TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering and Technology

DEPARTMENT OF MEDICAL ENGINEERING

DIPLOMA IN MEDICAL ENGINEERING
(DME 213 Y2 S2)

EHL 2204

DIGITAL ELECTRONICS

SPECIAL/SUPPLEMENTARY EXAMINATIONS
SERIES: JULY, 2014
TIME: 2 HOURS

INSTRUCTIONS TO CANDIDATES:

-Answer any **THREE** questions
-You are required to carry a scientific calculator for this paper.
This paper consists of **3 PRINTED** pages

QUESTION ONE

(a) (i) Convert the decimal number 23 to Binary. **(4 marks)**

(ii) Perform $(1-3)_{10}$ by I's complement **(4 marks)**

(b) (i) Define the term decoder

(ii) Design a Binary-to-octal decoder and implement it using gates. **(10 marks)**

Convert the decimal number 17 to exces-3 BCD **(2 marks)**

QUESTION TWO

(i) Convert the decimal number 17 to octal. **(3 marks)**

(ii) Perform $(7-9)_{10}$ by 2's complement **(8 marks)**

(b) Illustrate using a schematic diagram and truth table how a RS catch can be converted into a JK flip flap. **(6 marks)**

Find the minterms of $F = AB + \overline{B}C\overline{D}$ **(6 marks)**

QUESTION THREE

(a) (i) Convert 27_{10} to Hexadecimal **(3 marks)**

(ii) Explain, giving **TWO** reasons, why BCD is not used in digital computers. **(4 marks)**

(b) (i) Design a FULL adder circuit and implement it using the minimum number of gates. **(12 arks)**

(ii) Define the term conjunctive normal form as used in Boolean equations. **(1 marks)**

QUESTION FOUR

(a) (i) Convert $9B4_{16}$ into decimal **(3 marks)**

(ii) Add $275_{1o}+241_{10}$ using the 8421 BCD **(4 marks)**

(b) (i) Find the max-term of $F = A + B\overline{C}$ **(10 marks)**

(ii) Perform $(2345 - 6879)_{10}$ by 10s complement **(3 marks)**

QUESTION FIVE

(a) (i) Convert 124.35_8 into hexadecimal. **(3 marks)**

(ii) Convert 101_{10} to Cray code **(3 marks)**

(b) Sensor D is a daytime sensor while sensor E is the timetable sensor for digital electronics lessons. DME 213 class occupies lab 6 or med 5 for electronic lessons. Sensors L and M detect their presence in Lab 6 and in Med 5 respectively.

Design a logic circuit which will round an alarm whenever the students are absent and light lamps they are present at right. Implement the circuit. **(14 marks)**