

B.TECH. DEGREE EXAMINATION, MAY 2016

Sixth Semester

Branch : Automobile Engineering/Mechanical Engineering

AU 010 605/ME 010 605—MECHATRONICS AND CONTROL SYSTEMS (AU, ME)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours

Maximum : 100 Marks

Part A

*Answer all questions.
Each question carries 3 marks.*

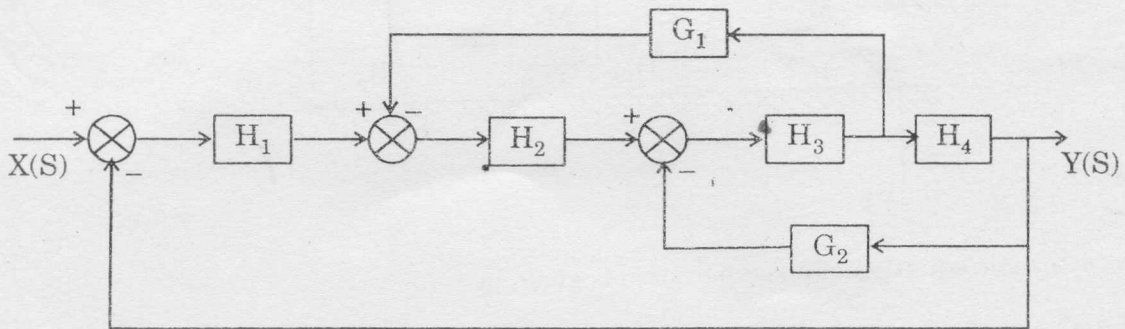
1. What are the elements of data presentation systems ?
2. Explain the function of a peripheral interface adapter.
3. Distinguish between open loop and closed loop control system.
4. What is meant by velocity lag ?
5. Mention the significance of order of a system.

(5 × 3 = 15 marks)

Part B

*Answer all questions.
Each question carries 5 marks.*

6. What is meant by sequential control ? Explain with an example.
7. What are the advantages of using external Interrupts rather than software polling as a means of communication with peripherals ?
8. For the system shown in figure, find the overall transfer function using block diagram reduction.



Turn over

9. What do you mean by Protocols in communication ? Explain with examples.
 10. Explain the effect of gain margin in linear control theory.

(5 × 5 = 25 marks)

Part C*Answer all questions.**Each full question carries 12 marks.*

11. Design a summing amplifier circuit that can be used to produce an output that ranges from -1 to 15V when the input goes from 0 to 100 mV.

Or

12. You are offered a choice of an incremental shaft encoder or an absolute shaft encoder for the measurement of an angular displacement. Explain the principal difference between the results that can be obtained by these methods?

13. Explain the two types of multiple access control used with LANs.

Or

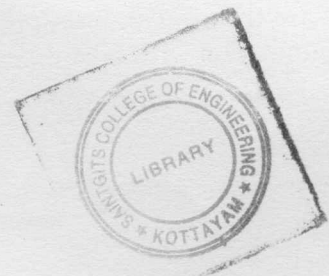
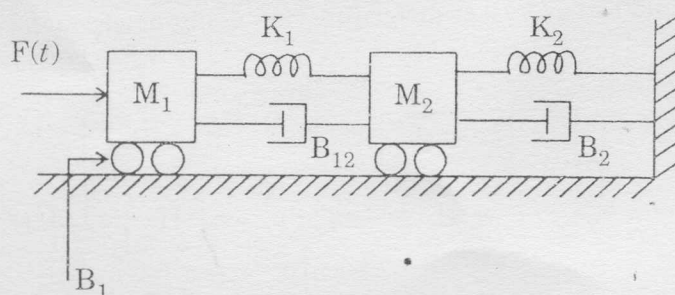
14. Explain what is meant by :

(a) Replication checks ; (b) Expected value checks ; (c) Reversal checks and (d) Parity checks.

15. Explain how a servomotor is interfaced with 8051 microcontroller for the control of angle in the servomotor.

Or

16. Explain the governing equator for the following mechanical system :



17. The characteristic equation of a servo system is given by :

$$a_0 s^4 + a_1 s^3 + a_2 s^2 + a_3 s + a_4 = 0.$$

Determine the condition which must be satisfied by the coefficients of the characteristic equation for the system to be stable.

Or

18. 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 Routh criterion, discuss the stability of the closed loop system as a function of K. Determine the values of K which will cause sustained oscillations in the closed loop system. What are the corresponding oscillation frequencies ?

19. Write a note on experimental determination of frequency response.

Or

20. Find the roots of the following polynomial by use of the root locus method :

$$3s^4 + 10s^3 + 21s^2 + 24s + 30 = 0.$$

(5 × 12 = 60 marks)

