Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 31357

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

Fourth Semester

Electronics and Communication Engineering

EC 2252/EC 42/EC 1252/080290020 — COMMUNICATION THEORY

(Regulation 2008)

(Common to PTEC 2252 Communication Theory for B.E. (Part-Time) Third Semester ECE – Regulation 2009)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. The average power of a periodic signal $g_p(t)$ is calculated using what theorem? State the theorem.

2. Represent an amplitude modulated wave as a function of time with amplitude sensitivity of the modulator as the constant.

3. Define the modulation index of the FM wave and specify how you will distinguish narrow band and wide band FM respectively.

4. Draw a simple schematic of a PLL demodulator.

5. When carrier to noise ratio is high, how will you get figure of merit of FM systems?

6. How will you define the narrow - band noise $m(t)$ at the IF filter output in terms of its inphase and quadrature components?

7. What is known as aliasing?

8. Justify the need for pre-emphasis and de-emphasis.

9. Give the equation for finding the entropy of a binary source.

10. For a discrete memoryless channel define channel capacity as per Shannon.

PART B — (5 × 16 = 80 marks)

11. (a) With suitable block diagrams and equations show how will you generate :

(i) DSBSC and

(ii) VSB signals.

Or

(b) A sine wave of frequency 10Hz is applied to a product modulator, together with a carrier wave frequency of 1 MHz. The modulator output is next applied to a resonant circuit. Determine the modulated wave after transmission through the circuit. Assume suitable data.

12. (a) A carrier wave of frequency 80 MHz is frequency modulated by a sine wave amplitude of 20 volts and frequency of 80 KHz. The frequency sensitivity of the modulator is 20 KHz/vdf.

(i) Determine the approximate bandwidth of the FM wave by Carson's rule.

(ii) Determine the bandwidth by transmitting only those side frequencies whose amplitude exceed 1% of the unmodulated carrier amplitude (use the universal curve/ideal condition).

Or

(b) Describe how FM wave is generated by the indirect method and give a suitable demodulating scheme for the same.

13. (a) Summarise the characteristics of various noise found in a communication channel.

Or

(b) Derive the equation for finding the probability density function of a one to one differentiable function of a given random variable.

14. (a) Explain the functioning of a superhetrodyne radio receiver and enlist its characteristics.

Or

(b) Compare the performance of any two CW modulation schemes.

15. (a) (i) Prove how you use the source coding to increase average information per bit.

(ii) Write the advantages of Huffman coding.

Or

(b) Write short notes on :

(i) Lossy source coding

(ii) S/N trade off.

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Question Paper Code : 31360

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

Fourth Semester

Electronics and Communication Engineering

EC 2255/EC 46/ EE 1256 A/ 080290023/10144 EC 406 — CONTROL SYSTEMS

(Regulation 2008/2010)

(Bode plot, Graph sheet, Semi – log, Nichol's chart are permitted)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. Define Transfer function.

2. Define resistance and capacitance of liquid level system.

3. What are the units of K_p, K_v and K_a?

4. What is the effect of PI controller on the system performance?

5. Define phase margin.

6. State Nyquist stability criterion for a closed loop system when the open loop system is stable.

7. What are constant M and N circles?

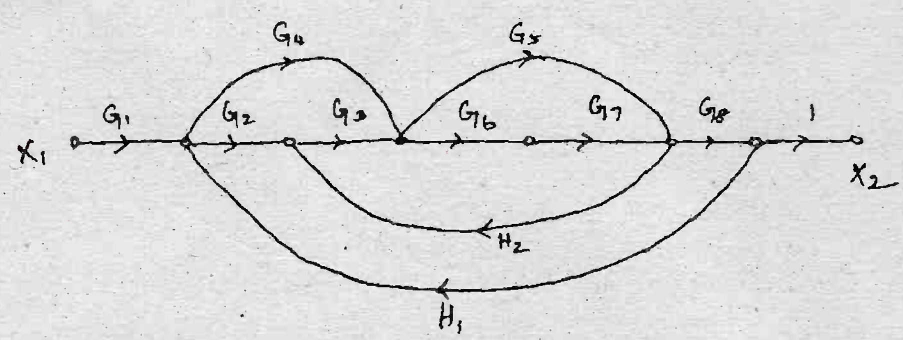
8. State the property of a lead compensator.

9. Define state equation.

10. Give the concept of controllability.

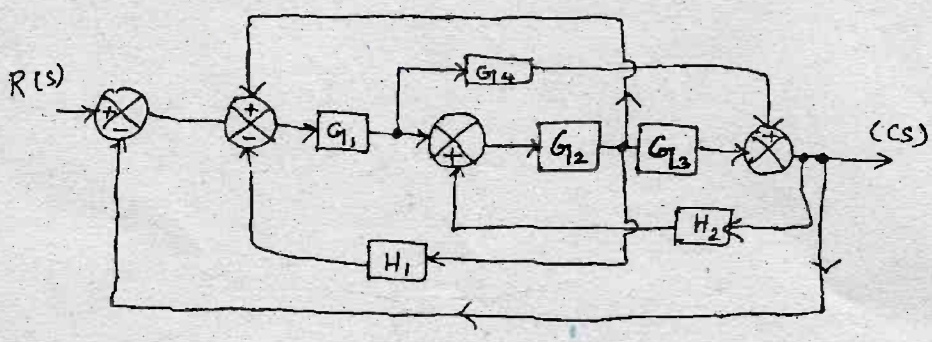
PART B — (5 × 16 = 80 marks)

11. (a) State Mason's Gain formula using Mason's Gain formula to find $\frac{X_2}{X_1}$.

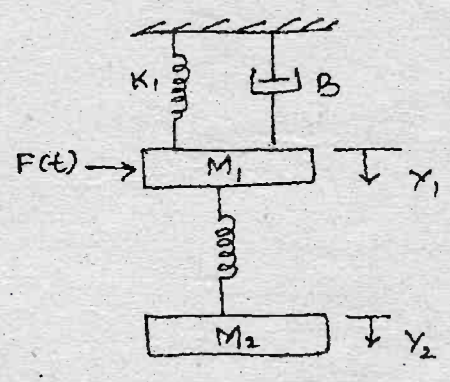


Or

(b) Use Mason's Gain formula to obtain C(S)/ R(S) of the system shown below.



12. (a) Determine the transfer function $\frac{y_2(s)}{F(s)}$ of the system shown in figure.



Or

(b) A unity feed back system is characterized by the open loop transfer function $G(s) = \frac{1}{s(0.5s+1)(0.2s+1)}$. Determine the steady state errors for Unit – step, Unit – ramp and Unit – acceleration unit. Also determine the damping ratio and natural frequency of the dominant roots.

13. (a) For the following transfer function draw bode plot and obtain gain cross – over frequency.

$$G(s) = \frac{20}{s(1+3s)(1+4s)}.$$

Or

(b) Discuss in detail about lead and lag networks.

14. (a) Sketch the root locus for $GH(s) = \frac{k(s+2)(s+3)}{(s+1)(s-1)}$.

Or

(b) The open loop transfer function of a unity feedback control system is given by $G(s) = \frac{k}{(s+2)(s+4)(s^2+6s+25)}$. By applying the Routh criterion, discuss the stability of the closed loop system as a function of K.

15. (a) For the given state variable representation of a second order system given below find the state response for a unit step input and $\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 2 \end{bmatrix} [u] \begin{bmatrix} x_1 & (0) \\ x_2 & (0) \end{bmatrix} = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$ by using the discrete – time approximation.

Or

(b) Consider the system with the state equation.

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -11 & -6 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u.$$

Check the controllability of the system.

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