

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
EIGHTH SEMESTER B.TECH DEGREE EXAMINATION, MAY 2019

Course Code: CE402

Course Name: ENVIRONMENTAL ENGINEERING – II

Max. Marks: 100

Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks.

Marks

- | | | |
|---|---|--|
| 1 | a) Define a) Sullage b) Sewage c) Storm water d) Night soil (4)
b) Explain Time of concentration (3)
c) Determine the size of circular sewer for a discharge of 700lps running half full. (8)
Assume $i=0.0001$ and $n=0.015$ | |
| 2 | a) Discuss the merits & demerits of separate and combined system of sewage (8)
b) Discuss the purposes served by an inverted siphon with help of a neat sketch. (5)
c) Explain the term relative stability. (2) | |
| 3 | a) Define a) BOD b) COD (4)
b) Explain physical characteristics of sewage (6)
c) The 5 day BOD of a sewage sample is 150 mg/l. Determine its 3 days 20°C BOD. (5)
Assume deoxygenation constant at 20°C as 0.1 | |

PART B

Answer any two full questions, each carries 15 marks.

- | | | |
|---|---|--|
| 4 | a) Give the flow diagram of a conventional municipal wastewater treatment. (3)
b) A city discharges $100 \text{ m}^3/\text{s}$ of sewage into a river, which is fully saturated with oxygen flowing at the rate of $1500 \text{ m}^3/\text{s}$ and with a velocity of 0.2 m/s . The 5 days BOD of sewage at the given temperature is 250 mg/l . Find when and where the critical D.O deficit will occur in the downstream portion of the river and what is its amount? Assume coefficient of purification of the stream (f) as 4 and coefficient of deoxygenation as 0.1. (12) | |
| 5 | a) Explain sludge volume index. (5) | |

- b) What are the limitations of activated sludge process? (5)
- c) Write short notes on rotating biological contactors. (5)
- 6 a) Compare a standard rate trickling filter with a high rate one. (7)
- b) A rectangular grit chamber is designed to remove particle with a diameter 0.2 mm and specific gravity 2.65. The settling velocities of these particles are found to be 0.02 m/s. A flow through velocity of 0.30 m/s will be maintained by the proportioning weir. Determine the channel dimensions for a maximum wastewater flow of 10,000 m³/day. (8)

PART C

Answer any two full questions, each carries 20 marks.

- 7 a) Design an imhoff tank to treat the sewage from a small town with a population of 20000 persons ,with sewage flow rate of 180 litres per day (14)
- b) What are the advantages and disadvantages of oxidation ponds? (6)
- 8 a) What are the features of acid regression stage and alkaline fermentation stage of sludge digestion? (10)
- b) Explain the working of an Up flow Anaerobic Sludge Blanket (UASB) reactor. Discuss any three drawbacks of UASB. (10)
- 9 a) What are the methods of sludge disposal. (6)
- b) Explain sludge drying bed? (8)
- c) What are the various factors affecting sludge digestion? (6)

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
EIGHTH SEMESTER B.TECH DEGREE EXAMINATION(S), OCTOBER 2019

Course Code: CE402

Course Name: ENVIRONMENTAL ENGINEERING – II

Max. Marks: 100

Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks.

Marks

- 1 a) Differentiate dry weather flow and storm water flow. What are the factors affecting dry weather flow? (5)
- b) A town has a population of 100000 persons with a per capita water supply of 150 l/day/person. Design a sewer running full at maximum discharge. Take $n=0.013$ at all depth of flow. Slope of 1 in 500 and take peak factor of 3 (10)
- 2 a) A 2% solution of a sewage sample is incubated for 5 days at 20°C. The depletion in oxygen was found to be 5mg/L. Determine the BOD of the sewage? (7)
- b) Discuss the importance of self cleaning velocity and limiting velocity in sewers. (4)
- c) Discuss the term time of concentration (4)
- 3 a) Explain Population equivalent (3)
- b) Explain the physical, chemical and bacteriological characteristics of sewage (12)

PART B

Answer any two full questions, each carries 15 marks.

