Roll No……..….. **Total No. of Printed Pages: [02]**
Total No. of Questions: [09]

BCA (Semester – 4th)
ENVIRONMENTAL TECHNOLOGY & SAFETY
Subject Code: BCIE0F91
Paper ID: [OE1160122]

Time: 03 Hours **Maximum Marks: 60**

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A **(2 marks each)**

Q1. Attempt the following:

a) Define HAZOP analysis and explain its significance in the petroleum industry.
b) Discuss the environmental impacts of gas flaring and suggest possible mitigation measures.
c) Explain the sampling methods used for assessing air pollution in the petroleum industry.
d) Describe the key strategies for controlling aqueous wastes in petroleum operations.
e) Differentiate between the various components of fire and their significance in fire control.
f) Discuss the importance of the DOW fire index in assessing fire hazards in the petroleum industry.
g) Enumerate the causes of refinery fires and propose preventive measures.
h) Explain the significance of emergency preparation in handling fire incidents in petroleum facilities.
i) Contrast surface and subsurface disposal methods for waste management in the petroleum industry.
j) Outline the effluent water treatment methods commonly employed in oil field waste management.

Section – B **(5 marks each)**

Q2. Discuss the environmental implications of air, water, and land pollution in the context of the petroleum industry. How can environmental control and engineering practices mitigate these impacts?

Q3. Explain the classification of fires according to NFPA standards. Evaluate the effectiveness of fire safety equipment in preventing and controlling fire incidents in petroleum facilities. Include a discussion on the importance of regular maintenance and testing.

Q4. Compare and contrast the various methods for treating water, solid material, and air emissions in the petroleum industry. Discuss the factors influencing the selection of appropriate treatment methods.

Q5. Analyze the key provisions of the Oil Mines Regulation Act in India related to safety management, drilling, production, and transportation in the petroleum industry. How do these regulations contribute to accident prevention and environmental protection?

Q6. Discuss the regulatory frameworks governing waste disposal practices and their enforcement mechanisms.

Section – C **(10 marks each)**

Q7. Develop a comprehensive emergency preparedness plan for a hypothetical petroleum facility, considering potential fire incidents, hazardous material releases, and other safety threats. Outline the key components of the plan, including emergency response procedures, evacuation protocols, communication strategies, and coordination with local authorities.

Q8. Discuss the principles and methodologies of HAZOP (Hazard and Operability) analysis in assessing and managing risks in petroleum operations. Provide a detailed explanation of the steps involved in conducting a HAZOP study, including the identification of hazards, operability issues, and recommended preventive measures.

Q9. Evaluate the effectiveness of existing regulations in ensuring the health and safety of workers, preventing environmental pollution, and promoting sustainable petroleum operations. Discuss any gaps or shortcomings in the regulatory framework and propose recommendations for strengthening safety standards and enforcement mechanisms.