M 19382

Reg. No. : .....

Name : .....

VI Semester B.Tech. (Reg./Sup./Imp. - Including Part Time) Degree Examination, July 2011
(2007 Admn.)
PT2K6/2K6 EC/CS/IT/AEI 601 : ENVIRONMENTAL ENGINEERING AND DISASTER MANAGEMENT

Time : 3 Hours Max. Marks : 100

Instructions : *1) Answer 8 questions from Q. I.*
2) Answer 1 question from Q. II, Q. III, Q. IV and Q. V.

I. 1) Write a note on man made landslides. **5**

2) Mention different types of soil erosion. **5**

3) Explain the various types of forest ecosystem. **5**

4) Discuss briefly the different threats to biodiversity. **5**

5) Describe various sources of pollution. **5**

6) Discuss the sources of air pollution. **5**

7) Discuss about population explosion. **5**

8) Discuss on human rights and environment. **5**

II. A) Discuss the use and abuse of land resources. **15**

B) Discuss the scope and importance of environmental studies. **15**

III. A) Discuss about the elements of an aquatic ecosystem. **15**

B) Discuss the characteristics of the biogeographical zones in India. **15**

IV. A) Explain the means of entry of pathogenic organisms into the soil system. **15**

B) Explain the different effects of noise pollution. **15**

V. A) Enumerate the wasteland reclamation strategies. **15**

B) Discuss about rainwater harvesting. **15**

M 19383

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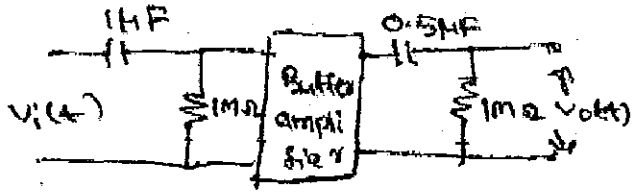
VI Semester B.Tech. (Reg./Supl./Imp. Including Part Time)
Degree Examination, July 2011
(2007 Admn.)
PT2K6/2K6 EC/AEI 602 : CONTROL SYSTEMS

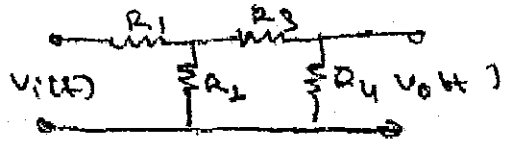
Time : 3 Hours Max. Marks : 100

***Instruction** : Answer **all** questions.*

1. a) Find the transfer function $\frac{V_0(S)}{V_i(S)}$ for the system below



b) Obtain the block diagram for given electrical n/w



c) Find the error constants K_p, K_v and K_a for the unity feedback system represented by the following open loop transfer function. Also determine the steady state error when the input is $r(t) = 1 + t + 2t^2$. $G(S) = \frac{100}{S^2(S+2)(S+5)}$.

d) Define the following systems sketching their o/p waveform for a unit step input.

i) Under damped system ii) Undamped system

iii) Over damped system iv) Critically damped system

e) What is pulse transfer function ? What are the steps involved in finding the pulse transfer function H(Z) from H(S) ?

P.T.O.

