Code No: R22026   **R10**   SET - 1

II B. Tech II Semester Supplementary Examinations, April-2018
CONTROL SYSTEMS
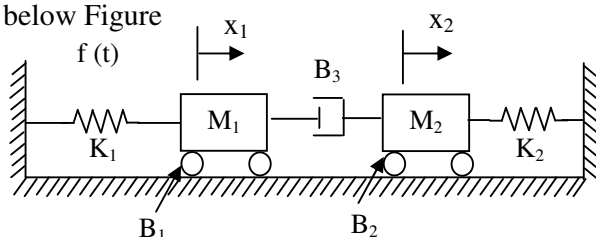(Com. to EEE, ECE, EIE, ECC, AE)

Time: 3 hours   Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) How the control systems are classified? What are its various types (8M)
   b) Obtain the transfer functions of the translational mechanical system shown in below Figure (7M)

2. a) Derive the transfer function of Field controlled DC motor (8M)
   b) List out the guidelines for Block diagram reduction technique (7M)

3. a) Derive the expression for response of Undamped second ordered system for unit step input (8M)
   b) Derive the expression for Time domain specifications (7M)

4. a) Define stability, explain the construction of Routh array (8M)
   b) Explain the various steps in the procedure for constructing Root Locus (7M)

5. Derive the expressions for (i) Resonant peak, (ii) Resonant frequency, (iii) Bandwidth, (iv) Phase margin (15M)

6. a) Sketch the polar plots of typical Type 0, 1 and 2 systems and explain the sailent features of these plots (8M)
   b) Describe the Nyquist stability criterion and its significance (7M)

7. a) Explain the effects and limitations of phase-lag compensation (8M)
   b) Enumerate the design steps involved in phase lag-lead compensation (7M)

8. a) Explain the state transition matrix and properties of the state transition matrix (8M)
   b) Obtain the state model of the system whose transfer function is given by (7M)

$$T(S) = \frac{S^2 + 3S + 3}{S^3 2S^2 + 3S + 1}$$