BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

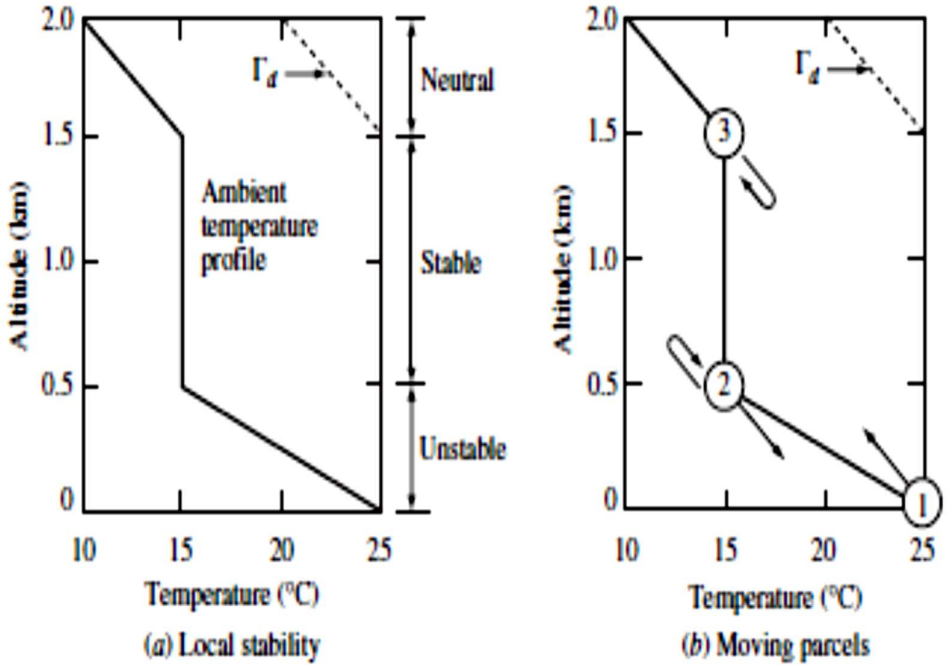
CLASS: BTECH **SEMESTER : IV**
BRANCH: CIVIL **SESSION : SP/2023**

SUBJECT: CE420 AIR POLLUTION CONTROL

TIME: 3 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	Discuss the factors affecting indoor air quality. Discuss effect of wind driven infiltration and stack driven infiltration.	[5]	1	2
Q.1(b)	an unvented, portable, radiant heater, fueled with kerosene, is tested under controlled laboratory conditions. After running the heater for 2 hr. in a test chamber with a 46 m^3 volume and an infiltration rate of 0.25 ach, the conc. of CO reaches 20 ppm. Initial CO in the lab is 0, and the ambient CO level is negligible throughout the run. Treating CO as a conservative pollutant, finding the rate at which the heater emits CO. if the heater were to be used in a small home to heat 120 m^3 of space having 0.4 ach, predict the steady state concentration. [1 atm, 25°C]	[5]	1	3
Q.2(a)	Discuss importance of isokinetic sampling and traverse points in stack sampling.	[5]	2	2
Q.2(b)	Discuss different methods used for particulate matter sampling.	[5]	2	2
Q.3(a)	The below fig. shows ambient temperature profile. The dotted lines show dry adiabatic lapse rate. Position 1, 2 and 3 shows air parcels position. Find the stable and unstable region up to which the pollutants will raise and discuss with proper reasoning.	[5]	3	3



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Q.3(b) A tall stack and a nearby short stack have plumes as shown in Figure P31. Which atmospheric temperature profile would be most likely to cause that pair of plumes? The dotted lines represent the dry adiabatic lapse rate. [5] 3 3

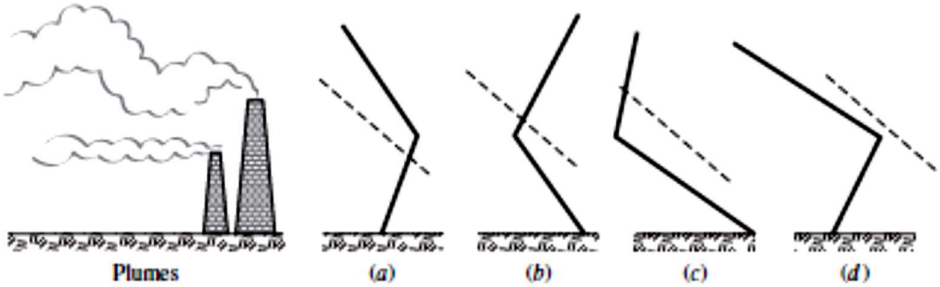

FIGURE P31

Q.4(a) Describe the techniques along with mechanisms used for gaseous air pollutant control. [5] 4 2

Q.4(b) A cylindrical precipitator having a diameter of 0.3 m and length 2 m handles dust particles of 1.0 micron with in standard air. The volumetric flow rate of air is 0.075 m^3/s. for an electric field strength of 100,000 v/m and $q_p = 0.3 \times 10^{-15}$ coulomb. determine the collection efficiency. [Cunningham correction factor $C = 1 + \frac{2\lambda}{d_p}(1.257 + 0.4e^{-0.55d_{p/\lambda}}$ for standard air, $\lambda = 0.066$ µm. $\mu_g = 1.84 \times 10^{-5}$ kg/m-s]. [5] 4 3

Q.5(a) Explain effective ways of reducing emissions from vehicles. [5] 5 2

Q.5(b) Determine air to fuel ratio required for complete combustion of gasoline (C_7H_{13}) [5] 5 3

::::::28/04/2023::::::M