Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

VII SEMESTER B.TECH. (CHEMICAL ENGINEERING)

END SEMESTER EXAMINATIONS, NOV/DEC 2016

SUBJECT: AIR POLLUTION MONITORING AND CONTROL [CHE 415]

REVISED CREDIT SYSTEM
(11/11/2015)

Time: 3 Hours MAX MARKS: 100

Instructions to Candidates:

- Answer **ANY FIVE FULL** questions.
- Missing data may be suitable assumed.

1A	Explain the different background information needed while selecting an air pollution monitoring site?	**10**
1B	What are the reasons for high air pollution in India?	**5**
1C	Explain the terms: a)Dust b) fumes c) mist d) summer smog and e) winter smog	**5**

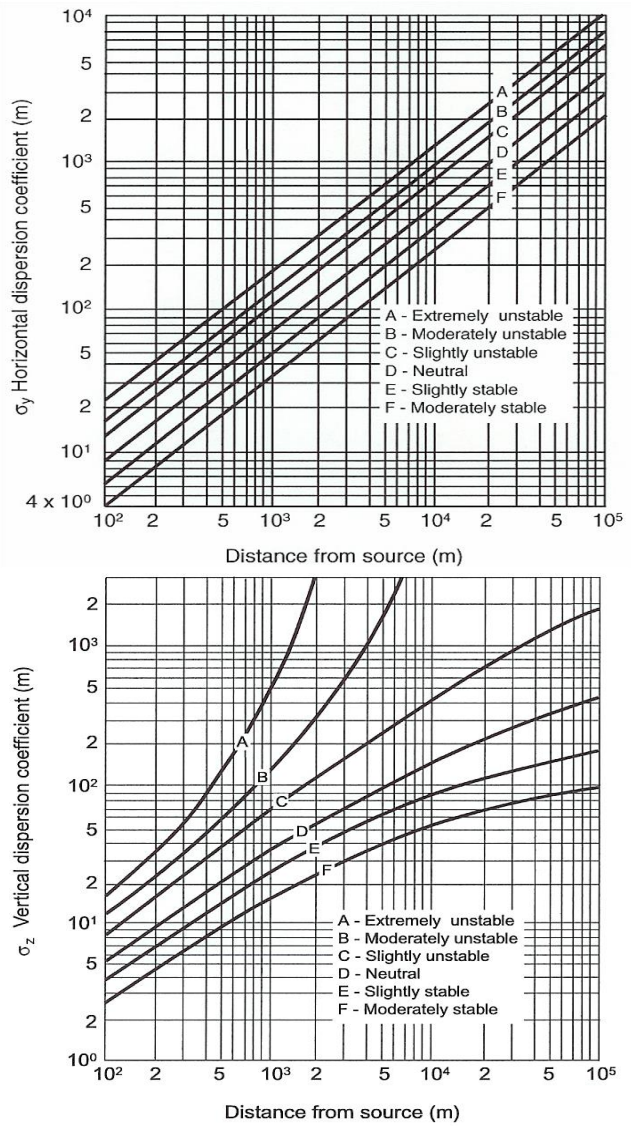
2A	With a neat sketch explain any five types of plume behavior in stack based on atmospheric conditions.	**10**
2B	It is proposed to establish a 750 MW power plant in your city. The plant emits 143,000 lb/day of SO_2 from effective height of 250m. Estimate concentration of SO_2 at a house which is at downwind distance of 4km if the wind speed is 6.63 m/s. Assume stability class is C. Does the plant satisfy the PCB NAAQ standards? Assume Gaussian plume. Consider ground reflection of plume. Dispersion coefficients in figure below a) At ground level. b) At the centerline of the plume. c) List steps you would propose to reduce the effect of the air pollution caused by the plant if the other contaminants from the plant include particulate matter and NO_x	 **4** **4** **2**

3A	i)With a neat diagram explain the NDIR method of CO_2 measurement. ii) What are the methods of control of CO_2 emissions?	**6** **4**
3B	With a neat diagram explain Wet Dry Method of limestone scrubber for removal of SO_2 from flue gases.	**10**

4A	Draw a neat chart of temperature dependence of NOx formation and explain thermal NOx, fuel NOx and prompt NOx.	**10**
4B	Explain briefly different combustion modifications for control of NOx	**10**

5A	i)Derive the expression for displacement losses for VOCs. ii)Estimate the volume of gasoline vapor emitted as displacement losses per cubic meter of gasoline when gasoline is transferred from petrol station storage tanks to the gasoline tanks of the customers' vehicles at 30^0C. The vapor pressure of gasoline is 12 psia and the molecular weight is 60 g/mol. (1 atm = 14.7 psia). Density of gasoline is 750 kg/m^3. What volume % of gasoline is lost?	**5** **5**
5B	Why is air pollution a major worldwide concern? Write short notes on the Indian laws of air pollution control and world treaties of air pollution control	**10**

6A	i) Why is CO called a silent killer? ii) What are the anthropogenic and natural sources of CO? ii) With a figure of excess air vs carbon monoxide production explain the strategies to reduce carbon monoxide?	**1** **4** **5**
6B	i)Define VOCs. Name a few common VOCs ii)What are the control methods to reduce VOC pollution?	**2** **8**



Dispersion coefficients for various stability criteria