

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V • EXAMINATION – WINTER • 2014****Subject Code: 153501****Date: 26-11-2014****Subject Name: Process Instrumentation, Dynamics and Control****Time: 10.30 am - 01.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1 (a) Derive transfer function for mercury-in-glass thermometer. List out the assumptions made. **07**
- (b) Define the following terms: **07**
- (i) Error
 - (ii) Set point
 - (iii) Offset
 - (iv) Transfer function
 - (v) Deviation variable
 - (vi) Controlled Variable
 - (vii) Block diagram

- Q.2 (a) Define 'Stability' and find the stability of the system using Routh stability criterion having characteristic equation: $S^4 + 8S^3 + 18S^2 + 16S + 5 = 0$ **07**
- (b) Determine the linearized transfer function for liquid level system with non-linear resistance. **07**

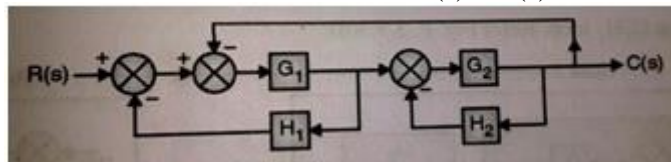
OR

- (b) Derive the transfer function of non-interacting system **07**
- Q.3 (a) A thermometer has a time constant of 5 seconds. The thermometer reads the temperature which is suddenly increased from 50 to 120 °C and is maintained at that temperature. Find **07**
- i. Temperature indicated by thermometer 5 seconds after change in the process is made.
 - ii. Time required for temperature reading of 110 °C.

- (b) What are the various components of a control system? Explain positive and negative feedback system. **07**

OR

- Q.3 (a) Determine the transfer function $Y(s) / X(s)$ for the following block diagram. **07**



- (b) List out different types of controllers and derive transfer function equation for P-type controller **07**
- Q.4 (a) Explain various terms used to describe under damped system. **07**
- (b) What are Bode diagrams? Explain the graphical rules for Bode diagrams. **07**

OR

- Q.4 (a) What is second order system? Derive transfer function of a second order system. **07**
- (b) With a neat figure explain the construction and working of Pneumatic Control Valve? **07**
- Q.5 (a) Explain working and construction of bimetallic thermometers. **07**
- (b) Give detailed classification of measuring instruments **07**
- OR**
- Q.5 (a) Explain principle, construction and working of venturimeter. **07**
- (b) What are static characteristics of instrument? Explain them in detail. **07**
