Total number of printed pages – 4   **B. Tech**

PEME 6412

Eighth Semester Examination – 2008

MECHATRONICS

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.   Write short answers to the following questions:

2×10

(a)   What are the application areas of a stepper motor ?

(b)   Name the two sources of elements of an electrical system.

(c)   Differentiate between electrostatic energy and electromagnetic energy.

(d)   What is a junction diode ?

(e)   What is a modulated signal ?

(f)   What is a logic gate ?

(g)   Give few points on "differentiate between transducer and sensors".

(h)   What is a bridge sensitivity of a strain gauge ?

(i)   Define an incremental encoder.

(j)   What is the speciality of Intel - 8085 microprocessor ?

2.   (a)   Write short note on evolution of mechatronics.   4

(b)   Discuss the different components of electrical systems along with its circuit diagram.   6

3.   (a)   What is a Laplace domain ? Discuss Laplace Transformation of some common functions.   5

(b) Briefly describe about Z-transformation modulation and demodulation. 5

4. (a) What do you mean by frequency response in system model ? 2

(b) How the mechanical, thermal and fluid elements helps in developing a system model ? 8

5. (a) Convert the binary number 10101.11 into the decimal form. Also convert the decimal number 50.578125 into the binary form. 4

(b) Convert $(1001010.11)_2$ into a hex number. Also convert $(6D.0F)_{16}$ into a binary number. 3

(c) How Boolean algebra is useful in the analysis and design of digital circuits ? 3

6. (a) Briefly discuss the working principle of transducer with neat sketch. 4

(b) Shortly describe the working principle of a DC motor. 4

(c) Give only the schematic diagram of a hydraulic control system. 2

7. Write short notes on any *four* : $2\frac{1}{2} \times 4$

(i) Microprocessor

(ii) Program Counter

(iii) Optical Encoder

(iv) Photovoltaic Transducer

(v) Solenoids and Relays.

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