

Total No. of Questions : 10]

SEAT No. :

**P1**

[Total No. of Pages : 2

[5871]-501

**B.E. (Civil)**

**ENVIRONMENTAL ENGINEERING-II**

**(2015 Pattern) (Semester - I)**

*Time : 2½ Hours]*

*[Max. Marks : 70*

*Instructions to the candidates:*

- 1) *Attempt Q.1 or Q.2 Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, and Q.9 or Q.10.*
- 2) *Figures to the right indicates full marks.*
- 3) *Draw neat figures wherever necessary.*
- 4) *Assume any missing data if necessary.*
- 5) *Use of scientific calculators is allowed.*

**Q1) a)** Discuss the following zones of a stream which is undergoing self-purification. **[5]**

- i) Zone of degradation.
- ii) Zone of active decomposition.
- iii) Zone of recovery.
- iv) Zone of clear water.

**b)** Differentiate between separate and combined sewerage system. **[5]**

**OR**

**Q2) a)** Draw a neat sketch of primary sedimentation tank showing different zones of sedimentation. Also comment on the performance of primary sedimentation tanks with reference to removal of suspended solids and corresponding BOD removal. **[4+1]**

**b)** Estimate the screen requirement for a plant treating a peak flow of 50 million litres per day. Assume velocity through screen is 0.8% m/s and size of bar 10mm width and 50 mm clear spacing and the bars placed 60° to the horizontal. **[5]**

**Q3) a)** Define the terms with respect to activated sludge process. **[5]**

- i) Hydraulic retention time.
- ii) Mean cell residence time.
- iii) Food to microorganism ratio.
- iv) Sludge volume index.
- v) Sludge recirculation ratio.

**b)** Write biological principle, advantages and disadvantages of sequential batch reactor. **[1+2+2]**

**OR**

**Q4) a)** Explain trickling filter in detail with a neat sketch and biological processes involved in it. **[5]**

**b)** Explain the terms.

- i) Self-cleansing velocity.
- ii) Variations in the sewage flow.

**P.T.O.**

**Q5) a)** Write wastewater treatment principle of phytoremediation technology and explain its working with schematic sketch. [4+4]

b) Design an oxidation pond for treating sewage from a hot climatic residential colony with 5000 persons. The sewage generation is about 135 litres per capita per day. The  $BOD_3$  at  $27^\circ C$  is 200 mg/lit. BOD loading in hot climate is 300 kg/ha/d. BOD removal rate constant = 0.23/day, depth of pond is 1.5m. [8]

OR

**Q6) a)** Explain the principle of working of aerated lagoon. Also state its merits and demerits over to oxidation pond. [4+2+2]

b) Write water treatment principle of root zone cleaning system and explain its working with schematic sketch and write its application. [4+3+1]

**Q7) a)** Explain working principle and application of MBR, MBBR and FMBR. [8]

b) Explain any two methods of sludge disposal with advantages disadvantages and application. [4+4]

OR

**Q8) a)** Draw a flow sheet and discuss the working principle of package sewage treatment plant. Write advantages and limitations of the same. [4+2+2]

b) Write principle and stages of anaerobic digestion. Explain factors affecting digestion process. [2+3+3]

**Q9) a)** Explain neutralization unit process with respect to its working principle, need, factors affecting the process and application. [9]

b) Give the range of important characteristics of waste water from following industry and draw a suitable flow diagram for treatment for each industry. [9]

i) Dairy industry.

ii) Distillery industry.

OR

**Q10) a)** Explain Recycle and reuse of treated wastewater with example. [6]

b) Explain in brief primary, secondary and tertiary treatment process adopted for treating industrial wastewater. [2+2+2]

c) State the sources and characteristics of sugar wastewater and draw suitable treatment flow sheet. [2+2+2]

