



FIJI NATIONAL UNIVERSITY

COLLEGE OF ENGINEERING, SCIENCE AND TECHNOLOGY
SCHOOL OF ELECTRICAL AND ELECTRONIC ENGINEERING

TRADE/DIPLOMA in ELECTRONICS ENGINEERING
PROGRAMME
(INSTRUMENTATIONS & CONTROLS)
(TELECOMMUNICATIONS & NETWORKING)

EEF551 DIGITAL ELECTRONICS II

FINAL EXAMINATION (TRIMESTER 1, 2018)

DATE/TIME/ROOM – Refer to Exam Timetable

INSTRUCTIONS TO CANDIDATES

1. You are allowed 10 minutes extra time during which you are not to write.
2. Write all your answers in the allocated Answer Booklet.
3. Begin each answer on a fresh new page and use both sides of the sheets.
4. Write your identification number on the top of each attached sheet.
5. Insert all written foolscaps, graph paper, drawing paper, etc in their correct sequence and secure with string provided.
6. For all sheets of paper in which has been done, cross it through and you must attach to your answer script.
7. Write clearly the number(s) of the question(s) attempted on the top of each sheet.
8. Numbering conversion systems calculators are prohibited.
9. All Sections are compulsory.

Section A: MULTIPLE CHOICE

(25 marks = 1 mark for each correct answer)

Instructions:

Write the corresponding question number for the correct alphabet in your answer booklet.

1. Bipolar junction transistors are commonly found in which digital integrated circuit (IC) device:
a) CMOS
b) TTL
c) RRL
d) ECL
(1 mark)
2. CMOS ICs have:
a) Noise immunity
b) Rugged cases
c) Strong drive capability
d) Faster speeds
(1 mark)
3. A 74LS00 IC in the electronics stores fall under what category:
a) MSI.
b) VLSI.
c) SSI.
d) ULSI.
(1 mark)
4. Evaluate the appropriate flipflop which will perform the tasks of a toggle flipflop:
a) SR NOR flipflop.
b) D flipflop.
c) JK flipflop.
d) SR NAND flipflop.
(1 mark)
5. Which Boolean Equation best describes the operation of the combinational logic diagram shown below:

a) $X = (AB)(AB + C)\bar{B}$
b) $X = (AB)(AB + C)B$
c) $X = (AB)(AB + C)B$
d) Both a) and b).
(1 mark)

6. Name the semiconductor component that is used in the CMOS ICs:
a) Transistors
b) Field effect transistors
c) Metal oxide semiconductor field effect transistors
d) Power diode
(1 mark)
7. Identify the “real world” electronic device:
a) DAC
b) ADC
c) BCD Decoder
d) Binary Comparator
(1 mark)
8. What is the operating voltage for a TTL IC?
a) 3V
b) 18V
c) 12V
d) 5V
(1 mark)
9. SR flipflops are commonly found in:
a) Counter circuits.
b) Register circuits
c) Debounced circuits
d) None of the above
(1 mark)
10. Choose the term used for a group of eight bits:
a) Byte.
b) Kilo-byte.
c) Giga-byte.
d) Mega-byte.
(1 mark)
11. The Boolean theorem known as De-Morgan’s theorem $\overline{A + B}$ is equivalent to:
a) $\overline{A} + \overline{B}$
b) $\overline{A} + \overline{\overline{B}}$
c) $\overline{A}.\overline{B}$
d) $\overline{A}.\overline{\overline{B}}$
(1 mark)
12. Identify the unit in a computer system that has the accumulator, logic circuits and B register:
a) Control unit
b) Arithmetic logic unit
c) Memory unit
d) All of the above
(1 mark)

13. When the J and K inputs are logic 1, the outputs condition will:
- Memorize the previous states.
 - Toggle.
 - Set.
 - Reset.
14. Choose the term associated with thermistors, photo-cells, photodiodes, flow meters, pressure transducers, tachometers, etc; which converts the physical variable to an electrical variable:
- Transducer.
 - Sensor.
 - Actuator.
 - All of the above.

(1 mark)

(1 mark)

15. A MAXTERM in a Boolean equation represents a:

- Logic 0
- Logic 1
- Logic 2
- None of the above

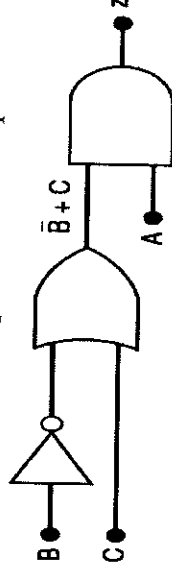
16. Which Boolean Expression would be an example of Sum-of-product (SOP) expression?

(1 mark)

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

(1 mark)

17. Determine the Boolean expression for output Z:



- $Z = A(B + C)$
- $Z = \overline{A}(B + C)$
- $Z = A(\overline{B} + \overline{C})$
- All of the above.

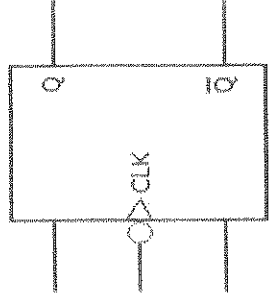
(1 mark)

18. Which is the suitable test instrument used to trace the missing logics in any digital circuits:

- Cathode ray oscilloscope.
- Digital storage oscilloscope
- Logic probe
- Logic pulser

(1 mark)

19. The diagram below illustrates which clock trigger of the flipflop:



- a) Negative edge trigger.
- b) Positive edge trigger.
- c) Active low trigger.
- d) Active high trigger.

(1 mark)

20. Choose the best digital display that will display a decimal number 4:

- a) Seven segment display.
- b) Alphanumeric display.
- c) Light emitting diode.
- d) All of the above.

