

Total number of printed pages – 4 **B. Tech**
CPBT 8310

Sixth Semester Examination – 2008

INSTRUMENTATION AND PROCESS CONTROL

Full Marks – 70

Time : 3 Hours

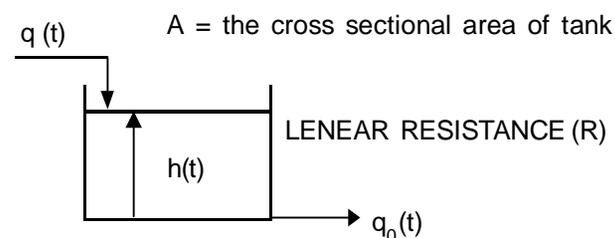
*Answer Question No. 1 which is compulsory
and any **five** from the rest.*

*The figures in the right-hand margin
indicate marks.*



1. Answer the following questions : 2 × 10
- (a) Name two dynamic characteristics of an instrument.
 - (b) Suggest one temperature measuring instrument for measuring the temperature of a moving body, whose temperature is in the range of 1500–2000 °C.

- (c) What is the unit of thermal coefficient for linear expansion ?
- (d) Write the Laplace transform of e^{-at} .
- (e) Find the time constant, for the liquid-level system as shown below :



- (f) If a closed-loop response is stable with respect to changes in the set point, is it stable to changes in the load ? If yes, then why ?
- (g) How does the pole location determine the stability of an uncontrolled or controlled process ?
- (h) What is meant by controller tuning ?

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Contd.

- (i) Compute the temperature at which Fahrenheit and Centigrade scale coincide.
- (j) Suggest one instrument for measuring high vacuum.
2. Describe in detail about different methods available for liquid-level measurement. 10
3. What are the different elements present in an instrument ? Explain it with a suitable example. 10
4. Define law of radiation. How this law is applicable in radiation pyrometer ? Explain it with a neat diagram. 10
5. Define the terms employed to describe an underdamped response, with the help of characteristics diagram. 10
6. Sketch the root locus for the equation

$$1 + \frac{k}{a(s+1)f} = 0 \quad 10$$

7. Describe one suitable method for each, to measure the following : 10
- (a) Humidity
- (b) pH Ion Concentration.
8. Write short notes on any two : 2×5
- (a) Feed forward controller
- (b) Bimetallic thermometer
- (c) Venturi meter
- (d) Transportation lag.