R16

Code No: 136FK

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year II Semester Examinations, March - 2024

INTRODUCTION TO MECHATRONICS

(Mechanical Engineering)

Time: 3 Hours **Max. Marks: 75**

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

1.a)	Define mechatronics with an example.	[2]
b)	Distinguish between inverting and noninverting amplifiers.	[3]
c)	State the dynamic characteristics of simplified measuring system?	[2]
d)	What is a guideway and what is the use of it?	[3]
e)	What is a microcontroller? How are they specified?	[2]
f)	Write short notes on pulse modulation.	[3]
g)	What are the advantages of PLC system?	[2]
h)	What are counters and mention various types of counters.	[3]
i)	What is a programmable motion controller?	[2]
j)	List out the advantages of implementing digital control systems.	[3]

PART – B

(50 Marks)

2. Explain the signal conditioning process, signal conditioning circuits and their use. [10]

OR

3. Write short notes on the following:
a) Operational amplifiers
b) Capacitors. [5+5]

4. Briefly explain TTL and CMOS. [10]

OR

5. Write note on CNC machines, types of CNC system. Also give a comparison of conventional, NC & CNC systems. [10]

6. Draw the schematic diagram of a electromagnet type DC motors and explain the principle of operation. [10]

OR

7. Draw the circuit diagram of a binary resistor based digital to analog converter and explain how it works? [10]

8. What are timers and explain how such timers can be programmed to carry out control tasks? [10]

OR

9. Develop ladder programs for systems that will carry out the following tasks:
a) Switch on a pump when the water level in a tank rises above 1.2 m and switch it off when it falls below 1.0 m.
b) Switch on a pump, then 100 s later switch on a heater, then a further 30 s later switch on the circulating motor. [5+5]

10. Where is proximity sensor and explain the basic principle of proximity sensors? [10]

OR

11. With suitable notations, discuss the principle of control actions of the following controllers.
a) On-off controller
b) Proportional controller
c) Proportional-plus-derivative controller. [3+3+4]

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