B.E. Sixth Semester (Mechanical Engineering) (C.B.S.)

# Mechatronics

P. Pages : 2 **KNT/KW/16/7398**

Time : Three Hours * 0 1 2 7 * Max. Marks : 80

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Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Due credit will be given to neatness and adequate dimensions.
9. Assume suitable data whenever necessary.
10. Illustrate your answers whenever necessary with the help of neat sketches.
11. Use of non programmable calculator is permitted.

**1.** a) What are the key elements of a typical mechatronics system? Explain with the help of figure. **7**

b) State and explain various requirements of the control system. **6**

**OR**

**2.** a) What is automatic car parking system? Explain the operation of this system with block diagram. **7**

b) State and explain various sensors used in engine management system. **6**

**3.** a) What is digital communication? Explain about the types of communication. **7**

b) Explain block diagram of Digital signal processing (DSP) **7**

**OR**

**4.** a) Explain block diagram of Data Acquisition System. (DAQS). **7**

b) Explain interfacing microcontroller outputs with Actuators. **7**

**5.** a) Show and explain circuit diagram and characteristics of thyristor and triac. **7**

b) If a stepper motor has a step angle of 7.5º. What digital input rate is required to produce a rotation of 10 rev/sec.? **6**

**OR**

**6.** a) State the working of D.C servomotor. State the application of D.C servomotor. **7**

b) State the types of stepper motor. Explain any one in detail. **6**

**7.** a) What is meant by logic-gate? State the types of logic-gate. Explain any one universal gate with truth table. **8**

b) Draw the schematic diagram of 8085 Architectures. **6**

**OR**

**8.** a) Simplify the following functions using K-maps and express the function in SOP and POS forms: **8**

i) $f(A, B, C, D) = \Sigma(0,1,2,5,8,14) + d(4,10,13)$

ii) $f(w, x, y, z) = \Sigma(1,3,7,11,15) + d(0,2,5)$.

b) Explain the pin configuration of 8085 microprocessor with schematic diagram. **6**

**9.** a) Explain any five aspects to be considered for the selection of PLC for given application. **7**

b) Explain the control of vibrating machine with the help of PLC. **6**

**OR**

**10.** a) Explain shift registers with suitable diagram. **7**

b) State the common PLC programming method. Explain any one method in brief. **6**

**11.** a) Explain in brief motor isolation schemes. **7**

b) Explain the characteristics of complementary metal-oxide semiconductor (CMOS). **6**

**OR**

**12.** a) Draw the basic block diagram of MEMS and explain it. **7**

b) State standard TTL characteristics and explain. **6**

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