# INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR

## Mid-Autumn Semester Examination 2022-23

**Date of Examination:** 22-09-2022 **Session: (FN/AN)** FN **Duration: 2 hrs** **Full Marks:** 30

**Subject No. :** HS50024 **Subject :** ECONOMICS OF CLIMATE CHANGE

**Department/Center/School:** DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

**Specific charts, graph paper, log book etc., required** NOT REQUIRED

**Special Instructions (if any) :** Use of scientific calculator is permitted.

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### Part A: $(2 \times 5 = 10$ Marks)

**Answer ALL Questions**

1. The following table details levels of three important parameters for 2010 and their projected values for 2050 for the business-as-usual (BAU) scenario (when, we don't do anything to reduce $CO_2$ emissions).

   (a) From the given information, find out at what rate total $CO_2$ emissions will growth by 2050?

   (b) What would be the total $CO_2$ emission (in million tons) for the world in 2050?

   [*Hint*: You may need to use the calculator and the Compound Annual Growth Rate (CAGR) formula $g = \left[\left(\frac{V_{final}}{V_{begin}}\right)^{\frac{1}{t}} - 1\right]$, where $g$ is growth rate per year, $V_{final}$ – final value, $V_{begin}$ – beginning value and $t$ is time in years.]

| | **2010** | **2050** |
|---|---|---|
| Per-capita GDP (2005 $/person) | 9,780 | 22,400 |
| $CO_2$–output ratio (tons/$ 1 million) | 522 | 278 |
| Population (millions) | 6,410 | 9,170 |
| **Total $CO_2$Emissions (million tons)** | **34,900** | **?** |

2. What are tipping points? Give an example of tipping points in economics. What are climate tipping points? How many tipping points have been identified so far by scientists? List some of them and discuss any one in detail.

[P.T.O.]

## Part B: (10 × 2 = 20 Marks)

Answer ALL Questions

3. What is the current level of $CO_2$ conentration in the atmosphere? What is the current level of $CH_4$ conentration in the atmosphere?

4. Which of the following gases have shown a cubic path of increase over time?
   (a) CFCs (b) Methane (c) Carbon dioxide (d) Halogen Gases

5. Which of the following is not a GHG?
   (a) $NO_2$ (b) $CH_4$ (c) $NO_2$ (d) $N_2O$

6. What is radiative forcing? What is the implication of positive radiative forcing?

7. What is climate sensitivity?

8. What is decarbonization?

9. What is global warming potential? How is global warming potential of a GHG measured?

10. What are 'global mixed pollutants'? Why is it important in the discussion relating to climate change?

11. What is a GCM? What is AOGCM? What is the ultimate goal of a GCM/AOGCM?

12. What is the range of projected warming by 2100 due to a doubling of GHG concentration in the atmosphere as per the AR5 of the IPCC? What is the benchmark level of emission against which this is calculated?