JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- Dec 2017

B.Tech 7th Semester

COURSE CODE: 10B13CE742

MAX. MARKS:35

COURSE NAME: Air Pollution Monitoring and Control

COURSE CREDITS: 3

MAX. TIME: 2 Hrs

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.

1. A settling chamber is 12 m long, 2m high and 2m wide processes 240 m^3/m of air at a temperature of 75° C. Determine the maximum size of the particle with specific gravity of 1.8 that is removed with an efficiency of 96 %. **(5)**

2. It is desired to design a cyclone that will remove a 15 μm particle with 50 % efficiency from an air stream of 6 m^3/ min. The temperature of air is 75° C and the specific gravity of particle is 1.5. The cyclone is to have standard dimensions. Assume 5 turns. **(5)**

3. A filter bag house must process 15 m^3/sec of waste gas. The bag house is to be divided into 8 sections of equal cloth area so that one section can be shut down for cleaning and repairing while the others continue operating. Lab analysis indicates an air to cloth ration 9 m^3/m^2min cloth will provide sufficient treatment. The bag serves 0.25 m in diameter and 7 m long. Determine the no of bags ant the physical arrangement to meet the above requirement. **(5)**

4. Design an electrostatic precipitator to process 5 m^3/s of stack gas. The drift velocity of the fly ash particles has been determined to be w = 1.5 x10^5 d_p. Diameter of particle is 0.7 μm and desired efficiency is 98 %. **(5)**

5. A parcel of dry air rising over a grass fire has a temperature of 60° C at 10 m. Assume a dry adiabatic lapse rate; determine the temperature at 200 m. **(2)**

6. Determine the effective height of a stack, given the following data: Physical stack is 170 m tall with a 1.25 m inside diameter, Wind velocity is 5.17 m/s, Air temperature is 18 °C, Atmospheric pressure is 1000 millibars, Stack gas velocity is 8.75 m/s, Stack gas temperature is 128 °C. **(5)**

7. A power plant burns 5.45 tons of coal per hour and discharges the combustion products through a stack that has an effective height of 75 m. The coal has a sulfur content of 4.2 %, and the wind velocity at the top of the stack is 6 m/s. The atmospheric conditions are slightly unstable. Determine the ground level concentration of SO_2 at a distance of 3.0 km downwind at the centerline of the plume and at a crosswind direction of 0.4 km on either side of the centerline. Given: At 3.0 km, σ_z = 170 m and σ_y = 280 m **(5)**

8. Define primary pollutants and secondary pollutants with examples. Define dust, smokes, mists, fumes. **(3)**