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

Question Paper Code : P 1357

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2009.

Fourth Semester

Electrical and Electronics Engineering

IC 1251 — CONTROL SYSTEMS

(Regulation 2004)

(Common to B.E. – Instrumentation and Control Engineering)

(Common to B.E. (Part-Time) Third Semester – EEE – Regulation 2005)

Time : Three hours Maximum : 100 marks

Semilog sheets will be provided on demand.

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the two assumptions to be made while deriving Transfer function of Electrical systems?

2. Define Signal flow graph.

3. Define Step Signal.

4. What do you mean by static error constants?

5. Define Gain Margin.

6. What are the advantages of Bode plot?

7. What are the conditions to be satisfied for a linear time-invariant system to be stable?

PART B — (5 × 16 = 80 marks)

11. (a) Define and explain the static characteristics of an instrument.

Or

(b) (i) Classify and explain the different types of standards of measurements. (8)

(ii) Explain about the basic elements of a generalized measurement system with a neat diagram. (8)

12. (a) Describe the constructional details and working of the electrodynamometer type wattmeter and also derive the torque equation and state the advantages and disadvantages of electrodynamometer type wattmeter.

Or

(b) Explain in detail mechanical resonance type frequency meter and electrical resonance type frequency meter.

13. (a) Explain in detail the working of the following bridges and derive their balance equation.

(i) Wheatstone's bridge.

(ii) Maxwell's bridge. (8 + 8)

Or

(b) Write a short note on techniques used to reduce the ground loop interference signals.

14. (a) Describe the principle of operation of LED and LCD display devices.

Or

(b) Explain various types of printers in detail giving all the important aspects of them.

15. (a) What are the selection criteria for a transducer? Write a note on Inductive transducer and Piezoelectric transducer.

Or

(b) With neat diagrams, explain any two types of analog to digital converters and any one type of digital to analog converter.

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

Question Paper Code : Q 2227

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2009.

Sixth Semester

(Regulation 2004)

Electrical and Electronics Engineering

EI 1361 — MEASUREMENTS AND INSTRUMENTATION

(Common to B.E. (Part-Time) Fifth Semester Regulation 2005)

Time : Three hours Maximum : 100 marks

Answer ALL questions

PART A — (10 × 2 = 20 marks)

1. Differentiate Resolution from Threshold.

2. Define Static error. Classify the types of static error.

3. Distinguish between an ammeter and a voltmeter.

4. Mention the adjustments required for an energymeter to read accurately with minimum possible errors.

5. Mention any four types of AC bridges.

6. What are the main causes of earth loop current?

7. What are the main parts of the Cathode Ray Tube?

8. Mention the methods used for magnetic tape recording used for instrumentation purposes.

9. What is a Transducer and an Inverse Transducer? Give an example for each.

10. Mention the performance parameters of Digital to Analog Converter.

8. Define Root Loci (RL) and Root Contours (RC).

9. What are the different types of compensating network?

10. What is the function of a controller?

PART B — (5 × 16 = 80 marks)

11. (a) Write the differential equations governing the mechanical system shown in Fig. 11 (a). Draw the force voltage and force current electrical analogous circuits and verify by writing mesh and node equations.

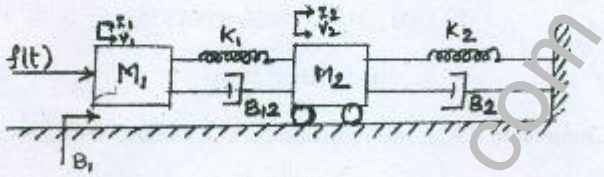

Fig. 11 (a)

Or

(b) Using block diagram reduction techniques find closed loop transfer function of the system whose block diagram shown in Figure 11 (b).

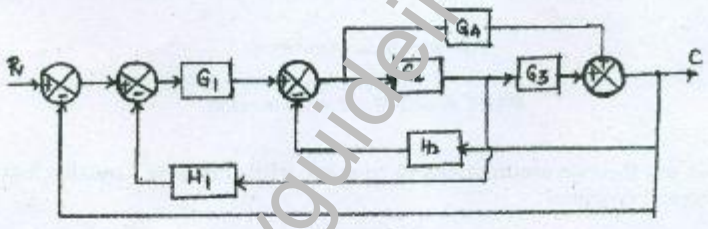

Fig. 11 (b)

12. (a) Using generalized error series calculate the steady state error of a unity feedback system having $G(s) = \frac{10}{(s+2)}$ for the following excitation.

(i) $r(t) = 2$

(ii) $r(t) = 2t$

(iii) $r(t) = \frac{t^2}{2}$

(iv) $r(t) = 1 + 2t + \frac{t^2}{2}$

Or

(b) Fig. 12 (b) shows a unity feedback system. Calculate ξ and ω_n when $K = 0$. Also determine K when $\xi = 0.6$.

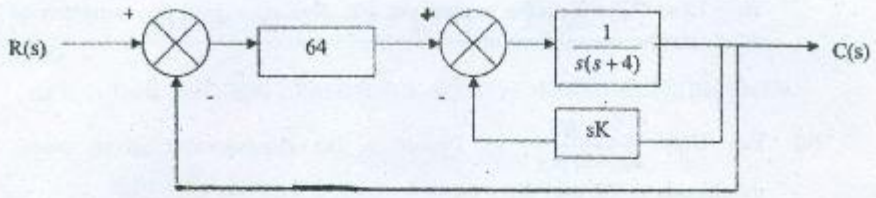

Fig. 12 (b)

13. (a) Sketch the Bode plot for the transfer function $G(s)H(s)=\frac{Ks^2}{(1+0.2s)(1+0.02s)}$. Find K for a gain cross over frequency of 5 rad/sec.

Or

(b) For a system with $G(s)H(s)=\frac{400}{s(s+2)(s+10)}$. Draw the polar plot.

14. (a) Write the characteristics equation and construct Routh array for the control system shown in Fig. 14 (a). It is stable for

(i) $Kc = 9.5$

(ii) $Kc = 11$

(iii) $Kc = 12$.

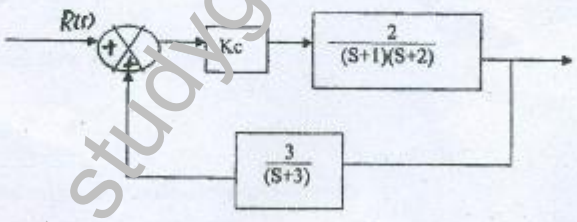

Fig. 14 (a)

Or

(b) For $G(s)H(s)=\frac{1}{s^2(s+2)}$. Sketch the Nyquist plot and determine the stability of the system.

15. (a) A Open Loop transfer function of a unity feedback system is $G(s)=\frac{K}{s(s+1)}$. It is desired to have the velocity error constant $Kv = 12\ \text{sec}^{-1}$ and phase margin as 40°. Design a lead compensator to meet the above specification.

Or

(b) For $G(s)=\frac{K}{s(s+2)(s+20)}$. Design a lag compensator given phase magnitude $\geq 35°$ and $Kv \leq 20$.
