Total number of printed pages – 4 **B. Tech**

PEEN 5402

Eighth Semester Examination – 2008

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) What are the controlled variables, manipulated variables and disturbances in a Distillation Column ?

   (b) What is the function of an Evaporator ? Give the name of different types of evaporator.

   (c) What do you mean by Economy of an Evaporator ? What is its value for a Tripple Effect Evaporator ?

   (d) What do you mean by Total Internal Reflux Control of binary distillation column ? In which condition it happen ?

   (e) What is Split-range control ? Which condition it is used ?

   (f) Draw the input and output flow versus time characteristics of a gas chromotograph.

   (g) What is resolution of a Mass Spectrometer ?

   (h) Draw the Three Element Control diagram of a Boiler used in Thermal Power Plant.

   (i) Give basic principle of Scintillation counters for detection of nuclear radiation.

(j) Why feed forward and cascade control is used over feedback control system ?

2. With neat sketch describe the basic principle of operation of a binary distillation column and discuss the effect of reflux charge on its operation. Why pressure control is very important for distillation column ? 10

3. What is the basic control strategy for single composition control for upsets in feed composition and dual composition control for upsets in feed flow. Draw the diagram also. 10

4. (a) Derive the stedy state model of a double effect evaporator and based on model draw the control structure. 6

(b) Draw the control diagram of a reactor temperature control system. 4

5. What is the difference between Dispersive and Non-dispersive type IR spectrometer ? Discuss the basic principle of any one of them. What is

monochromater ? What are the elements are used as a monochromator ? 10

6. Draw the schematic diagram and discuss the principles and basic theory of Gas Chromatography. 10

7. (a) Describe in detail the pulverised fuel combustion control in a boiler of power plant. 5

(b) Discuss with diagram the main steam temperature control system of a power plant. 5

8. Write notes on any *two* : 5×2

(a) pH measurement

(b) Moisture measurement

(c) Mass spectrometer.

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