ADAMAS UNIVERSITY, KOLKATA
School of Engineering and Technology
End Semester Examination (July 2020)

Name of the Program: M. Tech. (Env. Engg.). **Semester: II**
Stream: CE
Paper Name: Biological Process for Environmental Engineering **Paper Code: ECE61102**
Maximum Marks: 40 **Time duration: 3 hrs**
Total No of questions: 10 **Total No of Pages: 02**

Instruction for the Candidate:

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.
2. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
3. Assumptions made if any, should be stated clearly at the beginning of your answer.

Answer all the Groups

GROUP– A

Answer all the questions **5 x 1= 5**

1. i) Which are the components give during the aerobic decomposition of carbonaceous organic matter.
   ii) State the method to increase the solid content of sludge during the sludge treatment process.
   iii) Which process is used in the anaerobic treatment of sewage?
   iv) Name the five stages in the SBR process.
   v) Name the process of water treatment is done to avoid floating debris, branches, trees or other large particles suspended in water.

GROUP– B

(Short Answer Type Questions)

Answer ***any Three*** of the following **3 x 5 = 15**

2. Write short note on "Septic Tank" and explain its design procedure. 5

3. Define (**any Two**) from the following terms in details: 2½+2½=5

(a) Facultative Pond
(c) SBR process
(d) MBBR
(e) Oxidation Pond

4. Distinguish between separate sewerage system and combined sewerage system. 5

5. Compare between high rate and standard rate trickling filters. 5

6. State the characteristics of domestic sewage in respect of **any two** of the following:
   (a) Total solids
   (b) Biological solids
   (c) DO 2½+2½=5

GROUP– C
(Long Answer Type Questions)

Answer ***any Two*** of the following **2 x 10 = 20**

7. Discuss different methods of disposal of municipal solid wastes. 10

8. Design a septic tank having the following data: 10
   Number of users = 100
   Rate of water supply = 200 lit/head/day
   Detention period = 18 hours
   Percolating capacity of filter media = 1450 lits/m^3

9. Write short notes (**any Two**) from the following: 5+5=10
   a) Trickling filter
   b) Sludge digestion process
   c) Importance of manholes in sewerage system
   d) Brick sewer

10. Describe the irrigation and farming activities in the technique of disposal of sewage. 10

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ADAMAS UNIVERSITY
END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: M.Tech. (Environmental Engg.) Semester: II
Stream: CE
PAPER TITLE: Solid and Hazardous Waste Management PAPER CODE: ECE61104
Maximum Marks: 40 Time duration: 3 Hours
Total No of questions: 08 Total No of Pages: 01

Instruction to the Candidate:
1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.
2. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
3. Assumptions made if any, should be stated clearly at the beginning of your answer.

Answer all the Groups

Group A

Answer all the questions of the following $5 \times 1 = 5$

1. **a)** What serious effects are caused by radioactive waste?

b) Discuss the Industrial waste water characteristics.

c) Why COD is more than BOD ?

d) How can Radioactive waste be disposed?

e) Classify Hazardous waste.

GROUP –B

(Short Answer Type Questions)

Answer *any three* of the following $3 \times 5 = 15$

2. Differentiate between hydroclaving and microwaving for disposal of biomedical waste.
3. Explain the term leachate ? What problems are posed by leachates ?
4. Differentiate between physical and chemical treatment for industrial wastewaters ?
5. Write a note on material recovery facility.

GROUP –C

(Long Answer Type Questions)

Answer *any two* of the following $2 \times 10 = 20$

6. What are the different factors that must be considered in the design of transfer station? Explain storage load transfer station with neat sketch.
7. Explain and describe composting of solid waste, giving details of the digestion process of each method and their environmental impacts.
8. Define and explain the term E-waste. Discuss briefly the impacts of E waste on environment and human health.

ADAMAS UNIVERSITY
END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: M. Tech | Semester: II
Stream: CE | Specialization: Env. Engg.
PAPER TITLE: Industrial Wastewater Pollution Control (Elect-II); PAPER CODE: ECE61106
Maximum Marks: 40 | Time duration: 3 Hours
Total No of questions: 08 | Total No of Pages: 01

Instruction to the Candidate:

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.
2. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
3. Assumptions made if any, should be stated clearly at the beginning of your answer.

