Seventh Semester B.E. Degree Examination, May/June 2010
Control Engineering

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions, selecting*
at least TWO questions from each part.

PART – A

1.   a.   What are the requirements of an ideal control system?   **(05 Marks)**
    b.   Differentiate between open loop and closed loop control systems.   **(05 Marks)**
    c.   What are the characteristics of an integral controller?   **(05 Marks)**
    d.   Describe a controller which will improve the transient behavior of the system.   **(05 Marks)**

2.   a.   Write the transfer functions for the mechanical system shown in Fig.2(a).   **(10 Marks)**
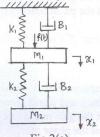

Fig.2(a)

    b.   Draw equivalent electrical circuits for the above mechanical system using voltage-force and current-force analogy.   **(10 Marks)**

3.   a.   Use block diagram reduction to obtain the overall transfer function of the system shown in Fig.3(a).   **(10 Marks)**
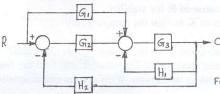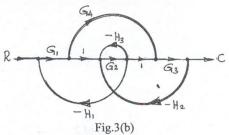

Fig.3(a)

    b.   Obtain the overall transfer function C/R from the signal flow graph shown in Fig.3(b).   **(10 Marks)**

Fig.3(b)

4 a. Derive the response of a first order system, subjected to unit step function input. Explain the importance of time constant on speed of response. **(10 Marks)**

b. By applying Routh criterion, discuss the stability of the closed loop system whose characteristic equation is $S^6 + 3S^5 + 4S^4 + 6S^3 + 5S^2 + 3S + 2 = 0$. **(10 Marks)**

PART – B

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

$$G(S) = \frac{K}{S(1+S)(1+0.125S)}.$$

Draw the polar plot and determine :

i) The value of K so that the gain margin of the system is 32 db.

ii) The value of K so that the phase margin of the system is 60°. **(20 Marks)**

6 The open loop transfer function of a unity feedback system is

$$G(S) = \frac{K(1-0.1S)}{S(1+S)(1+0.1S)}.$$

By sketching the Bode asymptotic plot, determine:

i) Gain crossover frequency and phase crossover frequency when K = 1

ii) The value of K so that the gain margin as the system is 30 db

iii) The values of K so that the phase margin of the system is 60°. **(20 Marks)**

7 The open loop transfer function of a unity feedback system is

$$G(S) = \frac{K}{S(S+2)(S^2+2S+2)}.$$

Sketch the root locus plot and determine :

i) Limiting value of K for stability

ii) The values of K so that the damping ratio is 0.707. **(20 Marks)**

8 a. What is a compensator? How are compensators classified? **(05 Marks)**

b. Derive the transfer function of lag network and find the frequency at which the phase angle lag of a lag network is maximum. What are the characteristics of a lag compensator? **(15 Marks)**

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Seventh Semester B.E. Degree Examination, May/June 2010
Total Quality Management

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions, selecting atleast TWO questions from each Part.*

PART - A

1 a. Define Total Quality Management. Explain in brief six basic concepts of TQM.   (08 Marks)
   b. With a neat block diagram, briefly explain TQM frame work.   (08 Marks)
   c. What are the benefits of TQM?   (04 Marks)

2 a. List out the 14 points containing Deming's philosophy. Explain any three in brief. (10 Marks)
   b. Mention ten principles suggested by Dr. Kaoru Ishikawa.   (10 Marks)

3 a. Define leadership. What are the characteristics of quality leaders?   (10 Marks)
   b. Mention and explain quality statements.   (10 Marks)

4 a. Write notes on : i) PDCA cycle   ii) SDCA cycle.   (12 Marks)
   b. Sketch and explain the WV model showing the connections amongst proactive and reactive
      improvement and process control.   (08 Marks)

PART - B

5 a. Write notes on : i) Re – engineering   ii) Kaizen.   (08 Marks)
   b. Define bench marking. What are the six steps involved in bench marking process? (08 Marks)
   c. What are the advantages and disadvantages of bench marking?   (04 Marks)

6 a. Define QFD. With a neat sketch, explain four phases of QFD process.   (08 Marks)
   b. With the help of form, explain the design FMEA document.   (08 Marks)
   c. List four benefits of QFD.   (04 Marks)

7 a. Explain ISO – 9000 series of standards.   (06 Marks)
   b. Explain briefly organizational evaluation standards of ISO 14000 series of standards.
                                                                                     (08 Marks)
   c. What are the four levels of documentation? Explain briefly with the help of documentation
      pyramid.   (06 Marks)

8 a. Explain the concept of six sigma.   (08 Marks)
   b. What is product acceptance control? Explain the differences between single, double and
      multiple sampling plans.   (12 Marks)

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