



M.E. DEGREE EXAMINATIONS: DEC 2022

(Regulation 2018)

Second Semester

ENVIRONMENTAL ENGINEERING

P18EEE0002: Climate Change and Adaptation

COURSE OUTCOMES

CO1: Apply the different concept of climate change and its consequences

CO2: Adopt the methodologies in finding the changes in climate

CO3: Apply basic climate modelling

CO4: Predict climate changes and downscaling techniques

CO5: Identify impacts of climate change

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Assertion (A): The migratory patterns of whales, fish and other marine animals are changing. CO5 [K₂]
Reason (R): Warming Ocean temperatures is the main reason for migration of marine organisms.
 - a) Both A and R are true and R is the correct explanation for A
 - b) Both A and R are true but R is the incorrect explanation of A
 - c) A is true but R is false
 - d) A is false but R is true
2. Where have some of the strongest and earliest impacts of global warming occurred? CO2 [K₂]
 - a) In the tropics
 - b) In northern latitudes
 - b) Impacts of global warming are distributed equally all over the planet.
 - d) In the poles
3. What percentage of the global greenhouse gas emissions does the transportation sector emit? CO1 [K₂]
 - a) 1%
 - b) 14%
 - c) 33%
 - d) 70%

4. Matching type item with multiple choice code

CO3 [K₂]

List I	List II
A. Radiative-convective models (RCM)	i. horizontal energy transfer modelled by EBMs with the radiative-convective approach of RCMs
B. Statistical-dynamical models (SDM)	ii. simulate Earth's climate with different climate variables and initial boundary conditions
C. General circulation model (GCM)	iii. analyse vertical temperature and provide modelling of radiative process and convective adjustment
D. Coupled model	iv. combine the interactions of the atmospheric GCMs and oceans GCMs

A B C D

- a) **iii** **i** **ii** **iv**
- b) iii ii i iv
- c) ii iii i iv
- d) i iii ii iv

5. Assertion (A): Numerical weather prediction models could also compute cloud ceiling and visibility, transport and dispersion, stream flow and sound propagation

CO4 [K₂]

Reason (R): The numerical weather prediction models is able to compute the cloud ceiling and visibility only when it is coupled with other models.

- a) Both A and R are true and R is the correct explanation for A
- b) Both A and R are true but R is the incorrect explanation of A
- c) A is true but R is false
- d) A is false but R is true

6. What was agreed to in the “Paris Agreement” that came out of COP-21, held in Paris in 2015?

CO2 [K₂]

- a) To protect biodiversity and end the deforestation of the world's rainforests
- b) To keep global temperature rise well below 2°C pre-industrial levels and to pursue a path to limit warming to 1.5°C
- c) To limit sea level rise to 3 feet above current levels
- d) To pursue a goal of 100% clean, renewable energy

7. Identify which of the following about Statistical downscaling model (SDSM) is/are correct.

COL [K₂]

- 1. Quality control identifies data errors, missing data and outliers.
- 2. Selected data transformation is not possible using.

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|-----|--|-----|-------------------|
| 18. | What do the current scenario of climate model indicate? | CO4 | [K ₂] |
| 19. | Does deforestation contribute to climate change. Comment | CO5 | [K ₂] |
| 20. | Briefly explain about the influence of climate change on human health. | CO5 | [K ₂] |

PART C (10 x 5 = 50 Marks)

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|-----|---|-----|-------------------|
| 21. | Justify how natural as well as anthropogenic greenhouse gas emission plays a vital role in global warming and climate change. | CO1 | [K ₃] |
| 22. | Describe about El Nino and its effects. | CO1 | [K ₂] |
| 23. | Is climate feedback, an internal process or an external process of the climate system. Relate how the climate feedback influences the climate of the earth? | CO2 | [K ₃] |
| 24. | Discuss on the mechanisms under which the Kyoto Protocol implement their operations. | CO2 | [K ₂] |
| 25. | What is the need to evaluate Global Climate models? How will you evaluate the GCMs and list the various performance indicators used in evaluation? | CO3 | [K ₂] |
| 26. | Differentiate Climate Sensitivity and feedback. Explain the various positive feedbacks that influence the climate change | CO3 | [K ₂] |
| 27. | Differentiate long term and short term forecast climate. | CO4 | [K ₂] |
| 28. | Describe in detail about any one method of statistical downscaling technique. | CO4 | [K ₂] |
| 29. | Is East Africa's current locust outbreak unprecedented? How is the current locust outbreak linked to climate conditions? What are the future consequences of the outbreak to the society? | CO5 | [K ₃] |
| 30. | What are the eight ways laid forward as India's Mission on Mitigating Climate Change? Explain any five of them briefly. | CO5 | [K ₂] |

Answer any TWO Questions

PART D (2 x 10 = 20 Marks)

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|-----|--|----|-----|-------------------|
| 31. | Discuss the distribution of heat over Earth's surface and how it drives global circulation. Illustrate the role of Coriolis force in the atmospheric circulation considering the global wind system. | 10 | CO1 | [K ₃] |
| 32. | Illustrate with appropriate evidence to substantiate the climate change in India. | 10 | CO2 | [K ₃] |
| 33. | How does climate change impact agriculture? Explain about India's National mission for sustainable agriculture. | 10 | CO5 | [K ₂] |
