FACULTY OF ENGINEERING

DEPARTMENT OF CIVIL ENGINEERING
SECOND SEMESTER EXAMINATION
(AUGUST 2018)
2017/2018 ACADEMIC SESSION

Course Title: BASIC ENVIRONMENTAL ENGINEERING

Course Code: CVE 506

HOD'S SIGNATURE

Instructions:

1) Answer 2 questions from section A and 3 questions from section B

2) **Time Allowed: 3 hours**

3) **SEVERE PENALTIES APPLY FOR MISCONDUCT, CHEATING, POSSESSION OF UNAUTHORIZED MATERIALS DURING EXAMINATION**

Course Code: CVE 506   **Course Title:** BASIC ENVIRONMENTAL ENGINEERING

Time Allowed: 3HOURS

INSTRUCTION: Answer 2 questions from section A and 3 questions from section B

SECTION A

QUESTION 1 (20 marks).

a. The global environment consists of the atmosphere, hydrosphere and lithosphere in which the life-sustaining resources of the earth are contained. Describe briefly these earth layers   (6 marks).

b. What is the biosphere.   (4 marks).

c. Define:

i. Environmental Engineering   (5 marks)

ii. Water Pollution   (5 marks).

QUESTION 2 (20 marks).

a. Outline the investigations you would conduct as an Environmental Engineer and the data you would collect for preparing a water supply scheme for City.   (10 marks).

b. Sketch a general layout of a water supply scheme from the sources (River) to the distribution of the treated water to the consumers showing the unit operations and processes.   (10 marks).

QUESTION 3 (20 marks).

a. The quality of sewage can be checked and tested by its physical, chemical and bacteriological (biological) characteristic.   (10 marks).

b. The pollution of stream by sewage discharged into a river by process of self-purification. Outline the process and state some factors which influence the DO Sag-curve.   (10 marks).

SECTION B

QUESTION 4 (20 marks).

a. Define pH and explain its implication in water (10 marks).

b. In a water treatment plant, pH values of in coming and outgoing waters are 7.2 and 8.4 respectively. Assuming a linear variation of pH with time, determine the average value of water. (10 marks).

QUESTION 5 (20 marks).

a. Define the concept of Biochemical Oxygen Demand (BOD) and what is meant by BOD_5. (6 marks).

b. State some uses of BOD test results. (4 marks).

c. Determine the ultimate BOD for a sewage having a 5-days BOD at 20^0c as 180mg/l. assume the base 10 rate constant K = 0.1/day. (4 marks).

d. Determine the 2-day BOD of the sewage. (2 marks).

e. A sample of sewage has a 4-day 20^0c BOD value of 70% of the final BOD. Find the base 10 rate constant. (4 marks).

QUESTION 6 (20 marks).

a. The sewage of a town is to be discharged into a river stream. The quantity of sewage produced per day is 8 million liters and its BOD is 250 mg/l. if the discharge in the river is 200l/s. If the BOD is 6 mg/l. Determine the BOD of the diluted water (10 marks).

b. What should be the above river discharge in the same town, if it is desired to reduce the BOD of the diluted water 20 mg/l? (10 marks)

QUESTION 7 (20 marks).

a. Explain the following associated with water-based sanitation of a community:
   i. Sanitation
   ii. Sullage (Grey Water)
   iii. Sewers
   iv. Sewerage
   v. Sewage (10 marks)

b. Calculate the velocity of flow in a sewer of circular section having a diameter of 1.0 m and at a gradient of 1 in 400, flowing half-full. (7 marks)

c. What will be the discharge through the sewer when running half-full? Use manning's formula, taking n = 0.012 (3 marks)