B.TECH. SEM -V ELECTRICAL 2014 COURSE (CBCS) : WINTER - 2017

SUBJECT: LINEAR CONTROL SYSTEMS

Day : **Thursday** Time **02.30 PM TO 05.30 PM**

Date : **11/01/2018** **W-2017-2134** Max. Marks: 60

N.B.

1) All questions are **COMPULSORY.**
2) Figures to the right indicate **FULL** marks.
3) Use of non-programmable **CALCULATOR** is allowed.
4) Assume suitable data if necessary.

Q.1 Explain the different terms used in signal flow graphs. Explain the detailed procedure to draw signal flow graph from block diagram. State Masons Gain formula. **(10)**

OR

Q.1 Explain in detail the derivation for mathematical model and transfer function of armature controlled DC motor. Draw necessary figure and block diagram. **(10)**

Q.2 Explain time domain specifications in detail. Write short note on steady state error and static error constants. **(10)**

OR

Q.2 Obtain the unit step response and unit impulse response of the following system: $\frac{C(s)}{R(s)} = \frac{10}{s^2+2s+10}$. **(10)**

Q.3 What are the advantages of root locus? Explain in detail rules for construction of root locus. **(10)**

OR

Q.3 Given $G(s) = \frac{k}{s(s+1)(s+3)}$. Sketch the root locus plot and comment on stability. **(10)**

Q.4 Explain the concept of compensation using root locus technique. Describe the effects of addition of poles and addition of zeros in the original system. Draw the necessary figures. **(10)**

OR

Q.4 Write short note on the following: **(10)**

a) Lag compensator design using root locus
b) Use of SISO design tool in MATLAB

Q.5 Explain the frequency domain specifications used to measure the performance and characteristics of a system in the frequency domain. Write a short note on correlation between time domain and frequency domain specifications. **(10)**

OR

Q.5 The specifications on a second order unit feedback control system with the closed loop transfer function $T(s) = \frac{\omega_n^2}{s^2+2\xi\omega_n s+\omega_n^2}$ are that the maximum overshoot must not exceed 30 percent and the rise time must be less than 0.2 sec. Find the limiting values of M_r and bandwidth. **(10)**

Q.6 Write short notes on the following: **(10)**

a) Comparison of lag, lead compensator
b) Use of SISO design tool in MATLAB

OR

Q.6 Write short notes on: **(10)**

a) Bode plot for lag compensator network
b) Design the lag compensator using bode plot

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