

Total No. of Questions : 10]

SEAT No. :

**P5107**

[Total No. of Pages : 3

**[5561]-501**

**B.E. (Civil)**

**ENVIRONMENTAL ENGINEERING - II**

**(2015 Pattern) (Semester - II)**

*Time : 2½ Hours]*

*[Max. Marks : 70*

*Instructions to the candidates:*

- 1) *Answer Q.1 or 2, Q.3 or 4, Q.5 or 6, Q.7 or 8, Q.9 or 10*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume suitable data, if necessary.*

- Q1)** a) Write Streeter-Phelps equation and explain the meaning each term involved in it. **[5]**
- b) Find min velocity and gradient required to carry coarse sand particles of size 1.5 mm and specific gravity is 2.65 through a sewer of diameter 0.9 m. Assume constants  $\beta = 0.04$ ,  $f = 0.03$  and  $N = 0.013$ . The sewer may be assumed to run half full. **[5]**

OR

- Q2)** a) Write a short note on pumping of sewage. **[5]**
- b) Explain in brief Self-purification of natural stream. **[5]**

- Q3)** a) Design a grit chamber with proportioning flow weir using the following data:**[6]**
- i) Sewage flow = 10MLD
  - ii) Grit size = 0.2mm. sp.gr. = 2.65
  - iii) Temperature of sewage = 10
  - iv) Desired removal efficiency = 80%
  - v) Constant  $n = 1/4$

Determine:

- I. Required surface overflow rate.
- II. Number and dimensions of grit channels.
- III. Dimensions of proportioning flow weir

**P.T.O.**

- b) Draw the flow diagram for primary settlement of sewage. State the type of impurities removed in each unit. [4]

OR

- Q4)** a) Write working principle of rotating biological contactor. Also write the advantages and disadvantages. [5]
- b) State modifications in ASP and hence differentiate between completely mixed ASP and extended processes. [5]

- Q5)** a) Write a note on phytoremediation for waste water treatment. [8]
- b) Design an oxidation pond for treating sewage from a residential colony having population of 10,000 with sewage flow rate of 120 lpcd with the following data. [8]

BOD<sub>5</sub> of raw sewage = 300 mg/l

Desired effluent BODs = 30 mg/l

Location - 28° N

Elevation - 200 m above sea level

Temperature - 25°C

Sky clearance factor - 60%

BOD removal rate constant for the pond at 20° C as 0.1/d

Assume permissible organic loading at 28°N as 200 kg/ha.d

OR

- Q6)** a) Explain aerated lagoon with respect to its working principle, design parameters and applications. [8]
- b) Explain the Algal-Bacterial symbiosis in oxidation ponds. Discuss the design criteria of Oxidation Pond. [8]
- Q7)** a) Write a detailed note on Sludge digester. [8]

- b) Explain in brief working principle, advantages and disadvantages of Packaged sewage treatment plant. [8]

OR

- Q8)** a) Discuss different methods of sludge treatment and disposal. [8]

- b) Write principle and stages of anaerobic digestion. Explain factors affecting digestion process. [8]

- Q9)** a) Explain the following points related to Distillery industry. [9]

- i) Flow sheet of manufacturing process and wastewater generation
- ii) Characteristics of waste water.
- iii) Flow sheet of wastewater treatment.

- b) Explain methods of waste water sampling. [5]

- c) Write characteristics of Sugar industry wastewater. [4]

OR

- Q10)**a) Explain the following points related to dairy industry. [9]

- i) Flow sheet of manufacturing process and wastewater generation
- ii) Characteristics of waste water.
- iii) Flow sheet of wastewater treatment

- b) Explain equalization and neutralization unit process with respect to its working principle, need, factors affecting the process and application. [9]

