



TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL & ELECTRONICS

ENGINEERING

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN TECHNOLOGY ELECTRICAL AND ELECTRONICS

ENGINEERING

ECI 2304 COMPUTER CONTROL SYSTEMS:

SERIES: AUGUST 2019

TIME: 2 HOURS

DATE: 4 Aug 2019

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of five questions. Attempt question ONE (Compulsory) and any other TWO questions.

Do not write on the question paper.

- Q1 a) i) Define the following:
- I) Pilot light
 - II) Control station
 - III) Distributed control system:
 - IV) Transmitter
- ii) In a compound control system, the ratio between variable is maintained at 3.5 to 1. If each has been converted to a 0-5V range signal, devise a signal-conditioning system that will output a zero signal to the controller when the ratio is correct. **(10 Marks)**
- b) Describe the general features and the working of a cascade process control system **(10 Marks)**
- Q2 a) i) With the aid of a block diagram, describe a smart sensors encasing a computer-based controller with the sensor
- ii) State any **THREE** areas of application of modern Computer Control. **(10 Marks)**

b) i) A data-logging system must monitor 24 analog loops. A small computer requires per instruction and 200 instructions to address a multiplexer line and to read in and process the data in that line. The ADC performs the conversion in $60 \mu\text{s}$. The multiplexer requires $40 \mu\text{s}$ to select and capture the value of an input line. Calculate the maximum sampling rate of particular line.

(10 Marks)

Q3 a) i) Define Supervisory Control
 ii) Distinguish between Distributed Control System (DCS) and Direct Digital Control (DDC).

ii) Draw block diagrams for each of the systems in (ii)

(10 Marks)

b) i) Define **SCADA**
 ii) Describe any **FIVE** major components units of the system in (i)

(10 Marks)

Q4 a) i) Figure 1.0 show a temperature control system

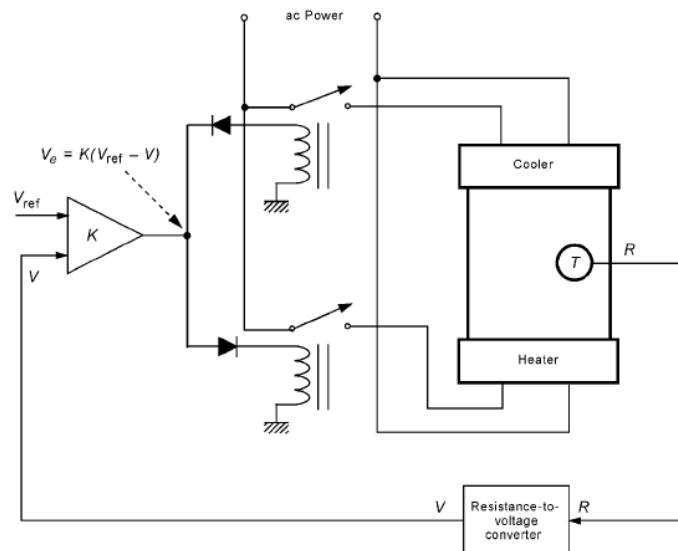


Fig. 1.0 Temperature control system

I) Explain the operation
 II) Implement the process control loop using a computer
 III) Describe the role of the computer.

(12 Marks)

iii) Describe the following software formats for controllers

I) Algorithm
 II) Source Code
 III) Compiler
 IV) High-Level Language

(8 Marks)

Q5 a) i) Draw the block diagram of a Single – board Computer (SBC) and explain the principle elements.

ii) State any **TWO** common application of (i)

(10 Marks)

b) i) Define “Data Logger”
 ii) Describe the major functional units of the system in (i)

(10 Marks)

