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B.E / B.Tech (Full-Time) DEGREE END SEMESTER EXAMINATIONS, APR / MAY 2014

MECHANICAL ENGINEERING

Fifth Semester

ME 9035 MEASUREMENTS AND CONTROL

(Regulation 2008)

Time: 3 Hours | Answer ALL Questions | Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. Define sensitivity.
2. Distinguish between precision and accuracy.
3. What does a charge amplifier do?
4. What is the function of a microprocessor?
5. State the principle of working of a load cell.
6. List any four flow visualization techniques.
7. Differentiate between open and closed loop control system.
8. State the need for an amplifier in a control system.
9. Give example for a photo electric control system.
10. Give example for an electronic control system.

Part – B (5 x 16 = 80 marks)

11. Draw a schematic of a control system to automatically raise water in an overhead tank, and explain the required components of the system. The system should continuously raise water from a sump at a fixed level. The control should be closed loop – pump should switch off automatically once max level is reached and should switch on automatically when level is below 30% of full level. Also the system should indicate the no. of hours of working and quantity of water discharged per month. (16)

12. a) Distinguish between and give suitable example for the following:
    1) Range & Span 2) Error & Accuracy 3) Drift & Reproducibility 4) Threshold & Resolution

    (OR)

    b) What is calibration of an instrument? Is it necessary? Describe the various types of errors involved in a measurement system and steps to minimise or eliminate them. (2+2+12)

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13. a) Explain the following with an example: (4x4)
a) Transducer b) Input circuit c) Signal Conditioning iv) Transmission device.

(OR)

b)i) Explain the functioning of a Linear Variable Differential Transducer with a neat sketch. (10)

ii) Briefly discuss about microprocessor based data logging (6)

14. a) Describe with examples how the following parameters are measured and the corresponding instruments used for measurement:
1) Displacement 2) Force/ Torque 3) Humidity 4) Temperature

(OR)

b) Explain the various flow visualisation techniques. Support your answer with a neat schematic of the same. Also mention the merits of flow visualization techniques. (12+4)

15. a) Describe the operation of a closed loop control system. Take controlling of speed of a rotating shaft and position control of a tool as examples. (8+8)

(OR)

b)i) What is a PID controller? How is it different from other type of controllers? Explain with an example its operation. (3+3+6)

ii) Draw a schematic of a stepper motor and indicate its various parts. (4)