



End Term (Even) Semester Examination May-June 2025

Roll no.....

Name of the Program and Semester: B.Tech.(ME) IV semester

Name of the Course: Mechatronics

Course Code: TME 409

Time: 3 hour

Maximum Marks: 100

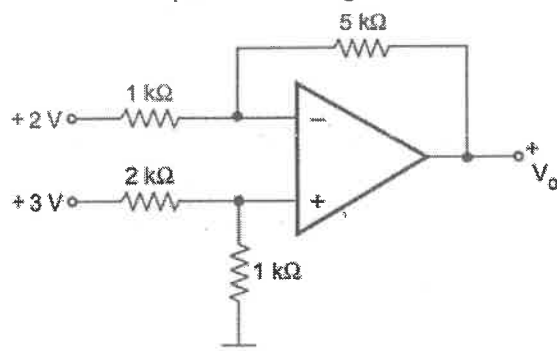
Note:

- (i) All the questions are compulsory.
- (ii) Answer any two sub questions from a, b and c in each main question.
- (iii) Total marks for each question is 20 (twenty).
- (iv) Each sub-question carries 10 marks.

Q1. (2X10=20 Marks)

- a. What do you mean by a mechatronic system? Discuss its various building blocks. (CO1)
- b. What is the role of an OP-AMP in a mechatronic system? Discuss the virtual ground concept for closed loop configuration of Op-Amp. (CO1)
- c. (i) Derive the expression for frequency response of a high pass filter.
(ii) Find the value of capacitance to have a cut-off frequency of 1 kHz in a low pass filter with $R=2\text{ k}\Omega$. (CO1)

- Q2. (2X10=20 Marks)
- a. Discuss the role of D/A converter in a mechatronic system. Draw its circuit and derive its output. (CO2)
 - b. What do you mean by a Sensor? Discuss the working of a temperature sensor. (CO2)
 - c. Find the output of following circuit: (CO2)



- Q3. (2X10=20 Marks)
- a. Discuss the construction and working of LVDT as a displacement sensor? (CO3)

- b. What do you mean by an actuator? What are various types of actuators used in a mechatronic system and where specifically they are used? (CO3)
- c. A 200 V DC shunt motor runs at 1000 rpm at full load with armature current 15 A. The armature resistance is $0.1\ \Omega$ and field resistance is $300\ \Omega$. Find:
 - (i) The back EMF
 - (ii) Input power
 - (iii) Mechanical power
 - (iv) Efficiency of motor (CO3)



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Q4.

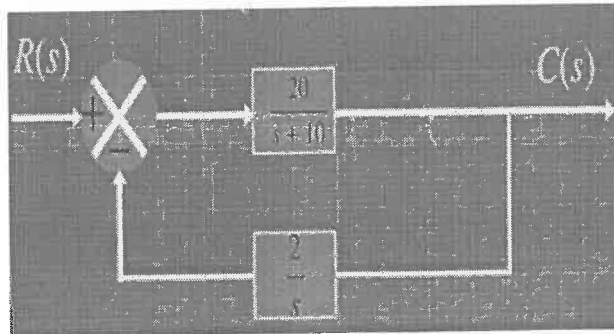
(2X10=20 Marks)

- Discuss the working of a 3-phase induction motor. What do you mean by the term slip? (CO4)
- What is the role of microcontroller in a mechatronic system? List the differences between microprocessor and microcontroller. (CO4)
- Write short notes on:
 - Proximity sensors
 - Speed sensors(CO4)

Q5.

(2X10=20 Marks)

- What do you mean by a transfer function? Find the overall transfer function of following system: (CO5)



- Derive the transfer function model of a DC motor. (CO5)
- Draw and discuss the internal block diagram of 8051 microcontroller. (CO5)