



ELIZADE UNIVERSITY, ILARA-MOKIN,  
ONDO STATE, NIGERIA

DEPARTMENT OF  
MECHANICAL, AUTOMOTIVE AND PRODUCTION  
ENGINEERING

SECOND SEMESTER EXAMINATIONS


2016/2017 ACADEMIC SESSION

COURSE: ATE 304 - Dynamics and Control (3 Units)

CLASS: 300 Level Automotive Engineering

TIME ALLOWED: 2 Hrs 30 Min.

INSTRUCTIONS: Answer question 1 and any other 4 questions

  
HOD'S SIGNATURE

Date: July/August, 2017

**Question 1**

- (a) State the Characteristics of Light Emitting Diodes (6 marks)
- (b) What is a Holding Current in Thyristor (2 marks)
- (c) Discuss the relationship between the following diodes:
  - (i) Light Emitting Diode (4 marks)
  - (ii) Photodiodes (3 marks)

**Question 2**

- (a) Write short notes on the following Sensors:
  - (i) System:
  - (ii) Sequential control:
  - (iii) Reference selector (reference input element) (9 marks)
- (b) What are the Characteristics of Metal-Oxide Semiconductor Field Effect Transistor (MOSFET) (3½ marks)
- (c) State any five (5) Actuators (2½ marks)

**Question 3**

- (a) Explain how robot operates using the figure Q3(a) below in relation to DOF (degree of freedom of our Shoulder, arm wrist, etc) of our body parts (7 marks)

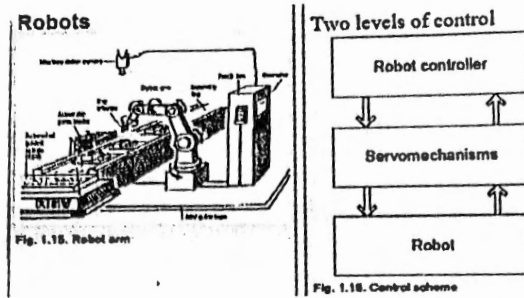


Fig.Q3(a)

(b) What is Signal and Systems in Mechatronics (2 marks)

(c) Define what is meant by:

(i) An analog circuit.

(ii) Digital circuit

(iii) Electric Circuit

(6 marks)

**Question 4**

Use the below table Q4 to calculate the value of the following resistors

(a) yellow, blue, orange

(5 marks)

(b) Red, yellow, orange

(5 marks)

(c) Red, Violet, Green

(5 marks)

**Table Q4: Resistor Color Code**

Color	Mantissa Value	Multiplier Value
Black	0	1
Brown	1	10
Red	2	100
Orange	3	1000
Yellow	4	10,000
Green	5	100,000
Blue	6	1,000,000
Violet	7	
Grey	8	
White	9	

**Question 5**

(a) What is the functional difference between a normal diode and Zener diode? (7marks)

(b) Complete the below Truth Table Q5(b) in the Boolean Algebra between A & B

TRUTH TABLE Q5(b)

INPUT	INPUT	OUTPUT
A	B	A AND B
0	X	0
0	1	X
X	0	0
X	1	1

(4 marks)

(c) Complete the below Truth Table Q5(c) in the Boolean Algebra between A & B

TRUTH TABLE Q5(c)

INPUT	INPUT	OUTPUT
A	B	A OR B
0	0	X
0	1	X
X	0	1
1	X	1

(4 marks)

**Question 6**

(a) Explain the Mode of operation of the simple open loop control system in the below Fig. Q6(a)

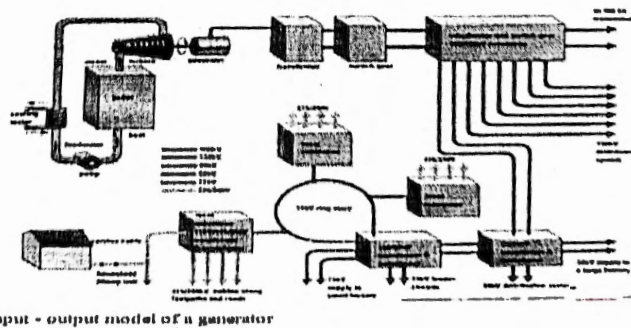


Fig. 6(a): A simple control loop (temperature regulator).

(9 marks)

(b) State the two laws that are used to analyse electrical circuits

(6 marks)

**Question 7**

- (a) The action of steering an automobile to maintain a prescribed direction of movement satisfies the definition of a feedback control system. Discuss (6 marks)
- (b) Determine  $L\{2e^{3t}\sin 3t\}$  (4 marks)
- (c) Define Mechanical switches giving four examples. (5 marks)