

D 33160

(Pages : 3)

Name.....

Reg. No.....



**FOURTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION  
FEBRUARY 2013**

**EE 04 406—LINEAR SYSTEMS ANALYSIS**

(2004 Admissions)

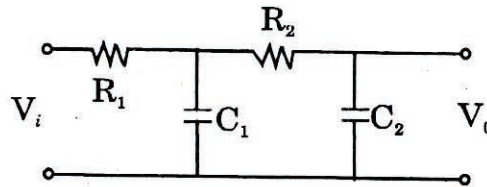
Time : Three Hours

Maximum : 100 Marks

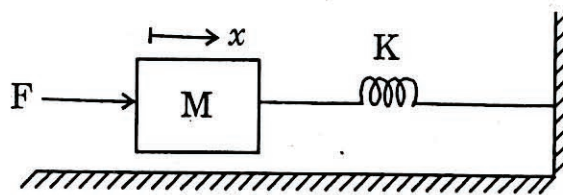
*Answer all questions.*

**Part A**

- I. (a) What is meant by deterministic and random systems ? Explain.  
(b) Using Mason's gain formula find the transfer function of the following system :



- (c) A mass spring system under equilibrium condition is shown in figure below. Derive the system equation.



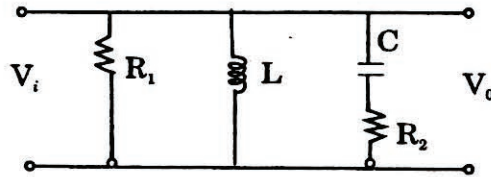
- (d) Define thermal resistance and thermal capacitance. Explain.  
(e) Define complex exponential Fourier series and explain.  
(f) What is frequency response ? Explain its properties.  
(g) Find the Laplace transform of  $x(t) = \sinh(t)$ .  
(h) Define velocity and acceleration error constants. Explain.

(8 × 5 = 40 marks)

Turn over

**Part B**

II. (a) (i) Using Kirchoff's current law, write the dynamic equations for the following circuit :



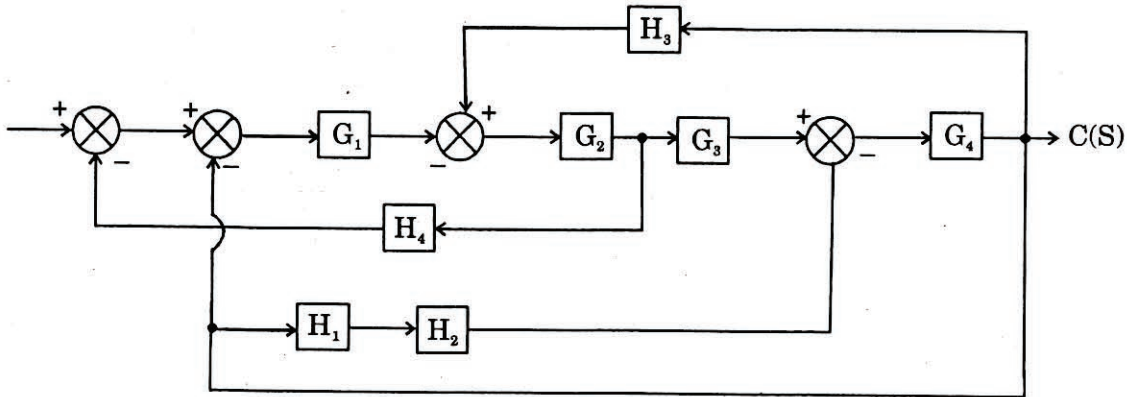
(9 marks)

(ii) Explain homogeneity and additive property of system.

(6 marks)

Or

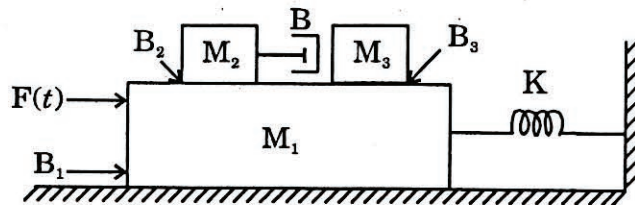
(b) Using block diagram reduction technique find C/R.



III. (a) Explain gear trains and derive torque equation referred to motor shaft.

Or

(b) Consider the mechanical system shown below and draw (i) force-voltage; and (ii) force-current analogous circuits :



IV. (a) Find the trigonometric Fourier series representation for the half-wave rectified sine wave.

Or

(b) Verify the Parseval's theorem for the following signal  $x(t) = e^{-2t} u(t)$ .

V. (a) Derive the steady state response of the second order system for unit impulse input.

Or

(b) Find the dynamic error coefficients of the unity feed back system whose transfer

function is  $G(s) = \frac{200}{s(s+5)}$ . Find the steady state error of the system for the input  $4t^2$ .

(4 × 15 = 60 marks)