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BIME-016

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

00982 **Term-End Examination**

December, 2017

BIME-016 : MECHATRONICS

Time : 3 hours *Maximum Marks : 70*

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

1. (a) What is a Temperature Transducer ? How are they classified ? Briefly explain all of them.

(b) Describe in brief, the methods for range sensing. *5+5*

2. (a) What do you mean by Inverse Kinematics ? Briefly explain the importance of path planning.

(b) How can a transistor be used as a switch ? Explain. *5+5*

3. (a) Describe the basic principles of stepper motors and servo motors.

(b) Draw a block diagram of a digital control system. Explain, how a digital control system is different from an analog control system. *5+5*

4. (a) What is a Transfer System ? What are its uses ? Explain the methods, advantages and disadvantages of a transfer system.

(b) Describe the mechanism of a Cam. Also describe the application and working of a cam-controlled system. *5+5*

5. (a) Differentiate between active and passive transducers.

(b) For a transducer, describe its input characteristics, transfer characteristics and output characteristics. *5+5*

6. (a) A 6-bit D/A converter gives an output voltage of 15·75 V for an input of 101010. What is the step size, the full range voltage, and the percentage resolution ?

(b) Show the binary addition and subtraction of 225 (decimal) and 475 (decimal). *5+5*

7. (a) What are the two types of data transfer techniques used in computer interfacing ? List out the main differences between them.

(b) Describe and compare the characteristics of proportional plus integral plus derivative control. *5+5*

8. (a) Describe armature speed control of a DC motor.

(b) Discuss the different types of electrical contacts with suitable examples. *5+5*

9. (a) A platinum resistance temperature sensor has a resistance of 120 Ω at 0°C and forms one arm of a Wheatstone bridge. At this temperature, the bridge is balanced with each of the other arms being 120 Ω. The temperature coefficient of resistance of the platinum is 0·0039/K. What will be the output voltage from the bridge for a change in temperature of 20°C ? The loading across the output is effectively open-circuit and the supply voltage to the bridge is from a source of 6·0 V with negligible internal resistance.

(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 ? 5+5

10. Write short notes on any ***two*** of the following : 5+5

(a) Ultrasonic Testing

(b) Fuzzy Logic

(c) Sensitivity and Accuracy