00056

THE OPEN UNIVERSITY OF SRI LANKA
FACULTY OF ENGINEERING TECHNOLOGY
BACHELOR OF TECHNOLOGY – LEVEL 06
FINAL EXAMINATION 2010/2011

MEX6333 – MECHATRONICS

DATE : 28TH FEBRUARY 2011
TIME : 0930 HRS – 1230 HRS
DURATION : THREE HOURS

LIBRARY
01 NOV 2011
The Open University of Sri Lanka

READ THE FOLLOWING INSTRUCTIONS CAREFULLY BEFORE ANSWERING THE QUESTION PAPER
The question paper has **six** questions.
Answer **four** questions only. Question **one is compulsory** and answers three others.

Question 01 Spend approximately one hour ***[40 marks]***

Design a mechanism for sorting small, medium and large size objects moving along a conveyor belt so that they each are diverted down different chutes for packaging.

Question 02 ***[20 marks]***

(a) Explain the principle of a pilot-operated value.

(b) Draw the symbols for
(i) a pressure relief value
(ii) a 4/2 value

(c) Design a pneumatic value circuit to give the sequence A^+, followed by B^+, followed by A^-, followed by B^-.

Question 03 ***[20 marks]***

Explain the following mechanisms.

(a) Ratchet, pawl and crank.
(b) Geneva wheel.
(c) Four bar linkage.
(d) Slider and crank.

Question 04 ***[20 marks]***

(a) Explain the basis on which the following forms of adaptive control systems function:

i. gain-scheduled
ii. self-tuning
iii. model-reference.

(b) Explain the difference between a parallel and a serial interface.

Question 05 ***[20 marks]***

(a) What type of control system did the PLC replace? Why was the PLC better?

(b) Devise a circuit (ladder diagram) that could be used with a conveyor belt which is used to move an item to a work station. The presence of the item at the work station is detected by means of breaking a contact activated by a beam of light to a photo sensor. There it stops for 100s for an operation to be carried out before moving on and off the conveyor. The motor for the belt is started by a normally open start switch and stopped by a normally closed switch.

(c) Explain how a PLC can be used to handle an analogue input.

Question 06 ***[20 marks]***

(a) What is the principle of microstepping? Briefly explain the advantages of two-phases on full stepping over one-phase on full stepping.

(b) Compare and contrast the control system for a domestic central heating system involving a bimetallic thermostat and that involving a microprocessor.

All Rights Reserved