

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT  
TEST II EXAMINATION (OCTOBER- 2018)

B. Tech. (VII- SEM.)

COURSE CODE: 10B13CE742

MAX. MARKS: 25

COURSE NAME: Air Pollution Monitoring and Control

COURSE CREDIT: 3

MAX. TIME: 1.5 HRS

*Note: Attempt all Questions. Carrying of mobile phones during exams will be treated as case of unfair means. Assume suitable data if required.*

1. Calculate the minimum size of the particle that will be removed with 100 % efficiency from a settling chamber under the following conditions; horizontal velocity of air is 3.6 km/hr, dynamic viscosity of air is  $1.48 \times 10^{-5}$  kg/m.s, specific gravity of particle is 2.22, correction factor is 1. Assume length to height ratio is 4:1. (4)
2. An air stream with a flow rate of  $10 \text{ m}^3/\text{s}$  is passed through a cyclone of standard proportions. The diameter of the cyclone is 2.5 m, and the dynamic viscosity of air is  $1.81 \times 10^{-5}$  kg/m.s. Find the diameter of particle that is collected with 50 % efficiency. Given, number of effective turns within the cyclone is 8, width of cyclone is 0.8 m and area of inlet is  $2.1 \text{ m}^2$ . Air temperature is  $25^\circ \text{C}$  and density of particle is  $2000 \text{ kg/m}^3$ . (4)
3. A fabric filter is to be constructed using bags that are 0.5 m in diameter and 6 m long. The bag house is to receive  $17 \text{ m}^3/\text{s}$  air flow, and the filtering velocity is 2.0 m/min. Determine the number of bags required for continuously cleaned operation. Air temperature is  $77^\circ \text{C}$ . (2)
4. An electrostatic precipitator is to be constructed to remove fly ash particles from stack gases flowing at  $10 \text{ m}^3/\text{s}$ . Determine the plate area required to collect a  $0.5 \mu\text{m}$  particle with 90 % and 99 % efficiency. Drift velocity is  $3.0 \times 10^5 d_p$  m/s. (4)
5. The CO content of a sample of air measured at  $20^\circ \text{C}$  and 750 mm Hg is 11 ppm. Calculate the CO concentration in  $\text{mg/m}^3$  and  $\mu\text{g/m}^3$ . (4)
6. The average car emits about 4 g of NO per mile. The average automobile travels about 0.015 million m/year. The number of automobiles is about 1.1 billion. Calculate total emissions from automotive in tonnes per year. (2)
7. What is primary pollutant and secondary pollutant? Discuss different types of wet collectors in brief. Write short notes on ESP and bag filter. (1+2+2)