



(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 100602

Roll No.

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B. Tech.

(SEM. VI) THEORY EXAMINATION, 2014-15
ENVIRONMENTAL ENGINEERING - 2

Time : 3 Hours]

[Total Marks : 100

Note: Attempt all Questions. Assume any missing data suitably.

- 1 Attempt any four parts of the following : (5×4=20)
- (a) Discuss advantages & disadvantages of BOD & COD tests.
 - (b) How are the organic content measured in wastewater sample? Discuss any one method in detail,
 - (c) Why are some diseases called "Waterborne"? Explain any one disease in detail.
 - (d) The BOD of sewage incubated for 5 days at 30°C is 130mg/l. Calculate the BOD at 20°C. Assume $K_{20}=0.1$
 - (e) Give the maximum acceptable limits of TDS, turbidity, colour, hardness & pH in drinking water.
 - (f) Deduce an expression for BOD with curve.

- 2 Attempt any two parts of the following : (10×2=20)
- (a) Derive Stokes law for the settling velocity of a discrete particle in dilute sample suspension. Discuss the limitations.
 - (b) Differentiate between coagulation & flocculation used in water treatment plant.
 - (c) At a water treatment plant, 12 million litres of water is treated daily, using alum dosage of 16 mg per litre. Find total quantity of alum used daily.
- 3 Attempt any two parts of the following : (10×2=20)
- (a) Design a rapid sand filter to treat 10 million litres of raw water per day allowing 0.5% of filtered water for backwashing. Half hour per day is used for backwashing. Assume necessary data.
 - (b) Differentiate between slow sand & rapid sand filters.
 - (c) In a water treatment plant, raw water is passed through a filter bed of uniform sand at a velocity of 5m/hour. The filter is made of sand grains of diameter =0.4mm, shape factor=0.85 & specific gravity =2.65, the depth of the bed is 0.67m & porosity is 0.4. Determine the head loss through the bed. (Take density of water = 968kg/m³ & dynamic viscosity =1.0 × 10⁻³ kg/m)
- 4 Attempt any two parts of the following : (10×2=20)
- (a) Differentiate between activated sludge process & trickling filter process.

- (b) Determine the size of high rate trickling filter for the following data:
Flow = 4 Mld, Recirculation ratio =1.4, BOD of raw sewage=250mg/l, BOD removed in primary clarifier=25%, Final effluent BOD desired = 50mg/l.
- (c) Design a facultative aerated lagoon to serve 50,000 people. For sewage flow @ 180 lpcd=7200cu.m/day. Raw $BOD_5 = 275\text{mg/l}$ & final BOD_5 is not exceed 30mg/l in winter. Ambient air temperature in January is 20°C and in summer 37°C .
- 5 Attempt any four parts of the following : (5×4=20)
- (a) What is septic tank. Discuss advantages & disadvantages of centralised & decentralised wastewater treatment.
- (b) What is sludge thickening ? Give detail of gravity thickening.
- (c) What is UASBR? Discuss its features.
- (d) Differentiate between anaerobic fixed bed reactor, fluidized bed reactor, expanded bed reactor.
- (e) What is anaerobic digestion? Explain in detail.
- (f) Design a septic tank for 300 users. Water allowance is 120 litres per head per day. Detention period may be taken as 8 hours. Draw a neat sketch of a septic tank.
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