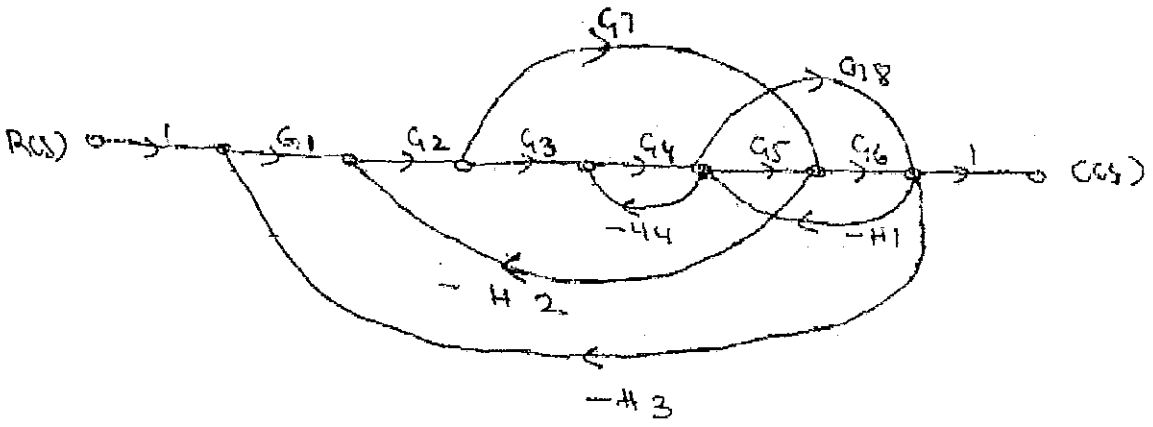
f) Explain Shanon's sampling theorem. Explain signal reconstruction using zero-order hold Ckt.

g) Explain Laplace transform method of obtaining C^{AT}.

h) Find the transfer function of the system having state model

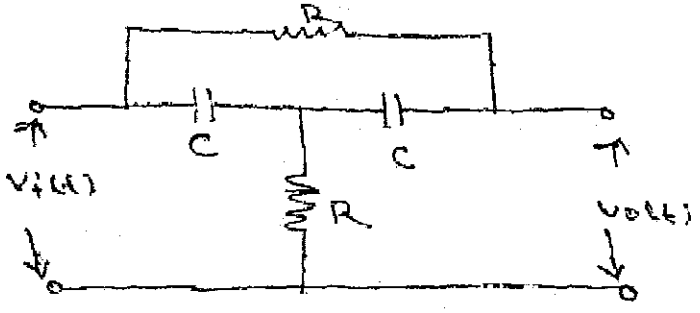
$$\dot{x} = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix} x + \begin{bmatrix} 1 \\ 0 \end{bmatrix} u \text{ and } y = [1\ 0]x. \qquad \textbf{(5×8=40)}$$

2. Find $\frac{C(S)}{R(S)}$ for following SFG. **15**



OR

3. Obtain the transfer function $\frac{V_0(S)}{V_i(S)}$ using Mason's gain formula for following network. **15**



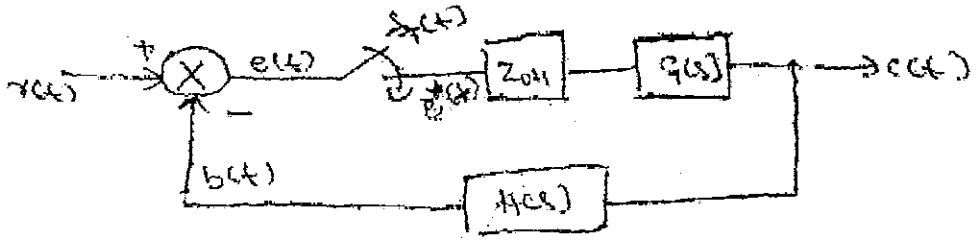
4. A unity feedback control system has $G(S) = \frac{80}{S(S+2)(S+20)}$. Draw the Bode plot. Determine GM, PM, W_{gc} and W_{pc}. Comment on the stability of the system. **15**

OR

5. The open loop transfer function of unity feedback system is

$G(S) = \dfrac{1}{S(S+1)(1+2S)}$. Sketch the polar plot and determine GM and PM. **15**

6. For the sampled-data control system shown below where $G(S) = \dfrac{1}{S+1}$, $H(S) = \dfrac{1}{S}$ and Z_{OH}, $G_0(S) = \dfrac{1-e^{-ST}}{S}$. Assume sampling period = 1 sec. Find the response to unit step input. **15**



OR

7. Find the Z-transform of (a) $e^{-at}\sin\omega t$ (b) $\sin k\omega T\, u(k)$. Find also ROC. **15**

8. a) For a certain system when $x(0) = \begin{bmatrix} 1 \\ -3 \end{bmatrix}$ then $x(t) = \begin{bmatrix} e^{-3t} \\ -3e^{-3t} \end{bmatrix}$ while

