B.Tech. MECHANICAL ENGINEERING (BTMEVI)

Term-End Examination

December, 2013

BIME-016 : MECHATRONICS

Time : 3 hours   *Maximum Marks : 70*

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

1. (a) Explain the principle on which an ordinary   7
           mercury in glass thermometer works. Also
           identify the sensor, signal conditioning and
           display elements of it.

    (b) List various elements that might be present   7
           in a control system involving a
           thermostatically controlled electric iron.
           Also briefly explain, with a block diagram,
           organization of these elements.

2. (a) Compare and contrast the traditional design   7
           of a watch with the watch that has been
           designed using the concept of mechatronics
           and which involves a micro processor.

    (b) Given an"LVDT with bellows", how would   7
           you devise a measuring instrument using
           it ? Which instrument would you devise
           and how would it be done ? Explain

3. (a) Analyse the motion of the following   7
           mechanizms and state whether they involve
           pure rotation, pure translation or are a
           mixture of rotation and translation
           components.
           (i)   The pen in an XY plotter
           (ii)   Wrist of a robotic Arm

(b) Which type of logic gates may be used to control the following situations : **7**
(i) Automatic Ticketing machining
(ii) Automatic soft-drink vending machine
(iii) An ATM
Explain any one of the above.

4. Draw the symbols for : **14**
(a) 4/2 valve
(b) 3/2 valve
(c) a pressure relief valve
(d) a manifold
(e) a directional valve
(f) pressure sequence valve
(g) single active cylinder

5. Suggest and explain the module that might be needed to interface the output of a microprocessor with an actuator. **14**

6. (a) Explain the procedure to perform dye penetrant test. List all the functions of a develops and fluorescent dye. **7**
(b) Compare and contrast X-Ray and γ-Ray (Gamma-Ray) radiograpy. **7**

7. Write short notes on (**any three**) : **14**
(a) Piezo electric sensors
(b) Signal conditioning in a measuring instrument
(c) Fuzzy logic
(d) Bourdon tube guage