

M.Tech. / Sem. VI

A

CHEMICAL SYNTHESIS AND PROCESS TECHNOLOGIES
Paper - Module 30: CHEMICAL ENGINEERING AND TECHNOLOGIES
(N.C. Admissions of 2008 and onwards)

Time : 2 hours

Maximum Marks :38

(Write your Roll No. on the top immediately on receipt of this question paper.)

Answer **four** questions in all including **QNo. 5**, which is compulsory.

1. a) Explain the various steps involved when a chemical engineer is asked to design the chemist's laboratory scale synthesis into commercial scale production on continuous basis. 07
b) Describe the working of a two pass tube and shell heat exchanger with the help of a neat labelled sketch. 03
2. a) Describe mathematically the phenomenon of heat flowing through a hollow sphere, having inside radius r_i and outside r_o , made of material whose thermal conductivity is k , temperature of inside surface T_i and outside surface T_o such that $T_o > T_i$. 06
b) Write material and heat balance for an element of a reactor volume. 04
3. a) Describe space time and space velocity. Derive the design equation for a backmine flow reactor. 07
b) Discuss graphically the optimum operation design procedure for determining temperature for catalytic oxidation of Sulphur dioxide to Sulphur trioxide. 03
4. a) Describe the process of obtaining both pine top and bottom product from a mixture of two components A and B where A is more volatile than B. 07
b) Draw a labelled sketch of a counter - current packed bed tower for gas absorption. 03
5. a) Discuss any two of the following :
 - (i) Deactivation and Regeneration of a catalyst. 04
 - (ii) Non ideal flow patterns in processing equipments. 04
 - (iii) Characteristics of propeller and turbine mixers. 04