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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

Fifth Semester, B.E. - Mechanical Engineering

Semester End Examination; Dec. - 2015

Mechatronics and Microprocessor

Time: 3 hrs

Max. Marks: 100

Note: i) Answer **FIVE** full questions, selecting **ONE** full question from each **unit**.
ii) Assume suitably missing data if required.

UNIT - I

- 1 a. Explain :
- (i) Control element (ii) Comparison element (iii) Correction element 10
- (iv) Process element (v) Measurement elements of a closed loop system with examples.
- b. With a suitable diagram explain the microprocessor based engine management system. 10
- 2 a. How sensors are classified? Explain with example. 7
- b. State the principle of working and application of hall effect sensor. 8
- c. Explain the method of debouncing using Schmitt trigger. 5

UNIT - II

- 3 a. Explain how Bipolar transistor can be used as switches. 8
- b. With suitable circuit diagram, explain the phase control circuit. 8
- c. What is the use of Snubber circuit? Explain it. 4
- 4 a. Explain the principle of brushless D.C. permanent magnet motor. Also explain the torque versus speed characteristic of it. 10
- b. With neat sketches, explain :
- i) Variable reluctance stepper motor 10
- ii) Permanent magnet stepper motor.

UNIT - III

- 5 a. With suitable examples, explain some of the processes that can occur in conditioning a signal. 10
- b. Explain the following :
- (i) Inverting amplifier 10
- (ii) Non inverting amplifier.
- 6 a. Explain how temperature compensation is achieved for :
- (i) Platinum resistance temperature sensor 10
- (ii) Electrical resistance strain gauge Using wheat stone bridge.
- b. Explain with suitable sketches :
- (i) Weighted resistor DAC 10
- (ii) Successive approximation ADC.

UNIT - IV

- 7 a. In Intel 8085 microprocessor, How I/O devices are addressed. Explain. 10
- b. With a neat sketch Explain the functional organization of Intel 8085 μ p. 10
- 8 a. What are the different addressing modes used in Intel 8085? Explain them giving one example for each. 10
- b. Draw the timing diagram for memory read cycle. 5
- c. Give the classification of Intel 8085 microprocessor Instruction set. 5

UNIT - V

- 9 a. Convert the following as specified :
- (i) $(7834.291)_{10}$ to Hexadecimal 6
- (ii) $(7B9C.BD)_{10}$ to Octal
- (iii) $(10110010.10101)_2$ to Decimal
- b. With truth table, explain OR, NAND, NOR an EXCLUSIVE –OR gates. 4
- c. Explain with example for each how - ve integers are represented in the memory. 10
- 10 a. It is desired to represent floating point number in an 8 bit per word memory with an accuracy of atleast five decimal digit and average of $10^{\pm 38}$. Show by sketching the layout how the memory would be organized. 10
- b. Assuming 5 bit binary number with the left most bit being sign bit perform the following subtraction using both 1's-compliment method as 2's-Compliment method :
- (i) 00101-00100 10
- (ii) 01011-01101
- (iii) 00101-11010

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