

**APJ Abdul Kalam Technological University**  
**First Semester M. Tech Degree Examination, December 2015**  
**Cluster: Kollam**  
**Branch: Electrical & Electronics Engineering**  
**Specialisation: Power Systems**  
**Subject: 02EE6231 DYNAMICS OF LINEAR SYSTEMS**

Time: 3 Hrs

Max. Marks: 60

**Instructions:**    *Answer All Questions from Part A.*  
                          *Answer Two Full questions from Part B.*

**PART A**

1. (i) Discuss in detail the compensation techniques and mention different types of compensators. (4 marks)  
(ii) Explain series and feedback compensation. (5 marks)
2. State and explain the major theorems of Lyapunov in the context of control theory
3. (i) Compare the characteristics between State Space Modeling and Transfer Function (6 marks)  
(ii) Define the following terms  
(a) State      (b) State variable      (c) State vector (3 marks)
4. (i) Convert the following transfer function to the Phase Variable Canonical form  
$$\frac{12s^5 + 6s^4 - 16s^3 + 5s^2 + 3s + 7}{-11s^3 + 4s^2 + 2s - 8}$$
 (5 marks)  
(ii) Draw the corresponding signal flow graph (4 marks)

**(4 x 9=36)**

**PART B**

5. (a) To highlight the significance of 'Observer' in control system design. (5 marks)  
(b) Differentiate between open loop and closed loop observer (7 marks)
6. (a) Define and Write the polynomial Diophantine equation (2 marks)  
(b) In what ways a polynomial Diophantine equation is being solved? (10 marks)
7. (a) Discuss about the optimality criterion for choosing observer poles (6 marks)  
(b) Discuss about controllability in MIMO systems (6 marks)

**(2 x 12=24)**

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