10. Explain following terms.

i) Closed - loop control system

ii) Open - loop control system.

iii) Digital control system

iv) Feed back control system.

Roll No._____ Total Printed Pages : 4

06BEE101

B.TECH (EEE)

VI-SEM, (Main/back) Examination, May/June-2016

SUB: MODERN CONTROL THEORY

Time : 3 Hours] **[Total Marks 60**

Use of following supporting material is permitted during examination.

1._____Nil_____ 2. _____Nil_____

Note: 1. Attempt any six question

2. Each question carry equal marks.

1. Explain following terms:

i) Concept linearity

ii) Relaxedness

iii) Time invariance

iv) Causality

v) Time variance

2. Given a single input single output state variable model.

$x = Ax + bu$

$y = cx$

prove that the eigen value of matrix A are invariant under state transformation $x = p\bar{x}$; p is a constant non singular matrix.

3. Define & prove controllability & observability of system.

4. State & prove the final value theorem of the Z-transform. What is the condition under which theorem is valid?

5. Define the regions of stability, marginal stability and instability on the S-plane. How are there regions translated to z-plane by the mappi 1:$z = e^{st}$?

6. i) Show that if a continuous time linear time invariant system is asymptotically stable, it is also B1BO stable

ii) Show that a BIBO stable continuous time linear time - invariant

system asymptotically stable only if the system is completely controllable & completely obserable.

7. Define following terms suitable explanation.

i) PI controller

ii) PID controller

8. A feed back system has a closed - loop transfer function.

$$\frac{Y(S)}{R(S)} = \frac{10(S+4)}{S(S+1)(S+3)}$$

Construct three different state models for this system.

i) One where the system matrix A is a diagonal matrix.

ii) One where A is infirst companion form.

9. Using appropriate examples. Show that sampling has detrimental effect on the transient response of a closed-loop system, but the study state response remains unaffected.