Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

M.TECH. (CHEMICAL ENGINEERING)

END SEM EXAMINATIONS, APRIL 2017

SUBJECT: AIR POLLUTION MONITORING AND CONTROL [CHE 5123]

REVISED CREDIT SYSTEM
DATE: 25/4/2017

Time: 3 Hours MAX MARKS: 100

Instructions to Candidates:

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

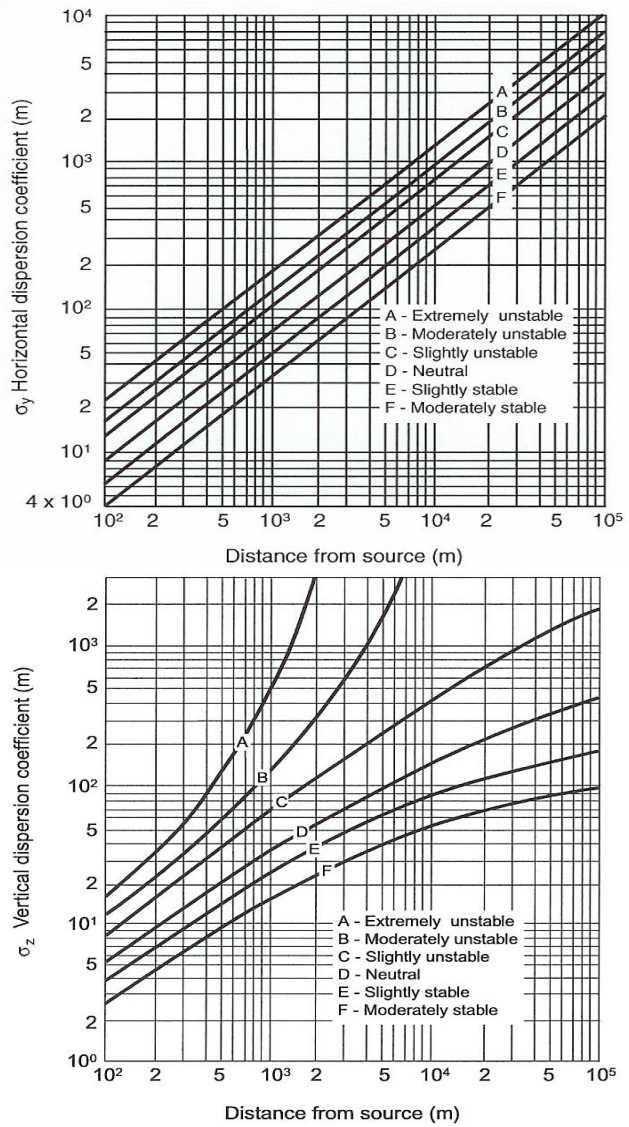
1A	(i) What is inversion? Describe with a neat diagram, the different kinds of inversions possible in the atmosphere? (ii)If the whole atmosphere would suddenly liquefy due to a drastic event, what would the height of the atmosphere be? (in feet above the sea level) (iii)List the reasons for high air pollution in India.	**5** **1** **4**
1B	(i)With a neat diagram discuss any two types of plumes in air pollution. (ii)Analyze the current air pollution scenario in a city of your choice. What solutions do you provide?	**5** **5**

2A	(i)With a neat diagram explain the working of a high volume sampler for particulate matter. (ii)What is summer smog? Describe the reactions causing it.	**6** **2**
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. i) At ground level. ii) At the centerline of the plume. iii) 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 Assume stability class is C. Does the plant satisfy the PCB NAAQ standards? Assume Gaussian plume. Consider ground reflection of plume. Dispersion coefficients are in figure below	 **4** **4** **4**

3A	With a neat sketch explain the working NDIR for measurement of gaseous pollutants	**10**
3B	Explain the working of a tape sampler with a neat diagram.	**10**

4A	Draw a neat chart of temperature dependence of NOx formation and explain thermal NOx, fuel NOx and prompt NOx.	**10**
4B	With a neat diagram explain working of forced oxidation limestone scrubber for removal of SO_2	**10**

5A	i)Define VOCs. Name a few common VOCs ii)What are the control strategies to reduce VOC pollution?	**2** **8**
5B	i) Why is CO called a silent killer? ii) With a figure of excess air vs carbon monoxide production explain the strategies to reduce carbon monoxide? iii) List the methods to reduce carbon dioxide (CO_2) emissions?	**2** **6** **2**



Dispersion coefficients for various stability criteria