Reg. No. | | | | | | | | | |

MANIPAL INSTITUTE OF TECHNOLOGY
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A Constituent Institution of Manipal University

VII SEMESTER B.TECH. (CIVIL ENGINEERING)

END SEMESTER EXAMINATIONS, NOV/DEC 2016

SUBJECT: **ENVIRONMENTAL ENGINEERING II** [CIE 407]

REVISED CREDIT SYSTEM

(/   /2016)

Time: 3 Hours   MAX. MARKS: 50

Instructions to Candidates:

❖ Answer **ANY FIVE FULL** the questions.

❖ Missing data may be suitable assumed

1A.	Why a circular section is more commonly used in construction of sewers? When are circular sections not much preferred	**02**

1B.	Differentiate between
	  i) Sullage and sewage
	  ii) Dry weather flow and Wet weather flow.
	  iii) Lateral sewer and outfall sewer.
		03

1C.	The surface on which the rain falls in-the city having a total area of 36 hectares is classified as follows {table} The density of population of this city is 250 per hectare and water supply per day is 225 liters. The sewage generated is 80 % of water supply and peak discharge is 3times the average. Determine the total runoff if rainfall if duration of rainfall is 5 minutes. Also calculate the quantity of sewage for which the sewers of separate system and partially separate system should be designed.	**05**
2A.	Describe with a neat sketch the components and function of manhole	**03**
2B.	Explain the tests to be performed before the commissioning of newly laid sewer lines.	**03**
2C.	Discuss one pipe and dual pipe system of plumbing with a neat sketch.	**04**
3A.	Differentiate between BOD and COD. What are significance BOD/COD ratio in design of wastewater treatment process?	**03**
3B.	With a neat sketch explain oxygen sag curve.	**03**

Table for 1C:

% of total area	Nature of surface	Runoff coefficient
20	Roofs	0.9
20	Pavements	0.85
5	Paved yards	0.8
15	Macadam roads	0.4
35	Lawns and gardens	0.1
5	Wooded	0.05

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3C.	Design a primary settling tank of rectangular and circular shape to treat a sewage for the town having a population of 1,00,000 with a water supply of 200 lpcd. Assume overflow rate as 45 $m^3/d/m^2$ and velocity of flow is 20 cm/s. Assume 80% of water supplied is converted into sewage. Detention period is 2 hours.	04
4A.	Design a single stage high rate Trickling filter to treat a flow of 3MLD with BOD of 300 mg/l for an organic loading of 12000 kg of BOD per hectare meter per day, surface loading rate of 100 ML per hectare per day (excluding recirculated sewage) and recirculation ration of 1.2. Also determine the strength of the effluent. Assume that 35% of BOD is removed in the primary clarifier.	04
4B.	List the various loading criteria for activated sludge process. Explain in detail any two.	03
4C.	With a neat sketch explain oxidation ditch.	03
5A.	Define composting. List various composting methods used for solid waste. Explain the factors effecting composting	06
5B.	Define the terms (i). Sewage sickness (ii).Super chlorination, (iii). Population equivalent (iv). Lagooning.	04
6A.	Define Coagulation. What are the common coagulants use in sewage treatment? Which are the special cases where coagulation is used for the treatment of sewage.	05
6B.	Discuss in brief various treatment process adopted for treating industrial wastewater	05