Answer all the Groups

Group A

Answer all the questions of the following $5 \times 1 = 5$

1. **a)** State the steps of chemical treatment method of industrial waste water.
b) What is COD?
c) What is unit process?
d) What is meant by souring in textile industry?
e) What are the methods of treatment of woolen scouring waste?

GROUP –B
(Short Answer Type Questions)

Answer *any three* of the following $3 \times 5 = 15$

2. Describe shortly the problems caused due to industrial waste water.
3. State the tests performed in industrial waste water.
4. What are the unit operations of pretreatment of industrial waste water?
5. State the manufacturing operations performed in woolen mill?

GROUP –C
(Long Answer Type Questions)

Answer *any two* of the following $2 \times 10 = 20$

6. Elaborate different types of industrial waste water and its effect.
7. Describe three step policy for water quality.
8. Explain Industrial and municipal waste treatment method.

ADAMAS UNIVERSITY

SCHOOL OF ENGINEERING AND TECHNOLOGY

END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: M.Tech in Environmental Engineering **Semester:** II
Course Name: Optimization Methods **Course Code:** ECE61112
Maximum Marks: 40 **Time duration: 3 hrs**
Total No of questions: 8 **Total No of Pages: 2**

Instructions:
1. At top of sheet, clearly mention Name, Roll No., Enrolment No., Paper Name & Code, Date of Exam.
2. Assumptions made if any, should be stated clearly at the beginning of your answer.
3. All parts of a Question should be answered consecutively.

Answer all the Groups

GROUP –A

1. Answer all the *five* questions of the following: **5 x 1 = 5**

i) Define basic solution.

ii) What are degenerate and non-degenerate basic solutions?

iii) What is the effect in dual LPP if equal type constraints present in primal LPP?

iv) Find the stationary points for the function $f(x) = 3x^2 + 2x - 7$.

v) What are the methods to solve integer programing problem?

GROUP –B

Answer Any Three Questions: **3 x5 = 15**

2. Solve the following LPP by graphical method. **[5]**

$$\text{Max } Z = 3x_1 - x_2$$
$$\text{subject to } 2x_1 + x_2 \geq 2$$
$$x_1 + 3x_2 \leq 2$$
$$x_2 \leq 4$$
$$x_1, \; x_2 \geq 0$$

3. Write the dual form of the following LPP. **[5]**

$$\text{Min } Z = x_1 + x_2 - 5x_3$$
$$\text{subject to } 3x_1 + 5x_2 - x_3 = 4$$
$$x_1 - 2x_2 + 3x_3 = 6$$
$$x_1 + x_2 + x_3 \geq 12$$
$$x_1, x_2, x_3 \geq 0$$

4. Find basic solutions of the given system. **[5]**

$$2x_1 + x_2 + 4x_3 = 11$$
$$3x_1 + x_2 + 5x_3 = 14$$

5. Find the extreme values of $f(x, y) = x^2 + y^2 + (x + y + 1)^2$. **[5]**

GROUP- C

Answer Any Two Questions: **2x10 = 20**

6. Find all the maxima and minima of the function $f(x, y) = 2x^3 + 6xy^2 - 3y^3 - 150x$. **[10]**

7. Solve the following LPP by using simplex method **[10]**

$$\text{Min } Z = 4x_1 + 8x_2 + 3x_3$$
$$\text{subject to } x_1 + x_2 \geq 2$$
$$2x_1 + x_3 \geq 5$$
$$x_1, x_2, x_3 \geq 0$$

8. Solve the following integer programing problem by Gomory's constraint method. **[10]**

$$\text{Max } Z = x_1 + 2x_2$$
$$\text{subject to } 2x_2 \leq 7$$
$$x_1 + x_2 \leq 7$$
$$2x_1 \leq 11$$
$$x_1, x_2 \geq 0 \text{ and integers.}$$