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**Sixth Semester B.E. Degree Examination, June 2012**  
**Mechatronics and Microprocessors**

Time: 3 hrs.

Max. Marks:100

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

**PART – A**

- 1 a. Explain the meaning of the term “Mechatronics” with respect to multi-disciplinary scenario. Briefly discuss the origin and evolution of Mechatronics. (07 Marks)
- b. Briefly explain the concept of system development in Mechatronics and functions of main elements in Mechatronics system (closed loop control system) with figure. (07 Marks)
- c. What are micro-processor based controllers? Briefly explain the principle of working of any one of the following with figure: i) Automatic camera ii) Engine management system. (06 Marks)
- 2 a. What is a sensor and how are they classified? What are the different types of sensors? (06 Marks)
- b. Briefly explain the various static and dynamic characteristics of sensors. (06 Marks)
- c. Briefly explain the principle of working and applications of any two of the following sensors:  
i) Light sensors ii) Proximity sensors iii) Hall effect sensor (08 Marks)
- 3 a. Briefly explain the working principle of a stepper motor. Draw the T- $\theta$  characteristic curve of a 3 $\phi$  variable – reluctance (VR) type of a stepper motor and then predict stable and unstable position of the rotor. (10 Marks)
- b. Explain the basic construction of DC motors. Explain field and armature speed control of DC motors. (10 Marks)
- 4 a. Draw the circuit diagram of op-amp integrator, differentiator and derive an expression of an output voltage. (06 Marks)
- b. Explain balance mode of wheat stone bridge and hence deduce the expression for change in output voltage. (08 Marks)
- c. With block diagram, explain digital data acquisition system. (06 Marks)

**PART – B**

- 5 a. Implement a NOT, OR and AND gates using NOR gates. Also mention their truth tables. (08 Marks)
- b. Convert the following: i)  $(754.534)_{10} = (\text{_____})_{16}$  ii)  $(110.10101)_2 = (\text{_____})_{10}$   
iii)  $(327.45)_8 = (\text{_____})_{10}$  (06 Marks)
- c. State Demorgan’s theorems. Also draw the logic circuits for the same. (06 Marks)
- 6 a. Explain the following terminologies of a 8085 microprocessor:  
i) Program counter ii) Assembler iii) ALU iv) Fetch cycle  
v) BUS (10 Marks)
- b. State any five differences between a microprocessor and a microcontroller. (05 Marks)
- c. Give the classification of microcontrollers. (05 Marks)
- 7 a. Explain the architecture of 8085 microprocessor with neat block diagram. (10 Marks)
- b. Write a program to find the largest of a byte in the array of numbers. (10 Marks)
- 8 a. Explain the flow of instruction and data in the 8085 microprocessor. (07 Marks)
- b. Draw and explain the timing diagram of opcode fetch machine cycle. (10 Marks)
- c. List the differences of 4004 and 8085 microprocessors register organization. (03 Marks)