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Code No: EE1931

GEC-R14

M. Tech II Semester Regular/Suppl. Examinations, July 2016

COMPUTER AIDED DESIGN OF CONTROL SYSTEMS
(Control Systems)

Time: 3 Hours

Max. Marks: 60

Note: Answer any **FIVE** questions. All Questions carry equal Marks.

5 × 12 = 60M

1. a) Explain the concept of decoupling zeros in generation of system matrices. (6M)
b) Explain the McMillan form of system transformation for a system with multiple inputs and outputs. (6M)
2. a) Explain concept of controllability and observability for a given system. (6M)
b) Write the consequences of the duality while dealing with observability and Controllability. (6M)
3. Explain the design procedure of phase lead compensator from inverse Nyquist diagram. (12M)
4. a) Explain briefly the following while designing criteria (6M)
i) Pole locations
ii) The circle criteria
b) Explain the concept of non- minimum phase response while design the controller. (6M)
5. a) Explain how the circle criterion useful to analyze absolute stability. (6M)
b) Write comparison between root location method of design and inverse nyquist diagram technique. (6M)
6. Develop MATLAB code for controllability and observability for the system given Below: (12M)

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} -2 & 0 \\ 0 & -1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 1 \\ 0 \end{bmatrix} u(t)$$

$$y = \begin{bmatrix} 1 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

7. a) Write MATLAB code for time domain analysis of any second order transfer function. (6M)
b) Write MATLAB code for frequency domain analysis of any second order transfer Function. (6M)
8. Explain design methodology of state feedback controllers and using MATLAB. (12M)
