

**UNIVERSITY COLLEGE TATI (UCTATI)****FINAL EXAMINATION QUESTION BOOKLET**

COURSE CODE	: BCE 3114
COURSE	: POLLUTION CONTROL
SEMESTER/SESSION	: SEM 1- 2024/2025
DURATION	: 3 HOURS

Instructions:

1. This booklet contains **4** questions. Answer **ALL**.
2. All answers should be written in answer booklet.
3. If in doubt, raise your hands and ask the invigilator.

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO

THIS BOOKLET CONTAINS 4 PRINTED PAGES INCLUDING COVER PAGE

QUESTION 1 (25 MARKS)

a) Differentiate between the following terms (Illustrate your answers with appropriate sketches if needed):

- i. grab sampling and composite sampling methods (4 marks)
- ii. Ground and surface water. (4 marks)
- iii. Coagulation by Alum and chlorination processes (4 marks)
- iv. COD & BOD. (4 marks)

b) A 25 ml water sample is placed in in a dish that wt. 50g, after filtration the wt of filter with wet sample was 50.5g. Drying was carried out at 103° C for 24 hrs. The weight of filter and dry sample was 50.24.
Calculate the followings;

- i. The wt of wet sample in g and as % (3 marks)
- ii. The wt of dry sample in g and as % (3 marks)
- iii. The wt of moisture in g and as % (3 marks)

QUESTION 2 (25 MARKS)

a) i. Acid rain is caused by human emission of sulphur and nitrogen compounds. Develop the chemical equation mechanism when sulfur and nitrogen emitted to the open environment. (5 marks)

ii. State three (3) effects of acid rain. (5 marks)

b) In a BOD determination, 6 mL of wastewater are mixed with 294 mL of diluting water containing 9.1 mg/L of dissolved oxygen. After 5 days incubation at 20 °C, the dissolved oxygen content of the mixture was 2.8 mg/L.

- i. Calculate P (7 marks)
- ii. Calculate the BOD in mg/L (8 marks)

QUESTION 3 (25 MARKS)

- a)
- i. What do we mean by maximum allowable limits of toxic compounds? (4 marks)
 - ii. Scheduled waste management introduced by environment quality acts 127 has different meaning and classifications explain and give example to clarify. (3 marks)
 - iii. Selection of landfills in solid waste management is very important criteria. Explain about this statement? (3 marks)
- b) Consider oil droplets $0.6\mu\text{m}$ diameter suspended in air and exposed to day time radiation. The density of the particle is 0.9 gm/cm^3 .
- i. Determine the concentration of the particle in $\mu\text{g/m}^3$ for a visibility of 1.5 km, if the k value is 4.0 (7 marks)
 - ii. Determine is the concentration of suspended particulates in the density of 2.5 gm/cm^3 and an effective diameter of 1.0μ , if k is 2.0 and visibility is reduced to 8 km? (8 marks)

QUESTION 4 (25 MARKS)

- a) The term wet scrubber describes a variety of devices that remove pollutants from a furnace flue gas or from other gas streams. In a wet scrubber, the polluted gas stream is brought into contact with the scrubbing liquid to cure air pollution contains Sulphur and Nitrogen gases compounds, Illustrate with schematic diagram the wet scrubber (you can select vertical or horizontal method). (7 marks)
- b) It is well known that CO_2 is one source of air pollution causes global warming. Assume that ethanol ($\text{C}_2\text{H}_5\text{OH}$) was used as fuel in vehicles for combustion process. the output from complete combustion of oxygen and ethanol is CO_2 and H_2O . Do the followings;
Calculate the followings (Take one liter as a basis):
- Write a balanced equation for the mentioned reaction. (6 marks)
 - suppose that the density of ethanol is 789 kg/m^3 and 5 liter of methanol was used how much kg needed. (6 marks)
 - Calculate how much O_2 was used to change all 5 liters to CO_2 and H_2O from the balanced equation. (6 marks)

-----End of questions-----