

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

**CLASS: M.Tech  
BRANCH: Civil & Env**

**SEMESTER : II  
SESSION : SP/22**

**SUBJECT: CE533 AIR POLLUTION & CONTROL TECHNOLOGY**

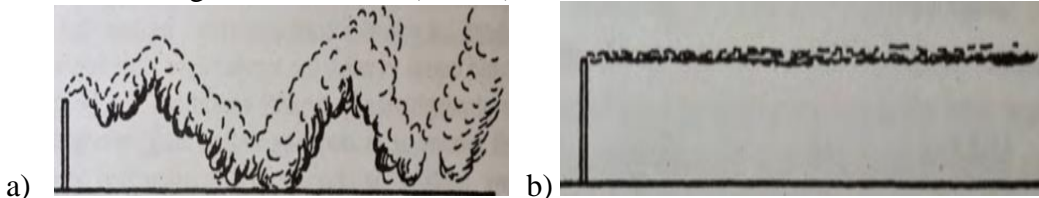
**TIME: 2  
hours**

**FULL MARKS: 50**

**INSTRUCTIONS:**

1. Attempt all questions.
2. The missing data, if any, may be assumed suitably.
3. Before attempting the question paper, be sure that you have got the correct question paper.

1. Differentiate between PM<sub>10</sub> and PM<sub>2.5</sub> according to their sources, characteristics, and health effects. (5)
2. Explain the working principle of the non-dispersive infrared analyzer with a schematic diagram. For which pollutant monitoring this technique is used? (4+1=5)
3. Based on typical results of PM<sub>10</sub> sampling by a high-volume respirable dust sampler, calculate the concentration in  $\mu\text{g}/\text{m}^3$ .
  - a) Initial rate of flow=1.7m<sup>3</sup>/min, final flow rate=1.47m<sup>3</sup>/min, the weight of clean filter paper= 5 g, the weight of filter paper after 24 hours of exposure= 5.348 g.
  - b) Compare your results with NAAQS standards. (4+1=5)
4. Enlist and explain the mechanism of dust capturing by fabric filters. (5)
5. Identify the following plume behaviour and comment on their lapse rate conditions and meteorological conditions. (2+2=5)



6. Calculate the ground level concentration of SO<sub>2</sub> 4 km downwind, from a thermal power plant. Wind speed is 4.9m/s at the effective stack height, effective stack height is 300m,  $\sigma_y=359\text{m}$ ,  $\sigma_z=216\text{m}$ , emission rate=  $6.47 \times 10^8 \mu\text{g}/\text{s}$ . (5)
7. Explain the fluidized bed combustion chamber process and its applicability in industries. (5)
8. Write notes on a) isokinetic sampling, and b) coal gasification (2.5x2=5).
9. a) Calculate the stoichiometric air-fuel ratio for a gasoline having composition C<sub>7</sub>H<sub>13</sub>.  
b) How evaporative emissions are controlled in a vehicle fuelled by gasoline. (2+3=5)
10. Suggest the control measures for noise pollution in a city with noise polluting industry, commercial areas, recreational auditoriums, and heavy traffic. (5)