Paper Code: MTED011	Roll No.									

M. TECH.
FIRST SEMESTER THEORY EXAMINATION, 2016-2017
ADVANCED CONTROL SYSTEM

Time: 3Hours *Max. Mark: 70*

Note: *a) This paper contains eight questions. Attempt any FIVE questions*
b) Each question carries equal marks.
c) If any where the system description is not given, assume that the system is a LTI with state space representation using matrices {A, B, C, D} ,by default.

Q1. Explain the theory and advantages of the state space representation over the transfer function representation.

Q2. Define controllability and observably and define the conditions as well. Test the controllability and observability of the given system below:
$dx_1/dt=-2x_1+x_2+u$; $dx_2/dt=x_1-x_2$; $y=x2$

Q3. Define the Eigen values of the system, and describe the physical intuition of the Eigen values for any system. Find the Eigen values of the system given in Q2 and comment on the stability of the system

Q4. Explain the conversion of state space to transfer function and find the transfer function of the system represented in Q2 and have you observed any interesting thing in the transfer function ? if yes, comment it.

Q5. Briefly explain the following:
a) Singular points
b) Jump response
c) Limit cycles

Q6. Explain the common nonlinearities in control systems.

Q7. Elaborate the tools/ methods for analysing the nonlinear systems and comment on merits and demerits of them.

Q8. What is meant by the describing function in the literature of nonlinear control systems? Derive the describe function for On-Off controller with dead zone nonlinearity