Reg.No.										

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL UNIVERSITY

SEVENTH SEMESTER B. TECH. CHEMICAL ENGINEERING
END SEMESTER EXAMINATION NOV 2015

SUBJECT: P.E. I: AIR POLLUTION MONITORING AND CONTROL (CHE 415)

Time: 3 HOURS **Max.Marks: 100**

Note: Answer **ANY FIVE FULL** questions
Each question carries 20 Marks

1 A	Draw a neat self-explanatory diagram of different phases in establishment of a plant monitoring system.	**6**
1 B	Describe the different methods of classifying air pollutants	**6**
1 C	Discuss the primary parameters in the meteorological information required for designing monitoring network.	**8**

2 A	Explain any 4 particulate pollutant sampling methods.	**10**
2 B	Explain the principle and working of gas chromatography for the analysis of a mixture of gaseous pollutants?	**10**

3	What are the three approaches to NOx control? Describe control methods under each approach. How would you evaluate and choose among these methods?	**20**

4 A	Derive an expression for cut size diameter of a particle in a gravitational settling chamber from first principles.	**5**
4 B	Explain the principle and working of a differential mobility particle size analyser with a neat diagram.	**5**
4 C	Why is turbulence important in the combustion zone in a flare? How is turbulence achieved?	**10**

5 A	What are the disadvantages of flares? How are they overcome in an incinerator?	**5**
5 B	It is observed in a hydrocyclone, for coal beneficiation, that coal particles leave via the inner vortex from the top exit. While in a cyclone for particulate matter removal, the coal particles leave from the bottom exit. Give reasons for this anomaly.	**5**
	Please Turn Over	

5 C	Carbon sequestration involves capture of CO_2 using three approaches- before, during and after combustion. Describe each approach. How would you evaluate and choose among the three?	**10**

6	A steel plant located 1 km outside the western edge of a city has a smelter with a stack 150 m high. The stack diameter is 20 m. Stack gas temperature is 77^0C. Stack gas velocity is 10 m/s. Flue gas is released into the ambient air which is at 32^0C. Density of flue gas is 1.2 kg/m^3. Wind is blowing eastward at a speed of 3 m/s. It is a sunny day (strong solar radiation). Assume that the pollutant concentration at the plume centerline is blown into the city whose dimensions are 3 km northwards and 4 km eastwards. Given, emission density in the city is 5*10^-4 g/s.m^2 and the mixing height of the city is 400 m. Considering the entire city to be enclosed in a box and that fixed box model is applicable, what is the concentration of pollutant in the city?	**20**