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University Examinations 2013/2014

THIRD YEAR, SECOND SEMESTER EXAMINATION FOR DIPLOMA IN
MECHATRONICS ENGINEERING

EMT 0245: MECHATRONICS SYSTEMS

DATE: APRIL 2014

TIME: 1 ½ HOURS

INSTRUCTIONS: Answer question *one* and any other *two* questions

QUESTION ONE – (30 MARKS)

- (a) Define the following terms as used in mechatronics
 - (i) Sensor
 - (ii) Actuator(4 Marks)
- (b) Distinguish between stepper and servo motors. (4 Marks)
- (c) Explain the two techniques involved in Analogue to digital conversion. (4 Marks)
- (d) State two ways of entering programs into a PLC. (2 Marks)
- (e) State the two types of control elements used in mechatronics. (2 Marks)
- (f) Define the term mechatronics and give two practical examples of mechatronic systems. (4 Marks)
- (g) With the aid of a block diagram, describe the architecture of a microprocessor. (7 Marks)

QUESTION TWO – (15 MARKS)

- (a) State one type of proximity sensor which could be used in mechatronic system. (1 Mark)
- (b) Give two typical application where this sensor could be used. (2 Marks)
- (c) State two desirable feature of proximity sensors. (2 Marks)
- (d) State three advantages of a PLC (Programmable logic controller) based mechatronic system over a computer based system, when used in a factory environment. (3 Marks)

(e) With the aid of a block diagram, describe the architecture of a PLC. (7 Marks)

QUESTION THREE – (15 MARKS)

(a) State the five key elements of a mechatronic system. (5 Marks)

(b) Distinguish between hydraulic actuators and pneumatic actuators. (4 Marks)

(c) State six factors to be considered when selecting an actuator for a given application. (9 Marks)

QUESTION FOUR – (15 MARKS)

(a) Outline the general procedure for theoretical modeling of a mechatronic system. (12 Marks)

(b) State three benefits of simulating systems using computers. (3 Marks)