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University Examinations 2020/2021

THIRD YEAR, FIRST SEMESTER EXAMINATION FOR THE DIPLOMA IN ELECTRICAL ENGINEERING

EEE 2404: PROGRAMMABLE LOGIC CONTROLLERS

DATE: JULY 2021 **TIME: 1½ HOURS**

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

QUESTION ONE (30 marks)

a) Explain the three process characteristics that are exhibited in energy control system. (6 Marks)

b) Derive the transfer function of the electronic integral mode shown below (4 Marks)

c) State four production processes that are controlled using PLC (4 Marks)

d) Explain the principle of operation of a PLC (6 Marks)

e) Draw the symbols for the following instruction……

(i) AND NOT

(ii) OR NOT

(iii)OR BLOCK (6 Marks)

f) Draw a ladder diagram for a circuit where a lamp is operated from three position switches connected in series. (4 Marks)

QUESTION TWO (15 MARKS)

a) Draw the block diagram of a PLC system and explain the function of each block (12 Marks)

b) Identify the three main styles of a PLC system (3 Marks)

QUESTION THREE (15 MARKS)

a) A system is described by the following instruction list. Produce the corresponding ladder diagram (10 Marks)

LD x 400	LD x 404
OR x 401	OR x 405
OUT R 100	AND NOT x 406
LD x 402	OUT R 102
AND x 403	
OUT x R 101	

b) Explain the following features of a PLC

(i) Counter

(ii) Time (5 Marks)

QUESTION FOUR (15 MARKS)

Design a ladder diagram for an industrial control system that ; (15 Marks)

(i) Counts 10 objects passing a long a conveyor belt

(ii) Closes a deflecting gate when that number has been deflected into a carton

(iii)Allows a time of 5 seconds between the tenth object counted and the closing of the deflector