

GUJARAT TECHNOLOGICAL UNIVERSITY**BE SEM-VI Examination-Nov/Dec-2011****Subject code: 160104****Date: 28/11/2011****Subject Name: Basic Control Theory****Time: 10.30 am -1.00 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) What is a system? What is a control system? Illustrate with an example. How do we classify control systems? 07
- (b) Which are different type of control systems? What are their relative advantages and disadvantages? Give three examples of each type. 07

- Q.2 (a) What is mathematical modeling of a system? Derive equations for Mass, spring & friction for motion in a straight line. 07
- (b) What is block diagram representation? Explain as to how liquid level control is split into blocks? Describe the rules for block diagram reduction. 07

OR

- (b) What is signal flow graph? What are it's properties? What is the terminology used in SGF? 07

- Q.3 (a) What is time response analysis of control systems? Which are the different type of inputs used to test time response of a system? What is transient and stable response? With the help of diagram explain various terms used in time response analysis. 07
- (b) What is Bode Plot? Write the procedure of drawing Bode plot. What is the effect of poles and zeros on the graph? Illustrate with an example. 07

OR

- Q.3 (a) What are polar plots? What are it's advantages? Sketch polar plot for any transfer function to explain polar plot. What are gain and phase margins? 07
- (b) What is Hurwitz's criteria of stability? Explain with the help of an example. 07

- Q.4 (a) What is Nyquist stability criterion? What is generalized Nyquist path and it's mapping? What are the steps to solve problems by Nyquist criterion? 07
- (b) What is root locus technique of finding the stability of a system? Explain with the help of an example 07

OR

- Q.4 (a) What is frequency domain analysis? What are it's advantages & disadvantages over time domain analysis? 07
- (b) What is feedback? How many type of feedbacks are there? What are it's effects on overall gain, stability, External disturbance or noise, sensitivity 07

- Q.5 (a) What is meant by order & type of systems? What are position, velocity and acceleration error constant? Explain the performance of type 0 system of step input. 07
- (b) What is meant by stability? Which are different states of stability? Explain them in detail with diagrams. 07

OR

- Q.5 (a) Derive mathematical model of a parallel R, L, C circuit. 07
- (b) What is the concept of state? Explain with an example. What are advantages of state space approach over classical method of modeling. Define the various terminology used in state space technique. 07