ELIZADE UNIVERSITY, ILARA-MOKIN,

ONDO STATE

FACULTY OF ENGINEERING

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

SECOND SEMESTER EXAMINATION, 2018/2019 ACADEMIC SESSION

COURSE TITLE: INDUSTRIAL ELECTRONICS DESIGN

COURSE CODE: EEE 526

EXAMINATION DATE: 8th July, 2019

COURSE LECTURER(S): DR. OLUGBENGA K. OGIDAN

TIME ALLOWED: 2 hours

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HOD's SIGNATURE

INSTRUCTIONS:

1. ANSWER <u>QUESTION ONE AND ANY OTHER THREE QUESTIONS</u> (TOTAL OF 4 QUESTIONS)

2. ANY INCIDENT OF MISCONDUCT, CHEATING, POSSESSION OF UNAUTHORIZED MATERIALS DURING EXAM SHALL BE SEVERELY PUNISHED.

3. YOU ARE NOT ALLOWED TO BORROW CALCULATORS AND ANY OTHER WRITING MATERIALS DURING THE EXAMINATION.

4. ELECTRONIC DEVICES CAPABLE OF STORING AND RETRIEVING INFORMATION ARE PROHIBITED.

5. DO NOT TURN TO YOUR EXAMINATION QUESTION PAPER UNTIL YOU ARE TOLD TO DO SO.

Question1

a.) Define the word transducer? (1 mark)

b.) State three differences between active transducers and passive transducers, give examples where necessary

(3 marks)

c.) Define the following terms:

i.) Sensor

ii.) Actuator

iii.) Hydrophone

iv.) Sonar transducer

v.) Calibration

(5 marks)

d.) Describe briefly three advantages of an instrumentation system within an industry (6 marks)

e.) You are a power system engineer in a developing power distribution company. The power generation available to you is not enough - just one third (1/3) of the power required for the city. As a result, there is the need for load-shedding. The city under your control had been grouped into four divisions namely:

- Residential area = pin 3
- Industrial area = pin 4
- Commercial area = pin 7
- University Teaching Hospital = pin 6

i.) Prepare in a tabular form how you will implement a load-shedding activity within a period of twenty four (12) hours. (Hint: use 1 second to represent 1 hour)

(3 marks)

ii.) Write a program that will implement the load-shedding plan using a modern power distribution controller

(4 marks)

iii.) Draw a flowchart of the program you have written to implement the load shedding

(2 marks)

Question 2

a.) Describe briefly the operation of an electromechanical relay (4 marks)

b.) What is the basic difference between a thermistor and a thermocouple, include diagrams where necessary. (2 marks)

c.)i.) What do you understand by Seebeck effect? (2 marks)

ii.) With well labelled diagram, explain the principle of operation of a thermocouple (4 marks)

Question 3.

a.) Define the following terms

i.) Real-time system (2 marks)

ii.) SCADA (2 marks)

b.) Describe how a medical instrumentation system can be applied to save the life of patients in an intensive care unit of a hospital. (8 marks)

Question 4

a.) With the aid of a well labelled diagram, describe briefly the operation of a speaker as a sound transducer (4 marks)

b.) State two differences between an electromechanical relay and a solid state relay (2 marks)

c.) There is the need to develop an automated security light (using a light sensitive switch) such that when it is dark the light will come up and when the day is bright, it will go off by itself (Hint: do not use a microcontroller in your design.)

i.) What component will you choose as the sensor and why? (2 marks)

ii.) Draw the circuit if the proposed system (1 mark)

iii.) Describe the system operation. (3 marks)

Question 5

a.) What do you understand by the term fly-wheel or fly back diode? (2 marks)

b.) With the aid of a circuit diagram, describe how it functions in relation to a relay (2 marks)

c.) D design a burglar alert system that could be used within a residential building. This system is expected to sound a buzzer in case of an intrusion into a premises and will send SMS to the owner of the premises and security operatives.

i.) Draw the block diagram

ii.) Draw the schematic circuit diagram

iii.) Draw the flowchart

iv.) Describe the operation of the system

(8 marks)

Question 6

a.) State five types of measurement instruments used in the laboratory/industry and their uses

(5 marks)

b.) What is a cathode ray oscilloscope and when do you need it in an industrial set-up?

(3 marks)

c.) Distinguish between fixed automation and flexible automation (2 marks)

d.) You are expected to automate a system that checks if tomatoes are ripe enough for plucking in an agricultural outfit. Which type of control system will you prefer to design (open loop or closed clop)? Support your decision with four reasons

(2 marks)