Pre. Ph.D. Course Work (2017 Course) : (Chemical Engg) :
SUMMER - 2019

SUBJECT: PAPER – II: RECENT ADVANCES IN CHEMICAL ENGINEERING

Day: Wednesday
Date: 24/04/2019

Time: 10.00 AM TO 1.00 PM
Max. Marks: 100

S-2019-5361

N.B.:

1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Draw neat labelled diagrams **WHEREVER** necessary.

Q.1 What is numerical method? What is the importance of numerical methods in transport processes? How Range – Kutta method is used in optimization of chemical processes? **(10)**

OR

Q.1 Which are the numerical differentiation techniques for multidimensional systems? What is their necessity? **(10)**

Q.2 Which are flow types and regimes in horizontal flow? What is their importance in defining and designing fluid flow operations for given process? **(10)**

OR

Q.2 What is non- Newtonian fluids? What is their behavior in two phase flow? How it affects fluid flow operations? **(10)**

Q.3 What is phase equilibrium? What is its significance in thermodynamic point of view? How to define the phase equilibrium for sorption of CO_2 by Dimethyl amine? **(10)**

OR

Q.3 What is NRTL model? What is its significance in defining phase non-ideality? **(10)**

Q.4 What is the concept of LMTD? What is its significance in heat exchanger design? **(10)**

OR

Q.4 What is boiler? Which are the heat transfer patterns and coefficients in boilers? Which are the possible steps to improve design efficiency of boilers? **(10)**

Q.5 What is zone melting? What are its applications? Which are the necessary steps to improve efficiency of zone melting? **(10)**

OR

Q.5 How mass transfer occurs in chemical reaction? Which are the factor and mass transfer parameters affecting chemical reaction kinetics by resin catalyzed reaction? **(10)**

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Q.6 What is need for process modelling? Which are the stages and approaches for process modelling? **(10)**

OR

Q.6 What is need for multi objective optimization? How to approach the issue to reduce reboiler duty and enhance component purity using multi objective optimization. **(10)**

Q.7 What is the importance of fermentation technology? Which are the issues associated with lactic acid fermentation? What are the design modifications to overcome the same? **(10)**

OR

Q.7 Which are biochemical processes? What are the factors affecting microbial biochemistry and reaction kinetics for ethanol synthesis? **(10)**

Q.8 Which are the types of contactors used in multiphase reactors? How design parameters affect contact efficiency in mechanically agitated contactors? **(10)**

OR

Q.8 Which are the factors affecting intrinsic kinetics of multiphase reactors? How to improve the performance of multiphase reactors by managing intrinsic kinetics? **(10)**

Q.9 What is MIMO systems? How to tube the controller for MIMO systems for any given control applications? **(10)**

OR

Q.9 What is multivariable control? Which are the factors defining design and applications of multivariable control? **(10)**

Q.10 Which are conventional waste water systems? What are their limitations and how to overcome them with the design modifications? **(10)**

OR

Q.10 Which are advanced oxidation processes, applicable in waste water treatments for textile industry? What are the precautions needed, benefits and limitations of AOP's.? **(10)**

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