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Total number of printed pages – 4

B. Tech
PEEN 5402

Eighth Semester Examination – 2007

INDUSTRIAL INSTRUMENTATION

Full Marks – 70

Time : 3 Hours

*Answer Question No. 1 which is compulsory
and any **five** from the rest.*

The figures in the right-hand margin indicate marks.

1. Answer the following questions : 2×10
- (a) How many controlled variables are required to control in Distillation column and why ?
 - (b) Why the inferential variable "Temperature" is measured in stead of composition in case of composition control in a Distillation column ?

P.T.O.

- (c) For what reason Split-range Control System is used in a reactor ?
- (d) What do you mean by Economy and Capacity of Evaporator ? What is their relationship?
- (e) What is "Swelling" and "Shrinkage" phenomena in a boiler ?
- (f) What is the function of Carrier gas in a Gas Chromatography System ?
- (g) What are the disadvantages of Single Focusing Mass Spectrometer ? How can you overcome these ?
- (h) Explain the terms "Absolute humidity" and "Relative humidity".
- (i) Name the different types of detectors used for detection of nuclear radiations.
- (j) What are the advantages of Cascade Control System over Simple Feedback Control System ?

2. (a) Draw the schematic diagram of a distillation column. Derive its internal mass balance equations and draw the operating characteristics. 6
- (b) Discuss the effect of feed enthalpy change in the operation of distillation column. 4
3. (a) What is the basic control strategy for single composition control for upsets in feed flow ? Draw the control diagram. 6
- (b) Draw one commonly used pressure control arrangement for distillation column. 4
4. Why Temperature Control in a reactor is very important ? Draw the control diagram for Temperature Control in a reactor using cascade arrangement and explain it. 10
5. (a) Describe the basic principle and operation of a non-dispersive IR spectrometer. 5

- (b) Discuss about the relative humidity sensors available for moisture measurement in liquid. 5
6. Draw the schematic diagram and discuss the principles and basic theory of Gas Chromatography. 10
7. (a) Why is Steam Temperature Control in power plant very important? Discuss on the main Steam Temperature Control System, illustrating with diagram. 5
- (b) Describe with diagram the Feed Water Control System in a power plant. 5
8. Write short notes on : 10
- (a) Mass spectrometer
- (b) pH measurement
- (c) Types of Evaporator.