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BIEEE-004

B.Tech. – VIEP – ELECTRICAL ENGINEERING (BTELVI)

Term-End Examination

December, 2015

BIEEE-004 : MECHATRONICS

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **five** questions. All questions carry equal marks. Use of scientific calculator is permitted.*

1. (a) Explain the sensor, signal conditioner and display elements in the measurement system of displacement using transducer. 7

(b) Explain the difference between open-loop and closed-loop control. 7

2. (a) Explain the function of a programmable logic controller. 7

(b) Explain the significance of the following information given in the specification of the transducers : 7

(i) A piezoelectric accelerometer Non-linearity : ± 0·5% of full range.

(ii) A resistance strain gauge force measurement transducer.

Temperature sensitivity : ± 1% full range over normal environmental temperature.

3. Suggest a sensor that could be used as part of a control to determine the difference of levels between liquids in two containers. The output is to provide an electrical signal for the control system. Explain the operation of the system in detail with schematic diagram. *14*

4. (a) Explain the operation of process control valve. *7*

   (b) A force of 400 N is required to open a process control valve. What area of diaphragm will be needed with a diaphragm actuator to open the valve with a control gauge pressure of 70 kPa ? *7*

5. (a) Explain the principles of operation of the variable reluctance stepper motor. *7*

   (b) How do you classify transducers ? Describe the working of any one type of transducer. *7*

6. (a) Draw a block diagram of a basic microcontroller and explain the function of each subsystem. *7*

   (b) Explain what is meant by electromechanical disc control and illustrate your answer by an example. *7*

7. Write short notes on any ***four*** of the following : $4 \times 3\frac{1}{2} = 14$

(a) Computer Printer

(b) Industrial Robot

(c) Fax Machine

(d) Servo Drives

(e) NC Machine

(f) Electrical Actuation System