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Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (BT) (2011 Onwards) (Sem.–5)

CHEMICAL ENGINEERING PRINCIPLES

Subject Code : BTBT-501

Paper ID : [A2073]

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Q.1 Answer briefly :

(a) Express a pressure of 200×10^3 Pa in mm Hg.

(b) Define Raoult's law.

(c) What is Molecularity of the reaction?

(d) A reaction has a stoichiometric equation $A + B \rightarrow 2R$, state the order of the reaction.

(e) Define space velocity.

(f) Write the uses of following measurement (i) pH (ii) Viscosity

(g) Derive the flow equation for orifice meter.

(h) What are the advantages of cascade control?

(i) What are the various components of a control system?

(j) Differentiate closed loop and open loop control.

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SECTION-B

Q.2 A reaction was carried out in a batch reactor and the results are reported below. Calculate the rate of the reaction.

Time, t (min)	0	10.0	30.0
% conversion	19.8	46.7	74.0

Q.3 List various advantages and disadvantages of :

(a) Feed forward control system

(b) Feed Backward control system.

Q.4 The heat capacity of ammonia, defined as the amount of the heat required to raise the temperature of a unit mass of ammonia by precisely 1 °C at a constant pressure, is, over a limited temperature range, given by the expression

$$C_P\left(\frac{Btu}{lb_m{}^\circ F}\right) = 0.487 = 2.297x10^{-4}T\left({}^\circ F\right).$$

Determine the expression for C_P in J/ (g.°C) in terms of T (°C).

Q.5 What are the factors affecting dynamic response of mercury thermometer?

Q.6 What the various advantages of head flow-meters over the other flow meters?

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SECTION-C

Q.7 (a) Draw the block diagram of an instrument and explain the function of different functional elements.

(b) What is meant by calibration of an instrument and how it is performed?

Q.8 Define Semi-batch reactors. And state the advantages and disadvantages of batch reactor.

Q.9 Two methanol - water mixtures are contained in separate flasks. The first mixture contains 40wt. % methanol, and second contains 70wt. % methanol. If 200 g of the first mixture combined with 150 g of the second, what are the mass and composition of the product?

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