Code :RR320201 **RR**

III B.Tech II Semester(RR) Supplementary Examinations, April/May 2011
ANALYSIS OF LINEAR SYSTEMS
(Electrical & Electronics Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE questions
All questions carry equal marks
⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Distinguish between continuous and discrete time systems with suitable examples.
   (b) Explain the D'Alenbent's Principle with the help of a suitable mechanical translational systems.
   (c) For the mechanical system shown in figure1, draw the mechanical equivalent network. Hence develop the force-voltage analogous electric circuit and write the equations.

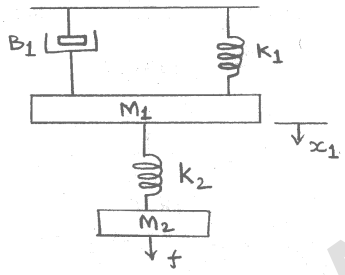

Figure 1:

2. (a) The transfer function of a system is $G(s) = \frac{2}{(s+1)(s+2)}$ obtain the state variable representation of the systems.
   (b) Determine the state transition matrix for the system represented by the characteristic matrix $A = \begin{bmatrix} 3 & 0 & 0 \\ 0 & -2 & 1 \\ 1 & 4 & 1 \end{bmatrix}$

3. (a) Find the current i(t) in a series R-L-C circuit comprising of resistor R = 5Ω, L=1H, C= $\frac{1}{4}$ F when the step voltage 3 u(t-3) is applied to it
   (b) Find the response of a series R-C circuit with R=1Ω, C=2F with an impulse voltage of 2δ (t-3) applied across it.

4. (a) Find the response i(t) for a series R-C circuit, with R = 1Ω, C=1F and applied by a periodic waveforms shown in figure 2 Assume initial conditions to be zero.
   (b) Fid the inverse Laplace transform of the following function using convolution theorem $F(s) = \frac{4s}{(s+2)(s^2+1)}$

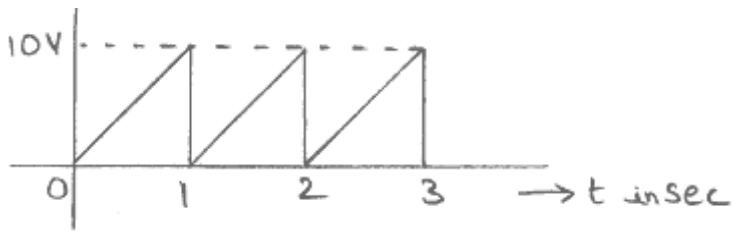

Figure 2:

5. A full-wave rectified output voltage, with an input voltage of 230 V, 50Hz, is applied to a series R-L circuit with R=2Ω, L = 3.18mH. Find:
   (a) Fourier coefficients

(b) RMS value of voltage

(c) RMS value of current

(d) Average power consumed in the circuit and power factor of the load.

6. (a) Find the Fourier transform of a gate function

$$G(t) = 1 \quad for \quad -\frac{T}{2} < t < \frac{T}{2}$$
$$= 0 \qquad otherwise$$

(b) Find the Fourier transform of the constant signal f(t) = $A(-\infty < t < \infty)$

7. (a) Test whether the following polynomial is Hurwitz or not?
$H(s) = s^6 + 5s^5 + 13s^4 + 21s^3 + 20s^2 + 16s + 8$

(b) Test whether the following function is positive real or not?
$F(s) = (s^2 - 2s + 2)(s^2 - 6s + 9)/(s^2 + 2s + 2)(s^2 + 6s + 9)$

8. (a) Explain how the removal of pole at infinity of an impedance Z(s) can realize an element in the network.

(b) Realize the network with the following driving point impedance function using first Foster form.
Z(s) = (s+2) / s(2s+5)

⋆ ⋆ ⋆ ⋆ ⋆