- 4 a) What is oxygen sag curve? Explain various zones of pollution in a river. (6)
- b) Design a suitable bar screen for a plant treating a peak flow of 50million litres per day of sewage. Also compute the head loss through such a screen. Assume suitable data wherever necessary. (9)
- 5 a) Write short notes on flow equalization tank. (3)
- b) Explain Streeter Phelp's equation. (4)
- c) Explain the construction and operation of an intermittent sand filter. Mention the advantages and disadvantages of this system (8)

- 6 Design a conventional trickling filter and its rotary distribution system for treating 5 MLD of sewage with a BOD of 200 mg/l. (15)

PART C

Answer any two full questions, each carries 20 marks.

- 7 a) Design an imhoff tank to treat the sewage from a small town with a population of 20000 persons ,with sewage flow rate of 180 litres per day (14)
- b) What are the advantages and disadvantages of oxidation ponds? (6)
- 8 a) What is an aerated lagoon? (5)
- b) Design a digestion tank for primary sludge with the help of following data (10)
- 1)Average flow=250mld
- 2)Total suspended solids in raw sewage=400mg/l
- 3)Moisture content of digested sludge =85%
- Assume any other suitable data you require
- c) Explain upflow anaerobic sludge blanket? (5)
- 9 a) With the help of neat sketch explain the working of sludge digestion tank (12)
- b) Write a note on sludge conditioning. (4)
- c) Explain the construction and working of sludge lagooning. (4)

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Eighth semester B.Tech degree examinations, September 2020

Course Code: CE402**Course Name: ENVIRONMENTAL ENGINEERING – II**

Max. Marks: 100

Duration: 3 Hours

PART A*Answer any two full questions, each carries 15 marks.*

Marks

- 1 a) Define the term population equivalent. (2)
- b) List and explain the factors affecting storm water flow. (3)
- c) A city has a projected population of 60,000 spread over an area of 50 hectare. (10)
Assume rate of water supply of 250 litres per capita per day, and out of this total supply only 75 % reaches in sewer as wastewater. Assume a peak factor of 1.5. Design a separate circular sewer line running half full. Consider Manning's rugosity coefficient of $n = 0.012$, and gradient of sewer $S = 0.0001$.
- 2 a) Define self- cleansing velocity and explain its significance. (4.5)
- b) Explain the classification of sewers according to the material. (3)
- c) Explain the working of an automatic flushing tank with neat sketch. (7.5)
- 3 a) Discuss the three systems of sewerage adopted in practice. (9)
- b) Differentiate between dry weather flow and wet weather flow. (2)
- c) Determine ultimate first stage BOD for a wastewater having 5 day BOD at 20°C (4)
as 160 mg/l. Assume deoxygenation constant at 20° C as 0.2 per day.

PART B*Answer any two full questions, each carries 15 marks.*

- 4 a) Discuss in detail the zones of pollution in a river or stream. (8)
- b) Compare the disposal by dilution and disposal by land treatment. (5)
- c) What is meant by rotating biological contactor? (2)
- 5 a) List and explain any five factors affecting self-purification capacity of a stream. (7.5)
- b) Explain grit chamber with the help of a neat sketch. (4)
- c) Write notes on activated sludge process. (3.5)
- 6 a) Discuss the working of intermittent sand filter. (2)
- b) Explain the features and operation of contact beds with neat sketch. (8)
- c) Explain streeter phelp's equation. (5)

PART C

Answer any two full questions, each carries 20 marks.

- 7 a) Design the dimensions of a septic tank for a small colony of 150 persons provided with an assured water supply at a rate of 120 litres per person per day. Assume any other data if required. (10)
- b) Discuss any two types of sludge disposal (5)
- c) Explain the features of an Imhoff tank with neat sketch (5)
- 8 a) An oxidation pond is to be constructed in a hot climatic area for treating the sewage from a residential colony with 5000 persons contributing sewage at 120 litres/capita/day. The 5day BOD of sewage is 300mg/ litre. Assume organic loading in the pond as 300kg/ hectares/day. Calculate the dimensions required for the tank and its detention time. (10)
- b) Write notes on sludge thickening? (4)
- c) Explain the features of a sludge digestion tank with a neat sketch. (6)
- 9 a) List and explain the factors affecting anaerobic digestion. (4)
- b) Explain oxidation ditch with a neat sketch. (4)
- c) Calculate the area of land required for drying the sludge from the digestion tank for 50,000 population, Also design the dimensions of beds. The dry sludge content per capita per day is 0.068kg. The moisture of the sludge is 95%. The specific gravity of wet sludge is 1.02. (12)
