observed from the isobars.
- b. How winds are influenced by the Coriolis effect? Due to the Coriolis and Ekman transport effect, what type of process occurs in the coastal regions (black area)?
- c. Predict the climatic conditions near high- and low-pressure areas and comment on whether it is matching the Cloud cover map.
- d. Why does air circulate? What is Jet stream? What factors influence Jet stream? Can we stop Jet stream?

Q4. Differentiate climate change and weather? Explain briefly the impacts of climate change on the Earth's system (Atmosphere, Biosphere, Cryosphere, Hydrosphere, and lithosphere). [20 M]

Q5. Write a short note on [20 M]

- a) Ozone layer depletion
- b) Water conservation
- c) Emerging micropollutants
- d) Thermal pollution