

**M.E. MECHANICAL ENGINEERING FIRST YEAR SECOND
SEMESTER EXAM 2025**

**SUBJECT: PRACTICAL INTRODUCTION TO MECHATRONICS
FULL MARKS 100**

ANSWER ANY FIVE QUESTIONS. ALL QUESTIONS CARRY EQUAL MARKS

Question 1

What makes the study of Mechatronics different from the study of Control systems?

Briefly explain with diagram the 4 methods by which computer can be used for system integration.

Draw the schematic diagram of a computer based monitoring and control of a process.

Question 2

What are Transducers?

What is the difference between absolute and relative motion measuring transducer? Give examples.

Explain the Null method and deflection method in connection with resistive Wheatstone bridge for strain measurement. Which one is suitable for dynamic strain measurement?

Question 3

For a piezoceramic transducer model, find the transfer function between charge and strain.

Draw the 3 port model of an Op amp. What are its important characteristics?

What are the various uses of an Op amp?

Explain an inverting Op amp

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Question 4

Explain with equivalent circuit diagram, a weighted resistance DAC using an Op amp in the inverting mode.

Explain with a 3 bit example an Upcount and a Successive approximation ADC.

Question 5

Explain the principle of an Absolute encoder.

With an example find the straight binary code (SBC) for decimal numbers.

State the need for Gray code and the relation between decimal number and gray code.

Question 6

Explain the principle of a servo motor and a stepper motor.

State the factors on which the angular resolution of a stepper motor depends.

Question 7

In the Inverted pendulum experiment demonstrated, what transducers were used? Which are analog and which are digital transducers ?

What actuator was used?

Draw a line diagram of the experiment as a computer controlled system.

Explain the principle of a potentiometer and derive its approximate input output relation.