CBCS SCHEME

USN

21MT743

Seventh Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
Mechatronics System Design

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. What is Mechatronics. Explain how it is different from the traditional approach of designing. **(10 Marks)**

b. Interpret the design process of mechatronics system. **(10 Marks)**

OR

2 a. Explain the key elements of mechatronics system. **(10 Marks)**

b. Explain the integrated design issues in mechatronics. **(10 Marks)**

Module-2

3 a. Generalize the basic rules used to reduce the block diagrams. **(10 Marks)**

b. Compute the transfer functions for the following block diagram using block diagram manipulations.

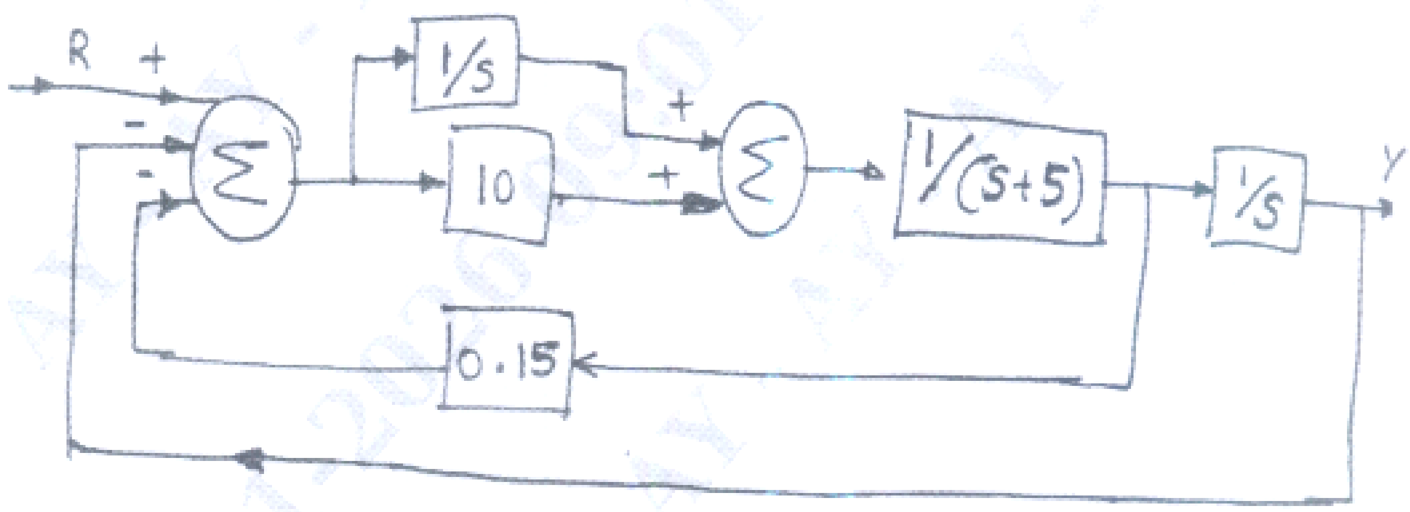

Fig. Q. 3 (b)

(10 Marks)

OR

4 a. Develop block diagram for the given transfer function using direct method with input r and output y considering all initial conditions.

$$T(s)=\frac{Y(s)}{R(s)}=\frac{s^2-3s+4}{s^4+2s^3-5s^2+2s-9}$$ (10 Marks)

$y(0)=1$; $\dot{y}(0)=-2$, $\ddot{y}(0)=6$, $\dddot{y}(0)=3$.

b. Compute the mathematical block diagram for the following electrical circuit shown in fig. 4 (b) using Analogy method.

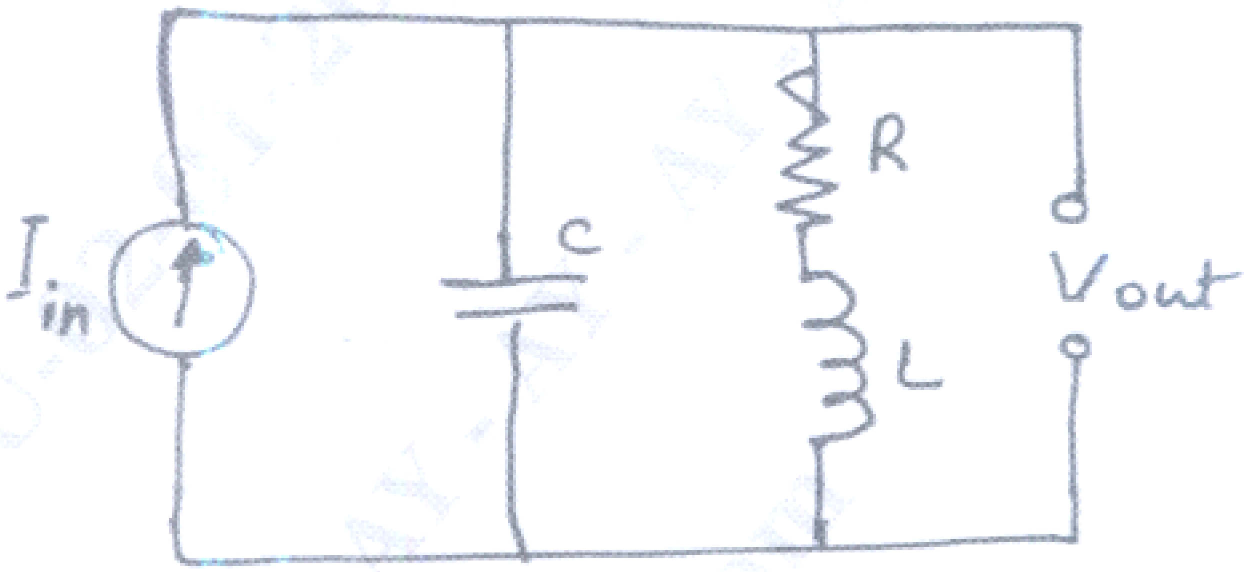

Fig. Q. 4 (b) (10Marks)

Module-3

5 a. Explain the fluid power design elements. (10 Marks)

b. Discuss the permanent magnet stepper motor with drive circuit model. (10 Marks)

OR

6 a. Describe control systems in fluid power with valve actuator mechanism. (10 Marks)

b. Explain any 3 electric components in fluid power circuits with examples for each type. (10 Marks)

Module-4

7 a. Describe the elements of data acquisition and control system. (10 Marks)

b. Outline the functions of analog – to – digital conversion. (10Marks)

OR

8 a. Explain the operational amplifier output characteristics using neat schematic symbol. (10 Marks)

b. Illustrate the Lab VIEW application software in Data Acquisition and Control System. (10 Marks)

Module-5

9 a. Explain an Instrumentation Amplifier with a neat circuit diagram. (10 Marks)

b. Discuss the Temperature Measurement using a k-Type Thermocouple. (10 Marks)

OR

10 a. Explain the strain Gauge based weighing System, an example for real time interfacing. (10 Marks)

b. Interpret pH Control System. an example for mechatronics system. (10 Marks)