Registration No. : | | | | | | | | | | |

Total number of printed pages – 2

B. Tech

FEEE 6301

Sixth Semester Back Examination – 2015

INDUSTRIAL PROCESS CONTROL AND DYNAMICS

BRANCH(S) : EEE, ELECTRICAL

QUESTION CODE : M 391

Full Marks – 70

Time : 3 Hours

*Answer Question No. **1** which is compulsory and any **five** from the rest.*
The figures in the right-hand margin indicate marks.

1. Answer the following questions : 2 ×10

(a) Find the base 10 equivalent of the binary number 0.11010_2.

(b) A sample of oxygen gas a temperature of 90 degree Fahrenheit. If its molecular mass is $5.3 \times 10 - 2$ kg. Find the average thermal speed of molecule.

(c) Define gauge factor. For semiconductor materials, the GF is negative or positive ?

(d) Write the characteristics of an ideal op-amp.

(e) Design a high impedance amplifier with a voltage gain of 42.

(f) What are tri-state buffer and comparator in digital system ?

(g) What is gauge pressure and head pressure ?

(h) A stepper motor has 10° per step and must rotate at 250 rpm. What input pulse rate, in pulses per second, is required ?

(i) What is proportional band ?

(j) Determine how many bits of D/A converter must have to provide output increments of 0.04 V or less. The reference is 10 V.

P.T.O.

2. Describe a typical microwave oven in the framework of a discrete-state space process. Define input variables, output variables, and the sequence of serial or parallel events. 10

3. What is discontinuous controller mode ? Explain the continuous controller modes for proportional, integral and derivative controller. 10

4. (a) A signal conditioning system uses a frequency variation from 6 kHz to 60 kHz to carry measurement information. There is considerable noise at 120 Hz and 1 MHz. Design a band pass filter to reduce the noise by 90%. What is the effect on the desired pass band frequencies ? 5

   (b) Lists out the characteristics of DAC and ADC converter. 5

5. (a) What is thermoelectric effect ? Explain peltier effect and seebeck effect. 5

   (b) A CdS cell has dark resistance of 100 k-ohms and a resistance in a light beam of 300 k-ohms. The cell time constant is 72 ms. Devise a system to trigger a 3-V comparator within 10 ms of the beam interruption. 5

6. (a) Write the properties of laser light. 5

   (b) Explain the pneumatic signals with principles. 5

7. (a) Explain the final control operation with proper block diagram. 5

   (b) Explain the operation of Sample and Hold circuit and write the issues of S/H circuit. 5

8. Write short notes on any **two** : 5×2

   (a) Pyrometry

   (b) Photo detectors

   (c) Nozzle/Flapper system

   (d) Electrical Actuators.