

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

**CLASS: ISc**  
**BRANCH: FOOD TECHNOLOGY**

**SEMESTER: III**  
**SESSION : MO/2019**

**SUBJECT : FT202 INTRODUCTION TO FOOD ENGINEERING**

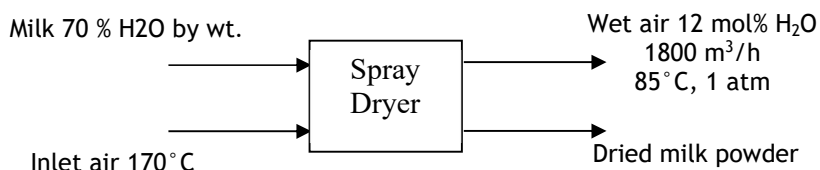
**TIME: 2:00 HOURS**

**FULL MARKS: 25**

**INSTRUCTIONS:**

1. The total marks of the questions are 25.
  2. Candidates may attempt for all 25 marks.
  3. Before attempting the question paper, be sure that you have got the correct question paper.
  4. The missing data, if any, may be assumed suitably.
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- Q1 (a) A force equal to 19.635 kgf is applied on the piston with a diameter of 5 cm. Find the pressure exerted on the piston in kPa. [2]
- Q1 (b) Define steady state, unsteady state, and equilibrium for a system. [3]
- Q2 (a) Define intensive and extensive properties. Write the name of two intensive and two extensive properties. [2]
- Q2 (b) A sample of gas having volume of 1 m<sup>3</sup> is compressed in such a manner so that its pressure is increased by 85%. The operation is done for a fixed mass of gas at constant temperature. Calculate the final volume of gas. [3]
- Q3 Milk powder is produced in spray dryer which evaporates all liquid. Operation is shown below. Assuming inlet air contains no water, calculate: (a) production rate of powdered milk and (b) molar flow rate of the inlet air. [5]



- Q4 A producer gas with the composition by volume, 27% CO, 6% CO<sub>2</sub>, 1% O<sub>2</sub>, and 66% N<sub>2</sub> is burnt with 20% excess air. If the combustion is 98% complete, calculate the composition by volume of the flue gases. [5]
- Q5 (a) Antoine parameters for the acetone are given as: A = 7.1327, B = 1219.97, and C = 230.653. Calculate the normal boiling point of acetone. Antoine equation is  $P=10^{(A-B/(T+C))}$ , where, P is in mm Hg and T in °C. [2]
- Q5 (b) Calculate the partial pressure of acetone in vapor phase at 50°C which arises from an acetone-water equimolar mixture. Assume Raoult's law is valid. Required data can be taken from Q5 (a). [3]