FIJI NATIONAL UNIVERSITY
College of Engineering, Science & Technology

SCHOOL OF ELECTRICAL & ELECTRONIC ENGINEERING
TRADE DIPLOMA IN ELECTRICAL ENGINEERING

EEE543 – DIGITAL AND ANALOG ELECTRONIC ENGINEERING.

SUPPLEMENTARY EXAMINATION – TRIMESTER 1 - 2016.

TIME: TBA **Date: TBA** **No. of pages: 7**

INSTRUCTIONS TO STUDENTS:

1. You are allowed 10 minutes **EXTRA** as reading time during which you are **NOT** to write.
2. Begin each answer on a fresh page and use both sides of the sheet.
3. Write your candidate number at the top of each attached sheet.
4. Insert all written foolscap, graph paper, drawing paper, etc. in their correct sequence and secure well.
5. For all sheets of paper on which rough/draft work has been done, cross it through and attach to your answer scripts.
6. Show all workings where necessary
7. Diagrams and graphs can be drawn in pencil.
8. Non- programmable calculators are allowed.
9. **ATTEMPT ALL QUESTIONS**
10. **Check your work before you leave the room!!**

Section A: **(20 marks)**

Part 1 MULTIPLE CHOICE **(10 marks)**

Attempt all questions in this section by selecting and writing the correct alphabet beside the number.

1. For which of the following flip-flops, the output is clearly defined for all combinations of two inputs.
   (a) D type flip-flop.
   (b) R-S flip-flop.
   (c) J-K flip-flop.
   (d) none of these

2. The voltage between the emitter and collector of a silicon transistor when the transistor is biased to be at the edge of saturation is:
   (a) 5 volts.
   (b) 10 volts.
   (c) 0.1 volts.
   (d) 0.3 volts.

3. Conventional flow assumes charges flow from

   (a) Positive to negative
   (b) Positive to positive
   (c) Negative to positive
   (d) Negative to negative

4. An ideal operational amplifier has;

   (a) An infinite output impedance
   (b) Zero input impedance
   (c) Infinite bandwidth
   (d) All

5. A basic SR flip flop can be constructed by cross-coupling which basic logic gates?

   (a) XOR or XNOR gates
   (b) AND or OR gates
   (c) AND or NOR gates
   (d) NOR or NAND gates

6. Using DeMorgans theorem, the expression $\overline{AB + DE}$ is equal to:

(a) $(\bar{A} + \bar{B} + (\bar{D} + \bar{E})$
(b) $(\ \overline{\ }\ )(\overline{\mathrm{DE}})$
(c) (AB).(DE)
(d) Both c and d

7. The truth table for an SR flip flop has how many valid entries?

(a) 3
(b) 1
(c) 4
(d) 2

8. The output will be LOW for any case when one or more inputs are zero in a(n)

(a) OR gate
(b) NOT gate
(c) AND gate
(d) NAND gate

9. A single transistor can be used to build which of the following digital logic gates?

(a) NAND gates
(b) OR gates
(c) NOT gates
(d) AND gates

10. What input values will cause an AND logic gate to produce a HIGH output?

(a) At least one input is Low
(b) All inputs are Low
(c) At least one input is High
(d) All inputs are High

Part 2 **NUMBER CONVERSIONS** (10 marks)

Convert the following;

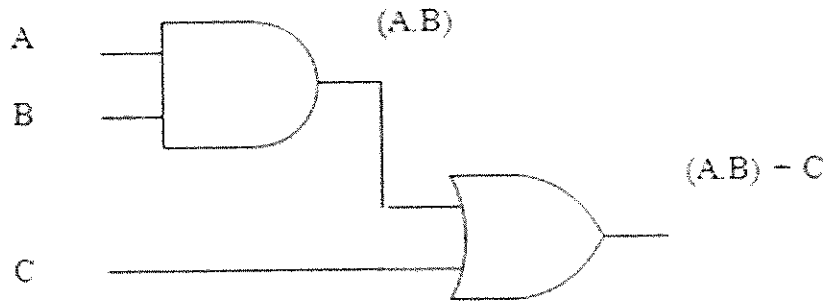
a) $4BC_{16}$ to Octal (2 marks)
b) 101011_2 to Decimal (2 marks)
c) 21_{10} to Binary (2 marks)
d) 101101_2 to Hexadecimal (2 marks)
e) 487_{10} to Excess 3 - Code (2 marks)

