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10ME65

Sixth Semester B.E. Degree Examination, Dec.2015/Jan.2016
Mechatronics and Microprocessor

Time: 3 hrs.

Max. Marks:100

**Note: Answer FIVE full questions, selecting
at least TWO questions from each part.**

PART – A

- 1 a. Define mechatronics. What are the advantages and disadvantages of mechatronics? (05 Marks)
- b. Explain with a block diagram the working of a digital camera. (10 Marks)
- c. Discuss basic elements of a closed-loop system. (05 Marks)
- 2 a. Explain static and dynamic characteristics of sensors. (08 Marks)
- b. Explain working principle of Hall effect sensor. (06 Marks)
- c. Define following terms:
 - i) Hysteresis error
 - ii) Repeatability
 - iii) Non-linearity error
 (06 Marks)
- 3 a. Discuss any four solid state switches. (10 Marks)
- b. What is stepper motor? Explain various types of stepper motor. (10 Marks)
- 4 a. Explain inverting and non-inverting op-amps with a neat sketch. (10 Marks)
- b. With a neat sketch, discuss basic elements used in analog to digital converter. (10 Marks)

PART – B

- 5 a. State and prove De-Morgan's theorem. Also draw the logic circuit for the same. (08 Marks)
- b. Explain any six laws of Boolean algebra. (06 Marks)
- c. With the help of symbols and truth table, explain XOR and NAND gate. (06 Marks)
- 6 a. What are the differences between microprocessors and microcontrollers? (04 Marks)
- b. Explain with a neat sketch of architecture 8085 microprocessor. (10 Marks)
- c. Explain the following terminology related to microprocessor:
 - i) Interrupts
 - ii) RAM
 - iii) Assembler
 (06 Marks)
- 7 a. Discuss classification of instruction sets of 8085 microprocessor. (10 Marks)
- b. What are buses? Explain types of buses. (08 Marks)
- c. List any four applications of microprocessor. (02 Marks)
- 8 a. Explain with a neat diagram of the flow of data word and instrumentation word. (10 Marks)
- b. Draw and explain timing diagram for memory write operation. (10 Marks)

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Important Note: 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8=50, will be treated as malpractice.

PART – B

- 5 a. Convert the following:
- $(ABC)_{16} = (\text{_____})_{10}$
 - $(204.2)_8 = (\text{_____})_{10}$
 - $(0.60)_{10} = (\text{_____})_2$
 - $(101010.101)_2 = (\text{_____})_{10}$. (08 Marks)
- b. Write a note on overflow and underflow. (06 Marks)
- c. Simplify the Boolean expression and realize using basic gates $Y = A(\overline{ABC} + \overline{ABC})$. (06 Marks)
- 6 a. Define the following terms with respect to microprocessor:
- Fetch cycle
 - Accumulator
 - Interrupts
 - Stack pointer
 - Write cycle. (10 Marks)
- b. Draw the block diagram of a micro controller and mention the functions of each block. (10 Marks)
- 7 a. Explain the different types of addressing modes of INTEL 8085 microprocessor with example. (10 Marks)
- b. Write a program to find the largest of N binary numbers that are stored at consecutive data memory locations starting at X. (07 Marks)
- c. What is the function of logical group of instructions and mention few of it. (03 Marks)
- 8 a. Draw the block diagram of a control unit and explain it. (10 Marks)
- b. Draw and explain the timing diagram of read operation. (10 Marks)
