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SUBJECT CODE NO:- H-303
FACULTY OF SCIENCE AND TECHNOLOGY
B.E. (Civil)
Environmental Engineering-II
(REVISED)

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

N.B

1. Question No.1 and Question No.6 are compulsory.
2. Solve any two questions from each section.
3. Figure to right indicate full marks.
4. Assume suitable data and mention it clearly.

Section A

- Q.1 Attempt any five 10
- a) Define
 - i) Combined sewer
 - ii) Separate sewer
 - b) Estimate the sewage quantity to design separate sewage system serving population of 60,000 with rate of water supply of 135 lpcd.
 - c) What is sludge buckling?
 - d) What is mean by unit operation and unit process?
 - e) Define BOD.
 - f) What is non-scouring velocity?
- Q.2 07
- a) Explain the classification of water carriage system. 07
 - b) Determine design discharge for combined system serving population of 60,000 with the rate of water supply of 150 lpcd. The catchment area is 100 hector and avg. coefficient of run-off is 0.60. the time of concentration for the design rainfall is 30 min and relation between intensity of rainfall and duration is 08
- $$I = \frac{1000}{(t + 20)}$$
- Q.3 07
- a) What is self-purification? What are the various factors which affect the process of self-purification? 07
 - b) State where manholes used in sewerage system? Explain working with neat sketch. 08
- Q.4 08
- a) A grit chamber is designed to remove particle with diameter of 0.2 mm. specific gravity 2.65 for avg. working temperature 20°C. A flow through velocity 0.25 m/sec. will maintain by providing a proportional flow weir. Determine the channel dimension for maximum waste water flow of 12000 m³/day. 08
 - b) What are various constituents of waste water? Write respective unit processes for removal of it. 07

- Q.5 Write short note (any three) 15
- a) Forces of sewer
 - b) Screening of waste water
 - c) Slamming tank
 - d) Sludge thickening

Section B

- Q.6 Draw a flow diagram of waste water treatment with their functions (each unit) 10
- Q.7
- a) Determine the surface area of settling tank for 0.5 m³/sec design flow using design overflow rate as 32.5 m³/m²/day. Find the depth of clarifier for the overflow rate and detention time of 95 min. adopt L/B between 2:1 and 5:1, length $\nless 100$ m. 08
 - b) Explain "Bacteria-algae" symbiosis in oxidation pond. 07
- Q.8
- a) Explain with flow diagram, the essentials of activated sludge process. 07
 - b) Determine the dimensions of high rate trickling filter for the following data. 08
 - a) Sewage flow = 3 mld
 - b) Recirculation ratio = 1.5
 - c) BOD of raw sewage = 250 mg/lit
 - d) BOD removed in primary tank = 25 %
 - e) Final effluent BOD desired = 30 mg/lit.

By what % the diameter of the filter will have to be modified if it is to be designed as standard rate trickling filter.
- Q.9
- a) What are the principles of UASBR and write its advantages and disadvantages. 07
 - b) What is solid waste? Explain solid waste disposal method in details. 08
- Q.10 Write short note (any three) 15
- a) Aerated lagoons
 - b) Sludge digestion
 - c) Rotating biological contractor
 - d) Incineration
 - e) Operating problems in trickling filter