Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
A Constituent Institution of Manipal University

II SEMESTER M.TECH. (ENVIRONMENTAL ENGINEERING)
END SEMESTER EXAMINATIONS, APRIL/MAY 2017
SUBJECT: **INDUSTRIAL WASTEWATER TREATMENT (CIE 5222)**
REVISED CREDIT SYSTEM

(22/04/2017)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Write the neat flowcharts/sketches wherever it is necessary.

1A.	Discuss the behavior of conservative and non-conservative pollutants in an aquatic system.	**4**
1B.	Discuss the necessity of industrial reconnaissance surveys.	**3**
1C.	List out the major parameters involved in sampling of wastewater? Mention the advantages and disadvantages of composite sampling?	**3**
2A.	What do you understand by equalization, neutralization, and proportioning? Give one example each from industry	**6**
2B.	Give four significant characteristics of effluents from a distillery. Mention any two different methods available for the management of its waste?	**4**
3A.	Describe the pollution potential of pulp and paper mill wastewater and the remedial measures in the context of industrial wastewater.	**5**
3B.	Discuss the wastewater generation units, treatment and any two resource recovery options applicable in tannery industry.	**5**
4A.	Write in detail about the wastewater treatment technologies and effluent standards that a pesticide industry needs to follow or maintain during the manufacturing process.	**6**
4B.	Discuss the wastewater pollution control measures recommended for drug manufacturing industries.	**4**
5A.	Design a complete-mix activated sludge process for the treatment of 1710 m^3/day of settled condensate wastewater with BOD5, 1500 mg/L generated from a synthetic organic chemical type of pharmaceutical industry. Assume the following conditions are applicable: 1. Effluent contains 25 mg/L biological solids, of which 65% is biodegradable; 2. MLSS concentration in the reactor = 5000 mg/L; 3. MLVSS (X) = 0.8* MLSS; 4. Solid retention time, θc = 5 days; 5. BOD_5 = 0.68 BODL (ultimate biological oxygen demand); 6. Return sludge concentration = 1%; 7. Effluent BOD_5 = 50 mg/L; 8. Maximum yield coefficient, Y = 0.6 mg/mg; 9. Decay constant, K_d = 0.07 day^{-1}.	**6**
5B.	Write in detail on: a) Cleaner Production Technologies (CPTs)4 b) Maximum Contaminant Level (MCLs)	**4**