



KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2007/2008

SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE AND COMPUTER ENGINEERING

SCT 106: DIGITAL SYSTEMS I

DATE: Thursday, 12th June, 2008

TIME: 11.00 a.m. – 1.00 p.m.

INSTRUCTIONS:

1. Question **ONE** is compulsory
2. Answer any other **TWO** from questions **TWO**, **THREE** or **FOUR**.

QUESTION ONE

a) Define a comparator and briefly explain how it works. (10 marks)

b) Explain the meaning of the following terms:

- Encoder and decoder
- Logic gate
- Power dissipation
- Logic levels

(8 marks)

c) Using a Karnaugh map, minimize the expression.

$$P - ABC + \overline{A}\overline{B}\overline{C} + \overline{A}BC + \overline{A}\overline{B}C + \overline{A}B\overline{C} + \overline{A}BC.$$

Determine the inverse function of the above expression.

(6 marks)

d) Convert the binary word

101101111001 into

- i) Octal code
- ii) Hexadecimal code
- iii) Denary

(6 marks)

QUESTION TWO

- a) Name the additional functions that can be provided by a multiplexer
(10 marks)
- b) Draw the logic circuit for the wired gate given by the Boolean expression

$$P = \overline{A+B}, \overline{C+D}, \overline{E+F}$$
(10 marks)

QUESTION THREE

- a) Describe the noise margin. There is a voltage band for both logic families that is called “indeterminate”. What does this mean?
- b) Indicate how you would use JK flip-flop to act as a D flip flop (An additional component is necessary).
(20 marks)

QUESTION FOUR

- a) Give the Boolean expression and truth table for the following logic gates.
 - i) 2 input OR
 - ii) 2 input NAND
 - iii) Buffer inverter
- b) How many outputs has a three input decoder? Write out the truth table for such a device.
(20 marks)
