

**B.Tech. MECHANICAL ENGINEERING
(COMPUTER INTEGRATED
MANUFACTURING) / B.Tech. AEROSPACE
ENGINEERING (BTAE)**

00739

Term-End Examination

December, 2016

BME-006 : 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 system of a Bourdon pressure gauge.
- (b) Explain the difference between open-loop and closed-loop control systems. 5+5
2. (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

3. (a) What are the advantages and limitations of hydraulic systems over other systems ?
- (b) Explain the working of wrist sensors. 5+5
4. What are the various types of CAMs used in the mechanism of mechanical systems ? Explain in detail with neat sketches and suitable examples. 10
5. (a) Explain, what is meant by sequential control with the help of a suitable example.
- (b) State the steps that might be present in the sequential control of a dish washer. 5+5
6. (a) A 6-bit D/A converter gives an output voltage of 15.750 volts for an input of 010101. What is the step size, the full range voltage and the percentage resolution ?
- (b) Apply the Hurwitz-Routh criterion to determine the stability of the system whose characteristic equation is given by
- $$s^5 + 5s^4 + 10s^3 - 6s^2 + 12s - 30 = 0. \quad 5+5$$
7. (a) Draw a block diagram of a basic microcontroller and explain the function of each subsystem.

- (b) What are the logic functions used for switches
- (i) in series, and
 - (ii) in parallel ? 5+5
8. (a) What are the limitations of two-step (on-off) controls and in what situation is such a control system commonly used ?
- (b) Explain the function of a Programmable Logic Controller. 5+5
9. (a) What is the main advantage of a capacitive proximity switch over the inductive proximity switch ?
- (b) State the advantages and disadvantages of ball screw over power screw. 5+5
10. (a) With a neat sketch, describe the servo valve.
- (b) Differentiate between air-amplifier and intensifier. 5+5
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