

DEPARTMENT OF COMPUTER SCIENCE
FINAL EXAMINATION SEPTEMBER 2022 SEMESTER
BCSC 3139:ELECTRONICS II-ELECTRONICS

DATE: SEPTEMBER 2022

TIME: 2 HOURS

INSTRUCTIONS:

- i. Answer all questions in SECTION I and Choose Two from SECTION II.*
 - ii. Do NOT write on the Question Paper*
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SECTION I

QUESTION ONE (COMPULSORY) (30 Marks)

a) Explain the following terms as implied in discrete structure

- i. Injective (2 marks)
- ii. Surjective (2 marks)
- iii. Bijection (2 marks)

b) Decide whether

$\subseteq, \subset,$

Or both could be placed in each blank to make a true statement. (4 marks)

- i. $\{a, b, c\} ___ \{a, b, c, d\}$
- ii. $\{1, 2, 3, 4\} ___ \{1, 2, 3, 4\}$

- c) Elaborate a diode as the basis of a Bipolar Transistor (BJT). (5 marks)
- d) Describe the role of a decoder as implied in digital electronics (3 marks)
- e) Provide **THREE** comparison of the Combinational and Sequential Circuits. (6 marks)
- f) Explain **THREE** differences between a SR flip flop and a JK flip flop. (6 marks)

SECTION II

QUESTION TWO (20 Marks)

- a. Describe the **THREE** different forms of Transistors as used in Electronics. (6 marks)
- b. Outline the **TWO** characteristics of the transistor that gives it the ability to change between two basic functions known as "switching" (digital electronics) or "amplification" (analogue electronics). (6 marks)
- c. The bipolar transistors have the ability to operate within three different regions. Highlight these **THREE** regions. (6 marks)
- d. Discuss **ONE** functions of Bipolar Transistors. (2 marks)

QUESTION THREE (20 Marks)

- a) There are **TWO** basic types of bipolar transistor construction. Elaborate them. (6 marks)
- b) The Bipolar Transistor basic construction consists of two PN-junctions producing three connecting terminals with each terminal being given a name to identify it from the other two. Describe these **THREE** terminals. (6 marks)
- c) By aid of a truth table show that $(p \rightarrow r) \vee (q \rightarrow r) \equiv (p \wedge q) \rightarrow r$ logically equivalent. (4 marks)
- d) Explain FOUR types of logical connector by aid of a symbol as use in discrete structure. (4 marks)

QUESTION FOUR (20 Marks)

- a) Describe a decoder as used in Digital Electronics. (4 marks)
- b) Outline any **TWO** types of decoder output forms. (4 marks)
- c) By aid of a diagram, elaborate the active high output type decoder. (6 marks)
- d) Illustrate the modification of a SR flip flop to a JK flip flop (6 marks)

QUESTION FIVE (20 Marks)

- a) Illustrate the Conversion of a SR flip flop into a T flip flop by aid of a diagram. (6 marks)
- b) Describe Karnaugh maps as used in digital Electronics. (4 marks)
- c) Explain **TWO** roles of a Karnaugh maps as used in digital Electronics. (4 marks)
- d) By aid of a diagram, elaborate the Active low output type of decoder. (6 marks)