

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

CLASS: BE
BRANCH: CHEMICAL ENGG/ CHEMICAL P&P

SEMESTER: VII
SESSION : MO/2018

SUBJECT : CL7031 POLLUTION CONTROL EQUIPMENT DESIGN

TIME: 1.5 HOURS

FULL MARKS: 25

INSTRUCTIONS:

1. The total marks of the questions are 30.
2. Candidates may attempt for all 30 marks.
3. In those cases where the marks obtained exceed 25 marks, the excess will be ignored.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. The missing data, if any, may be assumed suitably.

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- Q1 (a) Explain the origin of environmental constitution of India. [2]
(b) Explain institutional framework of SPCB. [3]
- Q2 (a) Explain the procedure of stack sampling for circular stack and rectangular stack. [2]
(b) Explain the working principle of chemiluminescent analyser for the detection of nitrogen oxides in the ambient air. [3]
- Q3 Explain about the working principles and design aspects of gravitational settling chambers? And derive an expression for the minimum particle size that can be removed with 100% efficiency. [5]
- Q4 (a) Compare the strength of gravitational, centrifugal and electrostatic force. [2]
(b) Explain about the working principle of cyclone separator with neat sketch? And derive an expression for cut size diameter of a given cyclone separator. [3]
- Q5 (a) Briefly explain the effect of modification of operating conditions on NO_x formation during the combustion process. [2]
(b) Explain the method of double contact, double absorption (DCDA) process to remove the SO_x from the industrial effluents. [3]
- Q6 (a) What is the significance of minimum liquid flow rate of solvent in absorption column explain briefly? [2]
(b) 1000 m³/hr of a gas mixture containing 10 mole % of solute and rest inert enters the absorber at 300K temperature and 106.658 kPa. 90% of the original solute is removed. Solute free water used for absorption contains 5 mol % solute when it leaves the tower at the bottom. Calculate the solvent flow rate to tower. [3]