Question Paper

MANIPAL ACADEMY OF HIGHER EDUCATION

INTERNATIONAL CENTRE FOR APPLIED SCIENCES
END SEMESTER THEORY EXAMINATION - DECEMBER 2022
III SEMESTER B.Sc (Applied Sciences) in Engg.

ELEMENTS OF MECHATRONICS SYSTEMS [IMET 231]

Marks: 50   **Duration: 180 mins.**

Answer all the questions.

1)

A) Explain the block diagram of a programmable logic controller. (6)

B) Write a short note on Optical Encoders. (2)

C) Define one-way and two-way shape memory effects in a shape memory alloy. (2)

2)

A) Illustrate the use of CRO to measure: (6)
i) Voltage
ii) Current

B) Define Programmable Logic Controller (PLC). (2)

C) A capacitive proximity sensor generates an electrostatic field and measures the changes in capacitance caused when a target enters the field. Illustrate this phenomenon with a neat diagram. (2)

3)

A) ICAS has decided to have a multi-level car parking system on campus. To count the number of cars getting parked daily, they decide to install a photo-electric sensor system. The transmitter and receiver are placed on opposite ends of each other along the same plane such that the output obtained is digital and is sent to a counter. (5)
Based on the said scenario, answer the following questions:
i) What mode of operation of the photoelectric sensor has been installed?
ii) When does a reliable detection occur?
iii) Graphically represent the output configuration of the system installed. (Take output on the y-axis and time on the x-axis)
iv) List the typical advantages and disadvantages of the installed system.

B) Explain half and full-step motion in a stepper motor. (3)

C) Describe how a transistor can be used in switching on a lamp. (2)