

M. TECH. -II (CHEMICAL ENGINEERING) (CBCS – 2015  
COURSE) : WINTER - 2017  
SUBJECT: CHEMICAL REACTOR ANALYSIS & DESIGN

Day: Tuesday  
Date: 28/11/2017

Time: 11.00 AM TO 02.00 PM  
Max. Marks: 60

W-2017-2826

N.B.:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Answers to both the sections should be written in **SEPARATE** answer book.
- 4) Draw diagrams **WHEREVER** necessary.

SECTION – I

Q.1 For the parallel reactions  $A + B \rightarrow D$  (10)  
 $A + B \rightarrow U$

Find all possible combinations of reaction scheme that will maximize  $S_{DU}$

OR

Q.1 Explain in detail all the factors affecting choice of reactor. (10)

Q.2 Write short notes on: (10)  
i) Minimum fluidization velocity                      ii) Bubble rise velocity  
iii) Maximum fluidization velocity                      iv) Porosity  
v) Dead zone

OR

Q.2 Which important parameters are to be considered in design of fluidized bed (10)  
Reactor?

Q.3 Calculate the heat of reaction for the synthesis of ammonia from hydrogen and (10)  
nitrogen at  $150^{\circ}\text{C}$  in kcal/mol of  $\text{N}_2$  reacted and also in KJ/ mol of  $\text{H}_2$  reacted.

OR

Q.3 Derive the energy balance equation for steady state tubular reactor with heat (10)  
exchange.

SECTION-II

Q.4 Explain the operation of semi-batch reactor with heat exchange. (10)

OR

Q.4 Explain the unsteady rate operation of CSTR. (10)

Q.5 Give design equations of fixed bed catalytic reactors. (10)

OR

Q.5 Explain mechanism of reaction in fixed bed catalytic reactor. (10)

Q.6 Explain all the design aspects of reactors with non ideal flow. (10)

OR

Q.6 Write short notes on: (10)  
i) Micro-mixing    ii) Meso-mixing