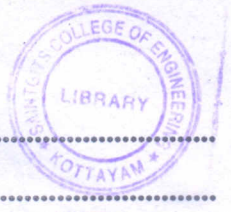G 1232

(Pages : 3)

B.TECH DEGREE EXAMINATION, MAY 2015

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 questions carries 3 marks.

1. Define transducer with an example.

2. Explain any *two* type of network systems.

3. Explain openloop control.

4. What is the effect of gain margin in linear control theory.

5. What is the physical significance of order of a system ?

(5 × 3 = 15 marks)

### Part B

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

6. A thermometer has a time constant 2.5 seconds. It is quickly taken form a temperature 0°C to a liquid bath having a temperature 200°C. Calculate the temperature indicated by the thermometer after a time of 1.5 seconds.

7. Draw a ladder programme for a NAND gate and explain each step.

8. Explain the physical significance of pole position in stability analysis.

9. Write short note on protocols in communication ?

10. Explain the working of a solenoid switch.

(5 × 5 = 25 marks)

Turn over
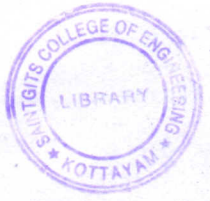
Part C

*Answer **all** questions.*
Each question carries 12 marks.

11. Design a mechatronics system to sort coins. Explain various sensors and actuators requires for this system. Represent the design in block diagram.
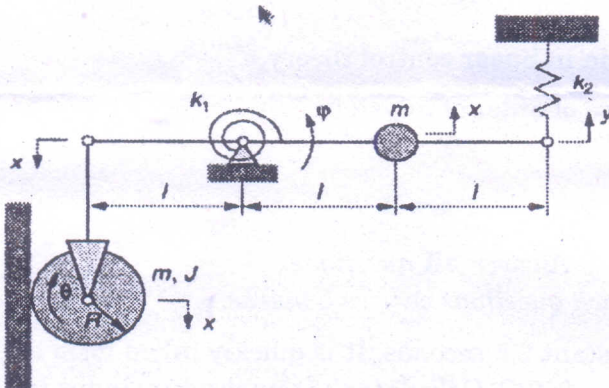
Or

12. With the help of symbols explain any four types of pneumatic directional control valves.

13. With the help of a PLC automate a punching process, explain its ladder logic.
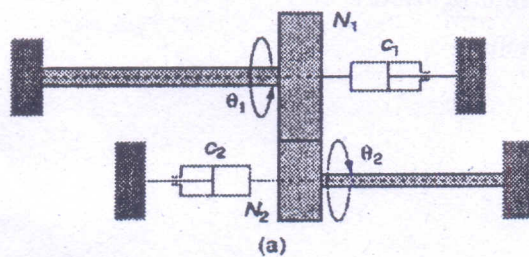
Or

14. Explain :

    (i)   Electro mechanical system.

    (ii) Interfacing.

    (iii) Recording of CD.

15. Write the governing equation of the mechanism given below.

Or

16. Derive the transfer function of the given rotating system, take the spring constant of shaft as K.

(a)

17. Analysis the stability of the system and find the values of k for which the system is stable :

     (i) $2S^3 + 6S^2 + k = 0$.

     (ii) $2S^2 + 10S + k + 1 = 0$.

Or

18. A unit feedback system is characterized by an openloop transfer function $G(s) = K/s\,(s+10)$. Determine the gain K, so that the system will have a damping ratio of 0.5 for this value of K. Determine settling time, peak overshoot for a unit step input.

19. Sketch the Bode plot for the system whose transfer function is $10/\!\left(s^2 + 6s + 10\right)$.

Or

20. A unit feedback system has an openloop transfer function $G(s) = k/s\!\left(s^2 + 4s + 13\right)$. Sketch the root locus.

                                                                          (5 × 12 = 60 marks)