The Open University of Sri Lanka
Faculty of Engineering Technology

Study Programme	:	Bachelor of Industrial Studies
Name of the Examination	:	Final Examination
Course Code and Title	:	**MEX6351–INDUSTRIAL AUTOMATION**
Academic Year	:	2012/13
Date	:	29th July 2013
Time	:	1330 – 1630 Hrs
Duration	:	3 hours

General instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of 8 questions. All questions carry equal marks.
3. Answer any 5 questions only.

Q1. (a) Distinguish between Mechanization and Automation. Elaborate by taking suitable examples from the manufacturing industry.

(b) Taking suitable examples, discuss situations in manufacturing industry where automation may not be appropriate.

(c) Hard automation and soft automation are two automation methodologies employed in the industry. Discuss the applicability of these two methodologies in the manufacturing industry.

Q2. (a) Explain the different categories of industrial plants in manufacturing industry. Give examples for each.

(b) Discuss the application of various automation technologies employed on the above mentioned categories of manufacturing industries.

(c) Briefly discuss the structure of an automated industrial plant and identify its main elements by taking a suitable example which is familiar to you.

Q3. (a) Distinguish between a sensor and a transducer. Take a suitable example to clarify your answer.

(b) Explain four (4) characteristics that need to be considered when selecting a sensor for a particular application.

(c) Select a technical process of your choice and illustrate the types of sensors that need to be integrated in order for the process to be automated.

Q4. (a) What is 'Primitive Communication' in relation to industrial communication systems?

(b) Briefly discuss the hierarchy of a typical industrial communication network in a large scale industrial automated plant.

(c) Distinguish between device buses and process buses commonly employed for communication systems in industrial automated plants. Discuss the applicability of each of the above buses within an industrial communication network.

Q5. (a) What makes an industrial robot differ from other programmable machines used in industry? Elaborate by taking suitable examples.

(b) Distinguish between payload and maximum load with regard to a robot's load bearing capacity. Why is the payload very much less than the maximum load bearing capacity of a robot?

(c) What is an end-effector with regard to an industrial robot? State examples of various end-effectors commonly used in industrial robots.

Q6. (a) Illustrate the basic units that make up a CNC machine tool.

(b) Using neat sketches, explain the convention of naming the axes of two most common CNC machine tools.

(c) What are the advantages that CNC machines offer over conventional machine tools used in the automation industry? Explain.

Q7. (a) What makes AC motors preferred over DC motors in the application of drive systems used in factory automation?

(b) Explain the operation of a servo motor and state how it differs from the operation of a conventional AC or DC motor.

(c) Discuss the pros and cons of using fluid power actuation in factory automation applications.

Q8. Write brief notes on any four (04) of the following topics.

(a) SCADA networks.

(b) Use of optical encoders for position identification in automation applications.

(c) Network topologies in industrial communication systems.

(d) Types of robots based on workspace configurations.

(e) Dynamic characteristics of sensors.

(f) DeviceNet standards in industrial communication systems.

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