$x(0) = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$ then $x(t) = \begin{bmatrix} e^{t} \\ e^{t} \end{bmatrix}$. Determine the system matrix A. **8**

b) State and prove final value theorem. **7**

OR

9. Find the response of the system,

$\dot{x} = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix} x + \begin{bmatrix} 2 & 1 \\ 0 & 1 \end{bmatrix} u(t)$, $x(0) = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$ and $y(t) = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix} x$ to following input

$u(t) = \begin{bmatrix} u_1(t) \\ u_2(t) \end{bmatrix} = \begin{bmatrix} u(t) \\ e^{-3t}u(t) \end{bmatrix}$ where u(t) is unit step function. **15**

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VI Semester B.Tech. (Reg./Sup./Imp.-Including Part Time) Degree Examination, July 2011
(2007 Admission)
PT2K6/2K6EC 603 : RADIATION AND PROPAGATION

Time : 3 Hours Max. Marks : 100

Instructions : *Answer* ***all*** *questions.*

PART – A

1. a) Define antenna. Explain the significance of antenna.
   b) Draw the diagram of phase pattern and power pattern. Indicate various parameters on it. Compare the features.
   c) Explain the normalised power pattern of broadside array.
   d) Discuss the important features of end fire array.
   e) Explain folded dipole antenna with a figure.
   f) Explain the principle of parabolic reflector antenna.
   g) Discuss the main importance of ground attenuation factor.
   h) Briefly explain the principle of the tropo scatter propagation. **(8×5=40)**

PART – B

2. a) i) Define directivity. Give the expressions of directivity. 7
   ii) Explain the followings :
   A) Radiation resistance B) Directivity and gain
   C) Beam efficiency D) Effective aperture 8

OR

   b) i) State and prove reciprocity theorem. 8
   ii) Explain self impedance and mutual impedance. Give the relationships for each of them. 7

P.T.O.

3. a) i) Derive an expression for total electric field and array factor for two isotropic point sources with the origin of the axis at the centre of the two point sources. Also determine the peaks, nulls and half power points if the magnitude of both E field is equal and out of phase with $d = \frac{\lambda}{2}$ and $\delta = \pi$. **10**

ii) What is pattern multiplication ? Explain with an example. **5**

OR

b) For an end fire array, derive the expression for finding out nulls, side lobes and BWFN. **15**

4. a) i) Explain the followings :

A) Travelling wave antenna **8**

B) Rhombic antenna

ii) Differentiate between narrow band and broad band antennas. **7**

OR

b) i) Explain log periodic antenna with a figure. **8**

ii) Write a short note on cassegrain antenna. **7**

5. a) i) Explain the reflection and refraction that occur in various types of wave propagation schemes. **10**

ii) Write a note on plane earth reflection. **5**

OR

b) i) Explain the behaviour of waves in ionosphere for different frequency range. **8**

ii) Define skip distance. Derive an expression for skip distance. **7**

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VI Semester B.Tech. (Regular/Supplementary/Improvement - Including Part Time) Degree Examination, July 2011
(2007 Admn.)
PT2K6/2K6EC/AEI604 – DIGITAL SIGNAL PROCESSING

Time : 3 Hours Max. Marks : 100

***Instruction** : Answer **all** questions.*

(8×5=40)

1. a) Compute the DFT of the sequence x(n) = [0,1,2,3].

   b) Find linear phase realisation of $H(z) = 1 + \frac{z^{-1}}{4} + \frac{z^{-2}}{4} + z^{-3}$.

   c) Explain the working of Barrel shifter with neat diagram.

   d) Prove the inherent stability property of FIR filter.

   e) Write a short note on Von Neumann and Harvard architecture.

   f) Compute 4 point DFT of x(n) = [1, 2, 1, 0].

   g) Write a note on Hamming window.

   h) Realize following system function by Linear phase FIR structure.

   $$H(z) = \frac{2}{3}z + 1 + \frac{2}{3}z^{-1}.$$

P.T.O.

