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# SF-7187

## B. E. - III (Sem. - VI) (T.P) Examination

**May/June – 2011**

## CE & RK

Time : **3** Hours] [Total Marks : **100**

**Instructions :**

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
**Fillup strictly the details of ☛ signs on your answer book.**

Name of the Examination :

☛ B. E. - 3 (SEM. - 6) (T.P)

Name of the Subject :

☛ CE AND RK

☛ Subject Code No. : 7 1 8 7 ☛ Section No. (1, 2,.....) : Nil.

Seat No. :

Student's Signature

(2) Attempt **all** questions.
(3) Figures to the **right** indicate full marks.
(4) Assume suitable data.
(5) Draw a neat sketch whenever necessary.

**1** (a) Answer the following : **4×1=4**

(i) Write Bernoulli's equation after correction for the pump work.

(ii) Define catalyst. Show the functions of catalysts and important characteristics of solid catalysts.

(iii) Show the factors affecting the rate of reaction.

(iv) Explain the continuity equation.

(b) Answer the following : **4×4=16**

(i) Explain orifice meter in detail and show the equation for finding out volocity of fluid through the orifice.

(ii) The half life period of a reaction of the first order is 240 seconds. Calculate its rate constant in seconds and minutes.

(iii) Write down the advantages and disadvantages of the batch reactor.

(iv) Explain Rotameter in detail with neat sketch.

2 Attempt any **two** : **7×2=14**

(i) Write short note on application of fluid static.

(ii) Explain temperature dependency from transition state theory.

(iii) Explain molecularity and order of the reaction.

3 Attempt any two : **8×12=16**

(i) The following table shows how the concentration of reactant A varied with time in a particular experiment.

| Time (min) | Concentration of 'A' mol/lit |
|---|---|
| 0 | $2.77\times10^{-4}$ |
| 18 | $2.32\times10^{-4}$ |
| 31 | $2.05\times10^{-4}$ |
| 55 | $1.59\times10^{-4}$ |
| 79 | $1.26\times10^{-4}$ |
| 157 | $0.58\times10^{-4}$ |
| $\infty$ | 0.00 |

(a) Plot a graph of concentration of 'A' against time.

(b) Draw the tangents to the curves at 10, 50, 100 and 150 minutes and calculate slopes.

(c) Plot a graph of rate of reaction against concentration of 'A'.

(i) Find if the line passes through origin explain.

(ii) With help of graph, state the relationship between the rate of reaction and concentration of reactant both in words and mathematically.

(iii) Find the value of rate constant from graph.

(iv) What is the order of reaction ?

(ii) The half life period for a certain first order reaction is $2.5 \times 10^3$ second. How long will it take for $1/4^{th}$ of the reactant to be left behind ?

(iii) Explain Reynold's number and transition from Laminar to turbulent flow and also explain Reynold's number for non-Newtonian fluids.

4 (a) Attempt the following : **10**

(i) Define mass transfer operation.

(ii) Enlist different types of manometers.

(iii) Enlist different types of distillation.

(iv) For separation of acetic acid from water_____ mass transfer operation is used.

(v) _____ pump is suitable when to handle fluid contaminated with suspended solid.

(vi) What is limitation of rotameter ?

(vii) Define reflux ratio in distillation.

(viii) What is schedule number for pipe ?

(ix) To stop the flowrate in pipeline _____ flauge is used.

(x) Give names of regular packings.

(b) What is Pump ? **10**

The sulphuric acid of density 1650 kg/m$^3$ and viscosity 8.6 MPa S is to be pumped for 800 m along through a 50 mm i.d. Pipe at a rate of 3 kg/sec and then raised vertically 15 m by the pump. If the pump is electrically driven and has an efficiency of 50%, what power will be required ?

5 Attempt the following : (any **three**) **6×3=18**

(a) A simple U-tube manometer is used to measure the pressure drop across an orifice. Liquid A is mercury (sp.qr.= 13.6), and fluid B, flowing through the orifice and filling the anometer leads, is brine (sp.qr. 1.26). When the pressure at the taps are equal, the level of the mercury in the manometer is 0.914 m below the orifice taps. Under operating conditions, the pressure at the upstream tap is 13790 N/m$^2$ gauge and that at the downstream tap is 254 mm Hg below atmospheric. What is the reading of the manometer in milimeters ?

(b) Write principle, construction and working of centrifugal pump with sketch.

(c) Write a note : Choice of separation methods.

(d) Discuss construction and working of tray tower with heat sketch.

6 Attempt the following (any **three**) **4×3=12**

(a) Differentiate centrifugal compressor and reciprocating compressor.

(b) Write a note pipe, tube and fittings.

(c) Discuss significance of mass transfer operation in Textile Industry.

(d) Write a note : Selection criteria for solvent in extraction.

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