42725

May, 2019

M.Tech. (Mechanical Engineering),

II SEMESTER (Reappear)

MECHATRONICS AND PRODUCT DESIGN

(MME-108)

Time : 3 Hours]   [Max. Marks : 75

Instructions :

1.   *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*

2.   *Answer any four questions from Part-B in detail.*

3.   *Different sub-parts of a question are to be attempted adjacent to each other.*

PART–A

1.   (a)   What is the difference between step input and ramp input?   (1.5)

     (b)   What is the need of Laplace transformation in calculation of system output?   (1.5)

     (c)   Write two functions of resolvers.   (1.5)

(d) Write truth table of AND logic gate. (1.5)

(e) Compare intelligent and non-intelligent robot. (1.5)

(f) Compare active and passive filters. (1.5)

(g) Write four important application of digital logic circuit. (1.5)

(h) Sketch a force measurement sensor. (1.5)

(i) Sketch mathematical model of a car in term of m, k and c. (1.5)

(j) What is need of a mathematical model. (1.5)

PART–B

2. (a) A robot arm having the following transfer function is subjected to a unit ramp input. What will be its output?

$$G(s) = K/(s+3)^2 \qquad (10)$$

(b) Drive expression of system transfer function for II order system. (5)

3. (a) Describe hardwares in a CNC machine with a neat sketch. (10)

(b) Describe various steps of analogue to digital conversion. (5)

4. Describe the solution of Mechanical Engineering problem with one example each using MATLAB and SIMULINK software/commands. (15)

5. (a) Compare and contrast the following: a microprocessor, microcontroller, programmable logic controller and a personal computer. (5)

(b) Describe a summing amplifier and differential amplifier with neat sketch. (10)

6. (a) Describe hyraulic system with a neat sketch. (10)

(b) Compare hydraulic and pneumatic system. (5)

7. Discuss the role and need of mechatronics in industry. Describe mechatronics circuit in automatic door opening with its constituent elements. (15)

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