2. a) i) State and prove periodicity property of DFT. 7

ii) Compute circular convolution using DFT and IDFT for the following

$x_1[n] = \{2, 3, 1, 1\}$ $x_2(n) = \{1, 3, 5, 3\}$ 8

OR

b) i) State and prove circular time shift property of DFT. 7

ii) The impulse response of a system is given as $[\underset{\uparrow}{3}, 2]$. Find the output of the system for an input [0, 1, 0, 1] using circular convolution. 8

3. a) i) Realize the following system function in Direct Form I

$$H(z) = \frac{(z-1)(z-2)(z+1)(z)}{\left[z-\left(\frac{1}{2}+j\frac{1}{2}\right)\right]\left[z-\left(\frac{1}{2}-j1/2\right)\right][z-j/4][z+j/4]}$$ 7

ii) Find Lattice ladder structure for the filter given by

$$y(n)+\frac{3}{4}y(n-1)+\frac{1}{4}y(n-2)=x(n)+2x(n-1)$$ 8

OR

b) i) Obtain Direct Form II realization for

$y(n) = 0.75\, y(n-1) - 0.125\, y(n-2) + 6x(n) + 7x(n-1) + x(n-2)$. 7

ii) Obtain Direct form II canonic and cascade realization of

$$H(z) = \frac{(z-1)(z^2+5z+6)(z-3)}{(z^2+6z+5)(z^2-6z+8)}$$

Cascade section should have biquadratic sections. 8

4. a) i) Obtain system function of a normalised butterworth filter of order 3. 7

ii) Design a FIR low pass filter using rectangular window using passband gain of 0 dB, cut off frequency of 200 Hz, sampling frequency of 1 KHz. Assume length of impulse response as 7. 8

OR

b) i) Write a note on triangular window. 7

ii) Using rectangular window design a lowpass filter with passband gain unity, cut off frequency of 1 KHz and sampling frequency of 5 KHz. Length of impulse is 7. 8

5. a) i) What is the importance of saturation logic ? Explain with relevant diagram. 7

ii) Write a short note on Von Neumann and Harvard architecture. 8

OR

b) i) With neat diagram explain working of DSP 56000. 7

ii) Explain how a 8-tap FIR filter is implemented using MAC unit. 8

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VI Semester B. Tech. (Reg./Supple./Imp. – Including Part-Time) Degree Examination, July 2011
(2007 Admn.)
PT2K6/2K6 EC 605 : DIGITAL COMMUNICATION

Time : 3 Hours Max. Marks : 100

***Instruction** : Answer **all** questions.*

I. a) Explain in brief mid-rise type and mid-tread type quantization.

b) Assume a speech signal with minimum frequency of 3.4 kHz and a maximum amplitude of 1 volt. The speech signal is applied to a delta modulator with its bit rates at 25 kbps. Discuss the choice of an appropriate step size for delta modulator.

c) A computer outputs binary data at the rate of 50 kbps that is transmitted using a base band binary PAM system, which is designed to have a raised cosine pulse spectrum. Find the transmission bandwidth required for roll off factor $\alpha = 0.4$.

d) Define the following :

i) Inner product ii) Norm

iii) Orthogonality iv) Projection.

e) Explain briefly white noise.

f) List the properties of matched filter.

g) Explain with example, the digital modulation schemes.

h) The input binary sequence to a QPSK modulator is {bi} = {0. 1 : 0.0 10 11 0 11 0}. Sketch the transmitted phase of the carrier as a function of Time.

Transmitted phase for each limit $11 \rightarrow \pi/4$ $01 \rightarrow \frac{3\pi}{4}$ $00 \rightarrow \frac{-3\pi}{4}$ $10 \rightarrow \frac{\pi}{4}$. **(5×8=40)**

P.T.O.

