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Sub Code:NME-014

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BTECH
(SEM VI) THEORY EXAMINATION 2017-18
MECHATRONICS

*Time: 3 Hours**Total Marks: 100*

- Note:** 1. Attempt all Sections.
 2. If require any missing data; then choose suitably.

SECTION A

- 1. Attempt all questions in brief. 2 x 10 = 20**
- a. Write down the advantages of mechatronics.
 - b. Differentiate between conventional and mechatronics system design.
 - c. Write down the names of control components in hydraulic actuator system.
 - d. What is counter?
 - e. What is A.C. Servomotor?
 - f. Define Actuator.
 - g. Give any two examples of mechatronics systems currently used now a day.
 - h. Define adaptive control
 - i. Explain block diagram of CNC machine
 - j. Explain building blocks of chasis of car as a result wheel moving along road

SECTION B

- 2. Attempt any three of the following: 10 x 3 = 30**
- a. Explain:
 - I. Analog to digital converter
 - II. Digital to analog converter
 - b. Define sensor. Also explain the push pull sensors and capacitive proximity sensor
 - c. What is stepper motor or stepper servomotor? Write the advantages and disadvantages of stepper servomotor.
 - d. Describe the stages of mechatronics design process
 - e. Explain:
 - I. Flexible manufacturing system
 - II. Challenges in mechatronics production unit

SECTION C

- 3. Attempt any one part of the following: 10 x 1 = 10**
- (a) Write down the few examples of mechatronics systems in industry.
 - (b) Explain the term inversion of mechanism and different types of mechanisms used in mechatronics.
- 4. Attempt any one part of the following: 10 x 1 = 10**
- (a) What are logic gates? Draw and explain the various logic gates used in digital electronics.
 - (b) Explain programmable logic controller along with the ladder diagram.

5. Attempt any one part of the following: 10 x 1 = 10

- (a) Explain:
- I. Hydraulic actuator
 - II. Pneumatic actuators
- (b) Consider a circuit which has a resistance R in series with capacitance C. the input to the circuit is V and output is potential difference across the capacitor V_c . The differential equation relating the input and output is:
- $$V_c = RC \frac{dv_c}{dt} + V_c$$
- (a) Determine transfer function
 - (b) Perform frequency response analysis

6. Attempt any one part of the following: 10 x 1 = 10

- (a) Discuss in detail the design of pick and place robot in perspective of mechatronics system design.
- (b) Explain the automatic car parking system in the context of mechatronics

7. Attempt any one part of the following: 10 x 1 = 10

- (a) Explain
- I. Autotronics
 - II. Bionics
 - III. Avionics
- (b) Explain :
- I. Computer integrated manufacturing
 - II. JIT production systems