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# B.Tech. MECHANICAL ENGINEERING (BTMEVI)

## Term-End Examination

## June, 2013

## BIME-016 : MECHATRONICS

*Time : 3 hours* *Maximum Marks : 70*

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

**1.** (a) Describe the components of a continuous sensing system with a neat block diagram.

(b) What are the main advantages of a capacitive proximity switch over an inductive proximity switch ? **2x5=10**

**2.** (a) What is a temperature transducer ? How are they classified ? Briefly explain all of them. **2x5=10**

(b) Describe the methods for range sensing in brief.

**3.** (a) Describe the functioning of a pilot operated check valve. **2x5=10**

(b) Differentiate between a pressure relief valve and a pressure reducing valve.

4. (a) What do you mean by inverse Kinematics ? Briefly explain the importance of path planning. **2x5=10**

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

5. (a) List the five basic types of PLC timers. What is the purpose of an RTO ( Retentive on Delay timer ) ? **2x5=10**

(b) Classify and describe in brief various symbols used in GRAFCET programming.

6. (a) Describe the working of wrist sensors. Also explain their applications. **2x5=10**

(b) List important guidelines for the selection of a sensor. Discuss each of them in brief.

7. (a) Describe the basic principles of stepper motors and servo motors. **2x5=10**

(b) Draw block diagram of a digital control system. Explain, how digital control system is different from analogue control system ?

8. (a) Compare and contrast the control system for the domestic central heating system involving bi-metallic thermostat and that involving a microprocessor. **2x5=10**

(b) What is the resolution of an analogue-to-digital converter with a word length of 12 bits and an analogue signal input range of 100V ?

9. (a) Convert the following decimal numbers 200, 235, 425 to binary numbers. 2x5=10

(b) What are the limitations of two step ( on-off ) control and in what-situation is such a control system commonly used ?

10. Write short notes on ***any four*** of the following :

(a) Feed back control 4x2½=10

(b) Ultrasonic Crack detection

(c) Logic Gates

(d) Mechanical actuators

(e) Architecture of Mechatronics

(f) Signal conditioning