Section B

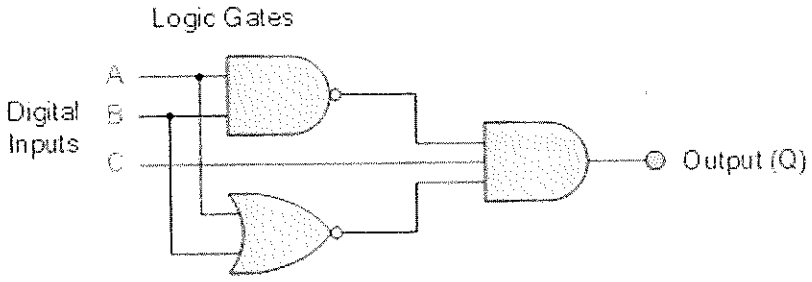
Combinational Circuits & Logic Families (TTL & CMOS)

Question 1

a) Given the following combinational logic circuit find the truth table (6 marks)



b) Given the following combinational logic circuit find the logic expressions and its truth table (10 marks)



c) Simply the following Boolean expressions using DeMorgan's Theorem. (4 marks)

$$\overline{(AB+C)(A+BC)}$$

Section C Flip Flops & Display Devices (20 marks)

Question 1

a) Explain the SR NOR gate flip flop with diagram and truth table (5 marks)

b) Explain the JK flip flop with diagram and truth table (5 marks)

Question 2

a) For the seven segment display (SSD), use the common cathode method to display digit "2" with resistor value 220Ω. **(10 marks)**

SECTION D

Rectifiers and Karnaugh Map (20 marks)

Question 1

a) Explain the operation of the Bridge full-wave rectifier with input waveform and also the rectified output waveform. (7 marks)

b) Assume that the total voltage across the high-voltage secondary of a transformer used to supply a full-wave rectifier is 320 volts. Find the average load voltage (ignore the drop across the diode). (3 marks)

Question 2

a) Write the simplified Boolean expression for the Karnaugh map below; (5 marks)

	C'D'	C'D	CD	CD'
A'B'				
A'B		1		
AB		1	1	
AB'				

b) Write the simplified Boolean expression for the Karnaugh map below; (5 marks)

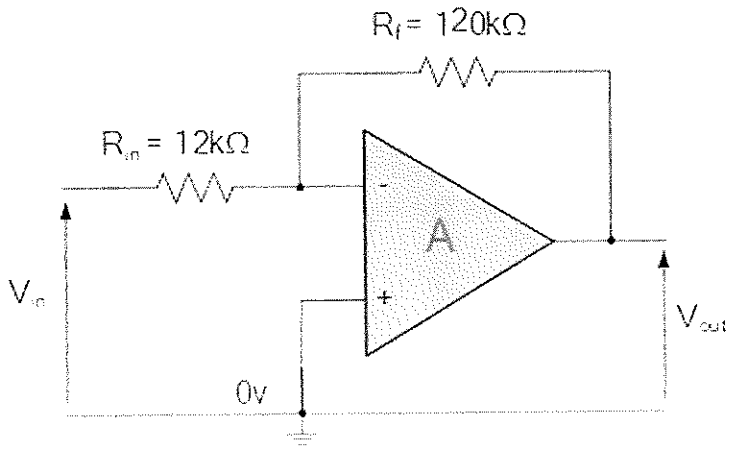
	C'D'	C'D	CD	CD'
A'B'			1	1
A'B				
AB	1			
AB'	1			

Section E **Op – Amps & Power Supplies** **(20 marks)**

Question 4

a) Describe the operation of the Inverting Op-amp (6 marks)

b) An Inverting Op-amp circuit is given below;



Calculate the closed loop gain of the circuit? (5 marks)

c) Draw a diagram of a conventional power supply (9 marks)

THE END