

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

Term-End Examination

June, 2018

00333

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) Identify the sensor, signal conditioner and display elements in the measurement systems of a mercury-in-glass thermometer.
(b) Explain the difference between open-loop and closed-loop control systems with the help of examples. 5+5

2. (a) Explain the principle of a brushless d.c. permanent magnet motor.
(b) A hydraulic cylinder is to be used to move a work-piece in a manufacturing operation through a distance of 60 mm in 12 seconds. A force of 12 kN is required to move the work-piece. Determine the required working pressure and hydraulic liquid flow rate, if a cylinder with a piston diameter of 100 mm is available. 5+5

3. (a) Draw the ladder rungs to represent two switches which are normally open and both have to be closed for a motor to operate.
- (b) What are the major advantages of Non-Destructive Testing? State some main NDTs and their fields of application. 5+5
4. (a) Explain the principle of operation of an ultrasonic range sensor with the help of a neat diagram.
- (b) Describe the architecture of a PLC with a suitable diagram. 5+5
5. (a) What is the largest decimal number that can be represented by the use of an 8-bit binary number?
- (b) Convert the following binary numbers to decimal numbers :
- (i) 1011
- (ii) 10 00011 0001 5+5
6. (a) Describe the characteristics of a proportional plus integral control.
- (b) A 6-bit D/A converter gives an output of 10.750 volts for an input of 10 1 011. What is the step size, the full range voltage and the percentage resolution? 5+5

7. (a) Differentiate between active and passive sensors. What are the requirements for selecting a sensor ?
- (b) Describe the components of a continuous sensing system. 5+5
8. (a) Explain how a mechanical system is different from hydraulic and pneumatic systems. Discuss the relative advantages and disadvantages of a pneumatic system over a hydraulic system.
- (b) Write short notes on any *two* of the following :
- (i) Fuzzy Logic
 - (ii) Pyro-electric Sensors
 - (iii) Visual Inspection 5+5
-