

Roll No

MEPE - 103 RGPVONLINE.COM**M.E./M.Tech., I Semester**

Examination, June 2014

Advanced Control System*Time : Three Hours**Maximum Marks : 70*

- Note :** i) Attempt any five questions.
 ii) All questions carry equal marks.
 iii) Assume suitable data if not given.

1. a) Explain the principles of root loci.
 b) Explain state space method.
2. a) Explain effect of load disturbance upon control actions.
 b) Explain the different methods used to find the state feedback gain matrix and compare them.
3. a) Consider a linear system described by the transfer function $Y(s)$
 $u(s) = 10s(s+2)(s+1)$.
 Design a feed back controller with a state feedback so that the Eigen values of the closed loop system are at $-2, -1 \pm j1$.
 b) State and prove optimal control problem based on dynamic programming in discrete time system.

4. a) Explain the principles of causality and invariant imbedding.
 b) Explain Minimum - Time problem?
5. a) Suppose if the system equations are known in Jordan form. How do you test the properties of controllability? Explain using a state model.
 b) Explain State Regulator problem in brief.
6. a) Derive the Describe function for an on-o nonlinearity.
 b) Explain the popular inherent nonlinear elements and their functionalities.
7. State, prove and explain Lyapunov's stability theorem. Also explain what are the sufficient conditions of stability.
8. Draw a phase-plane portrait of the system defined by
 $\dot{x}_1 = x_1 + x_2$
 $\dot{x}_2 = 2x_1 + x_2$
