

M.E./M.TECH. Degree Examination, December 2020

Second Semester

MS18202 – Mechatronics System Design

(Regulation 2016)

Time: Three hours

Maximum :80 Marks

Answer **ALL** questions

PART A - (8 X 2 = 16 marks)

1. _____ is the used to generate error signal
 - a) Feedback element
 - b) Comparator
 - c) Correction unit
 - d) Process unit
2. Lumped parameter is a
 - a) Collective function and property
 - b) Collective property
 - c) Independent function and property
 - d) All the above
3. Example of an optimization software is
 - a) Ansys
 - b) Pro-E
 - c) Matlab
 - d) Solid works
 - e) All the above
4. The Stewart Platform is a classic example of a mechanical design that is used for
 - a) Speed control
 - b) Position control
 - c) Level control
 - d) Pressure control
5. Identify the elements which transforms a robot into a smart system.
6. Find the electrical capacitance equivalent in mechanical system.
7. State the significance of life cycle in system engineering process.
8. Identify the constraints involved in optimization.

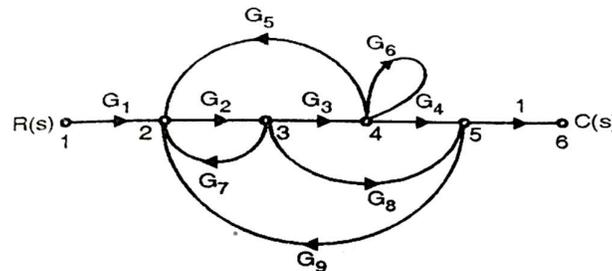
PART B - (4 X16 = 64 marks)

09. (a) (i) Describe the role of a sensor and actuator in mechatronic system. Suggest the important actuators used in mechatronics system design and mention any two examples. (8)
- (ii) How mechatronics system design is different from the traditional design process of designing. State the advantage of using the mechatronic design methodology. (8)

(OR)

- (b) Consider a traditional automotive system and how it can be redone using mechatronics system design? Explain in detail about mechatronics design based automotive system. (16)

10. (a) (i) Use signal graph method to derive transfer function for given below figure (8)



- (ii) Identify and list the electrical and mechanical system building blocks and explain them with system model and representation. (8)

(OR)

- (b) Derive an equation and obtain its transfer function for an automotive suspension system and show its block diagram. (16)

11. (a) (i) Suggest a simulation process that involves generating chance variables and exhibits random behaviors. Also explain the process with an example. (8)
- (ii) Device a block diagram for hardware in loop simulation and explain each block in detail. (8)

(OR)

- (b) (i) Identify the forms of inputs to the systems and explain each input with an application. (8)
- (ii) Discuss the scaling of elasticity for geometrically similar models. (8)

12. (a) (i) Suggest a method to solve complex optimization problems and explain in detail (8)
- (ii) Describe the applications of multidisciplinary design optimization with relevant diagrams. (8)

(OR)

- (b) Explain the steps involved in linear least squares parameter estimation with a case study. (16)