MODEL QUESTION PAPER
UNIVERSITY OF KERALA
13.604 MECHATRONICS (N)

Time 2Hrs 100 Marks

Part A

Answer all questions, each question carry 2 marks

1. Explain an ON-OFF control system.
2. Explain the advantages of closed loop controls.
3. Write down the mathematical model of a spring-mass-damper system.
4. Differentiate null and deflection sensors.
5. What are the applications of a strain gauge?
6. Explain gauge factor of a strain gauge.
7. What is a thermopile?
8. Distinguish between tactile and proximity sensors.
9. What is latching in PLC ladder logic?
10. Explain the block diagram of an op-amp.

Part B

Answer any one question from each module, each question carry 20 marks

Module I

11. a) Explain the different modes of closed loop control systems.
    b) Distinguish first order and second order systems with examples.
12. a) Explain adaptive control and the three different types of adaptive controls.
    b) Explain a servo control system.

Module II

13. a) Explain the different static characteristics of sensors.
    b) Explain the working of a Coriolis flow meter.
14. a) Explain the dynamic characteristics of sensors.
    b) Explain the working of incremental and absolute optical encoders.

Module III

15. a) Explain the working of a hybrid stepper motor with diagrams.
    b) What are the methods to improve the resolution of a stepper motor?
16. a) Explain the different types of DCVs used in electro-hydraulic circuits.
    b) Construct a ladder logic to operate two hydraulic cylinders in the sequence A1A0B1B0 using solenoid DCVs.

Module IV

17. a) Explain the various signal conditioning techniques
    b) Explain the functioning of dual slop ADC using relevant diagrams.
18. a) Explain a perceptron network and its function.
    b) Explain with block diagrams a simple fuzzy logic control system.