II. 1) a) A signal $g(t) = 2\cos 400\pi t + 6\cos 640\pi t$ is ideally sampled at $f_s = 500$ Hz. If the sampled signal is passed through an ideal low pass filter with a cut-of frequency of 400 Hz. What frequency components will appear in the filter output ? **10**

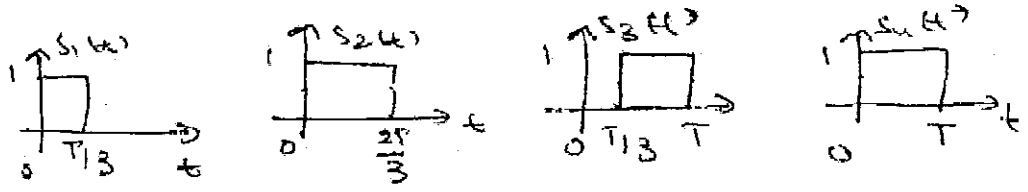
b) With relevant wave forms explain two types of quantization error in DM. **5**

OR

2) a) Explain how to generate PPM. **8**

b) With neat block diagram explain PCM. **7**

III. 3) Consider the signals $s_1(t)$, $s_2(t)$, $s_3(t)$ and $s_4(t)$. Shown in fig below. Using Gram-Schmidth, orthogonalization procedure determine the orthonormal basis function for these signals. **15**



OR

4) a) The binary data 0 0 1 0 1 1 0 are applied to the input of a duo binary system. Construct the duo binary coder output and corresponding receiver output with a pre corder. **10**

b) Write short note on adaptive equalization. **5**

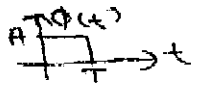
IV. 5) Write the block diagram of correlation receiver. Derive the expression for response of bank of correlation receiver to noisy input. **15**

OR

6) Fig. below shows a finite energy signal $\phi(t)$.

i) Sketch the impulse response hopt (t) of the optimum filter matched to $\phi(t)$.

ii) Determine the value of output of matched filter at t = T, assuming noise is zero and input is $\phi(t)$. **15**



V. 7) Explain with block diagram PSK modulator and demodulator. Derive the expression for probability of error. **15**

OR

8) Explain QPSK Scheme. Derive the expression for probability of error. **15**

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VI Semester B.Tech. (Regular/Suppl./Imp. Including Part Time) Degree Examination, July 2011
(2007 Admn.)
PT2K6/2K6EC/AEI 606(C) : LINEAR SYSTEMS ANALYSIS

Time : 3 Hours Max. Marks : 100

***Instruction** : Answer **all** questions.*

PART – A

1. a) Differentiate stochastic and deterministic systems.
   b) Write a note on superposition principle.
   c) Give force-current analogy of mass, spring and dashpot elements.
   d) Compare electrical and electromechanical systems.
   e) Write a note on convolution and its significance.
   f) Explain velocity error constant in detail.
   g) What is BIBO stability ? Explain.
   h) Explain zero state response and zero input response of a system. **(8×5=40)**

PART – B

2. a) Draw the signal flow graph of block diagram shown in fig. 1 and find the transfer function. **15**

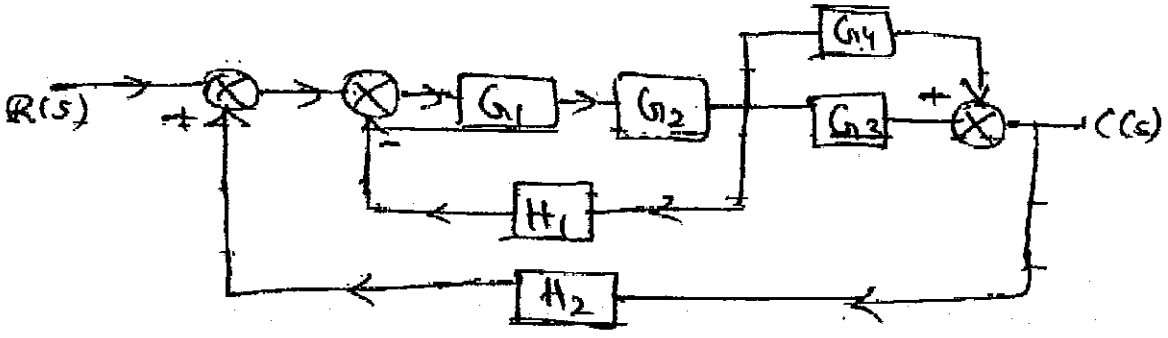

Fig. 1

OR

P.T.O.

