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BIME-016(S)

B.Tech. – VIEP – MECHANICAL ENGINEERING (BTMEVI)

Term-End Examination

00232

December, 2016

BIME-016(S) : MECHATRONICS

Time : 3 hours *Maximum Marks : 70*

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

1. (a) How does a microcontroller differ from a microprocessor ?

(b) Identify the sensor, signal conditioner and display elements in the measurement of a mercury-in-glass thermometer. *5+5*

2. (a) Explain the difference between open-loop and closed-loop control systems.

(b) Describe the function of a programmable logic controller. *5+5*

3. (a) Explain the significance of the following information given in the specification of transducer :

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

(ii) A capacitive linear displacement transducer :

Non-linearity and hysteresis : ± 0·01% of full range

(b) What will be the change in resistance of an electrical resistance strain gauge with a gauge factor of 2·1 and resistance 50 Ω, if it is subjected to a strain of 0·001 ? *5+5*

4. (a) Explain the principle of a pilot-operated valve.

(b) A pneumatic system is operated at a pressure of 1000 kPa. What diameter cylinder will be required to move a load requiring a force of 12 kN ? *5+5*

5. (a) Describe the characteristics of proportional plus integral control ?

(b) What is the largest decimal number that can be represented by the use of an 8-bit binary number ? *5+5*

6. (a) What are the logic functions used for switches (i) In series, and (ii) In parallel ?

(b) Explain how a sequential valve can be used to initiate an operation, only when another operation has been completed. *5+5*

7. (a) What is the main advantage of a capacitive proximity switch over the inductive proximity switch ?

(b) Briefly explain the desired qualities of a hydraulic oil. *5+5*

8. (a) A 6-bit D/A converter gives an output voltage of 7·875 volts for an input of 010101. What is the step size, the full range voltage and the percentage resolution ?

(b) Briefly explain the principle of operation of photoelectric sensors with a neat diagram. *5+5*