



COLLEGE OF ENGINEERING & TECHNOLOGY

Department : Electrical & Computer Control Engineering

Lecturer : Dr. Walid A. M. Ghoneim

Course : Microcontroller Applications

Course Code: EE 416

Time : 2 hours

Date : 20 / 1 / 2016

Marks: 40

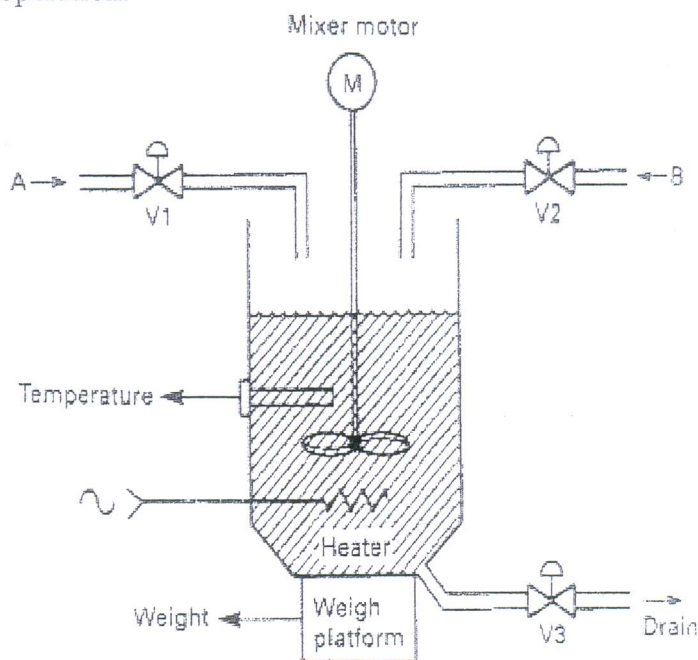
Final Exam

Answer all the following questions

(Q1) (20 marks)

ILO (A4,5,8,12,15,27,31. B.1,2,3,7,19. C2,3)

1 – The process shown in Figure(1) is to be started and stopped manually with push buttons, then – once started – it should be controlled automatically using a digital control system according to the following sequence of operation:



- 1 Open valve V1 until 250 kg of product A have been added.
- 2 Start mixer blade.
- 3 Open valve V2 until 310 kg of product B have been added.
- 4 Wait 120s (for complete mixing).
- 5 Heat to 80 °C and maintain at 80 °C for 10 min.
- 6 Heater off. Allow to cool to 30 °C.
- 7 Stop mixer blade.
- 8 Open drain valve V3 until weight less than 50 kg.

Determine and justify:

- a. The number and types of inputs and outputs [2]
- b. The block diagram of the digital closed-loop control system in two cases:
 - i. The set point is analog (potentiometer) [2]
 - ii. The set point is digital (Keypad) [2]

Members of course Examination Committee:	Signature:	Date:
Lecturer: <i>Dr. Walid Ghoneim</i>	<i>[Signature]</i>	17/1/2016
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