b) Draw the signal flow graph for the network shown in fig. 2 and find the transfer function. **15**

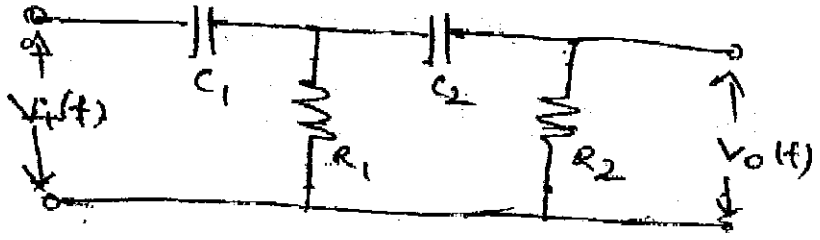

Fig. 2

3. a) For the mechanical system shown in fig. 3, draw the mechanical network. Hence write the equilibrium equation for it and obtain electrical analogous circuit using force-voltage analogy. **15**

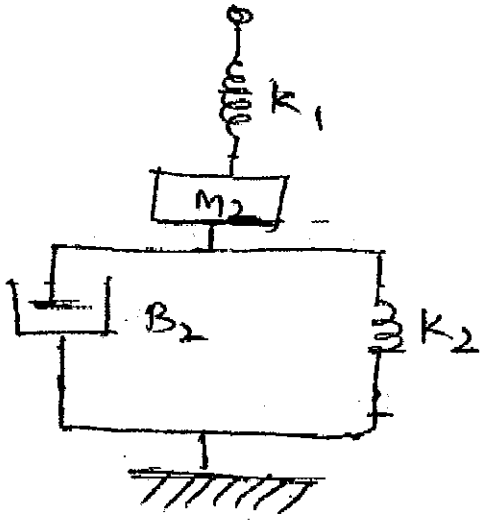

Fig. 3

OR

b) For the system shown in fig. 3 obtain electrical analogous circuts using force - current analogy. Write the equilibrium equations. **15**

4. a) Starting from the expression of C(t) for unit step input of typical under damped second order system, derive the expression for settling time. **10**

   b) Discuss the advantages of feedback in a control system. **5**

   OR

   c) A second order system is given by $\frac{(CS)}{R(S)} = \frac{25}{S^2+6S+25}$ find its rise time, peak time, peak overshoot and settling time if subjected to unit step input. Also calculate expression for its output response. **15**

5. a) Write a note on Routh's stability criterion. Explain the significance of auxillary equation. **8**

   b) Determine the stability of a system with characteristic equation $S^5 + 4S^4 + 2S^3 + 8S^2 + S + 4 = 0$. **7**

   OR

   c) Determine the rang of k for the stability of the system shown in fig. 4. **15**

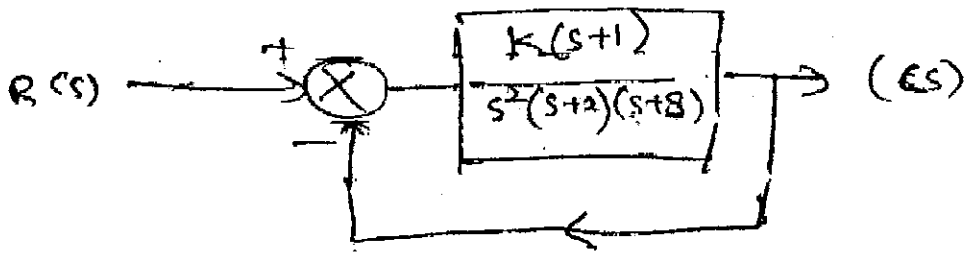

Fig. 4.