# INDIAN INSTITUTE OF TECHNOLOGY
## Department of Chemical Engineering
Subject Name: **Industrial Pollution Control**
Subject No.: **CH 62007**
**Mid Spring Semester Examination**, 2009

Date: **17. 09. 09 (AN)** Time: **2 Hrs** Full Marks: **30**

No. of Students:57

Instructions: Answer **all** questions. (Make reasonable assumptions wherever applicable)

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1. a) What are primary and secondary air pollutants? Explain with examples.
b) List the major concerns of the regulatory bodies around the world for air pollution control.
c) Classify the major anthropogenic sources of Air pollution with a brief description of each
d) What are the major functions of Pollution Control Board in India?
e) List the major air pollution control devices and indicate some of the major controlling process parameters.
f) "The behavior of the particulate matter in the atmosphere is influenced by their relative sizes". Justify the statement.
g) Outline the major approaches for minimization of wastewater generation.
h) Define $BOD_5$

[1+1+2+1+2+1+1+1]

2. a) Describe the types of particle behavior found in sedimentation. What parameters should be considered for designing of the sedimentation tank? Describe the condition when *Discrete settling* occurs and indicate the settling path associated with it. How the settling path associated with *Zone settling* differs from that of discreet one. [5]

b)A wastewater contains the following constituents :

40 mg/l phenol
350 mg/l Glucose ($C_6H_{12}O_6$)
3 mg/l of $S^{2-}$
50 mg/l Methyl alcohol
100 mg/l of ethylene diamine hydrate (mostly non biodegradable)

i)Calculate TOC, COD and the $BOD_5$ assuming k of the mixed wastewater is 0.25 /d
ii) After treatment the soluble $BOD_5$ is 10 mg/l with a k of 0.1/d, Compute the residual COD. [5]

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2. ) Describe the meteorological conditions that produce various plume patterns. Draw the temperature vs. altitude profile and the corresponding plume behavior. Which plume type will be the most favorable considering a tall stack operation [ 5]

Explain with a simple diagram what is effective stack height? List the parameters necessary for the calculation of Effective stack height. [2]

On basis of average temperature gradient in the following situations classify the degree of stability of the atmosphere.

i) Temperature at ground level 20 C temperature at 500 m is 25 C
j) Temperature at ground level 25 C temperature at 800 m is 15 C
k) Temperature at ground level 25 C temperature at 1500 m is 5 C [3]