(1 mark)

21. Determine which sequential circuit is used to change their states and output values whenever a change in input values occurs:

- a) Synchronous.
- b) Asynchronous.
- c) Both a) and b)
- d) None of the above

(1 mark)

22. An example of a programmable logic device (PLD) is:

- a) TTL.
- b) ECL
- c) EPROM
- d) CMOS

(1 mark)

23. What term explains a quantitative measure of noise immunity?

- a) Propagation time delay.
- b) Speed product.
- c) Fan-out.
- d) Noise margin.

(1 mark)

24. Choose the digital device that accepts several digital data inputs and selects one of them at any given time to pass on to the output:

- a) Decoder
- b) Encoder
- c) Demultiplexer
- d) Multiplexer.

(1 mark)

25. Determine the digital IC parameter that can measure the ability of the output of one gate to drive the input(s) of subsequent gates:

- Fan-in.
- Fan-out.
- Speed product delay.
- Propagation time delay.

(1 mark)

Section B:

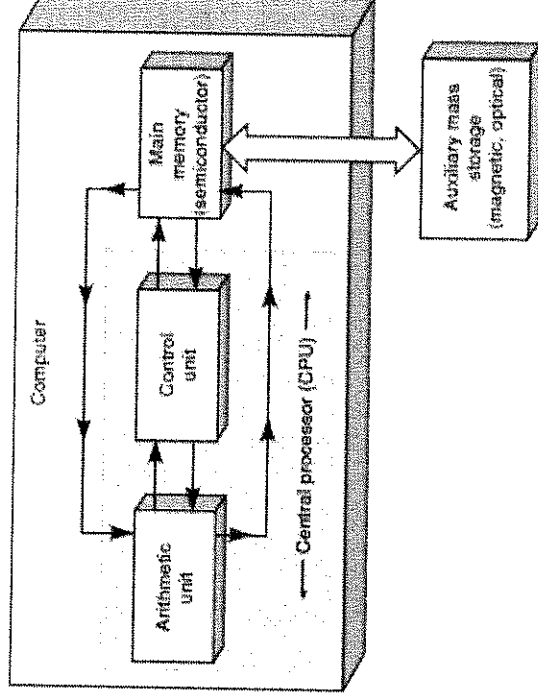
Topics – Programmable logic devices; display devices; digital logic families & memory devices.

(25 marks)

Instructions:

Write the appropriate answers in your answer booklet.

1. Describe how the computer system memory operates:



2. Using the datasheet as attached, determine the series resistor, R_S for the yellow seven segment display part number HDSP A803; and illustrate the connection of the series resistor with the display. Convey the type of seven segment display used. (Consider maximum ratings as per datasheet and supply voltage, $V_S = 5V$) (4 marks)

3. Given the following digital IC parameters, determine the noise margin of 74LS series: (5 marks)

Parameter	74LS
$V_{IH(min)}$	2V
$V_{IL(max)}$	0.8V
$V_{OH(min)}$	2.7V
$V_{OL(max)}$	0.4V

(4 marks)

4. Design the following Boolean functions using a programmable read-only memory (PROM). Include the analysis of the design.

$$A(X, Y, Z) = \sum m(5, 6, 7)$$

$$B(X, Y, Z) = \sum m(3, 5, 6, 7)$$

(9 marks)

5. Convey and discuss three digital IC electrical parameters.

(3 marks)

Section C:

Topics – Combinational logic circuits; asynchronous and synchronous circuits; & DAC and ADC

(28 marks)

Instructions:

- *Ensure that your answers in your answer booklet appear in a logical numbering pattern than being too scattered.*

1. You as a design engineer were assigned to develop a car parking system to activate the alarm circuit from car parking level 5 to level 16. The design specifications were aimed at to exclude the first four levels that are reserved. Design the minimized logic diagram. (Include some assumptions, conditions, analysis and process flow to satisfy the design objectives) (14.5 marks)
2. Design a MOD 6 asynchronous up-counter by including the state diagram, state table and the logic circuit diagram. (11 marks)
3. A 5-bit DAC has a current output. For a digital input of 10100, an output current of 10 mA is produced. What will I_{out} be for a digital input of 11101? (2.5 marks)

Section D:

Topics – sequential logic circuits, MSI logic circuits & arithmetic logic circuits

(22 marks)

Instructions:

- *Ensure that your answers in your answer booklet appear in a logical numbering pattern than being too scattered.*

1. Design a 74151 MUX given the following system by folding about X_4 :

X_4	X_3	X_2	X_1	Y
0	0	0	0	1
0	0	0	1	1
0	0	1	0	0
0	0	1	1	1
0	1	0	0	0
0	1	0	1	0
0	1	1	0	1
0	1	1	1	0
1	0	0	0	1
1	0	0	1	1
1	0	1	0	1
1	0	1	1	1
1	1	0	0	0
1	1	0	1	1
1	1	1	0	1
1	1	1	1	0

2. Design a full adder using a 3-to-8 decoder from the given truth table:
(14.5 marks)

Input bit for number A	Input bit for number B	Carry bit input C_{IN}	Sum bit output S	Carry bit output C_{OUT}
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

(7.5 marks)

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COLLEGE OF ENGINEERING, SCIENCE AND TECHNOLOGY
SCHOOL OF BUILDING AND CIVIL ENGINEERING
TRADE DIPLOMA IN ARCHITECTURAL TECHNOLOGY
DAT513 PROFESSIONAL STUDIES

FINAL EXAMINATION TRIMESTER 1/2018

DURATION OF EXAMINATION: TWO (3) HOURS PLUS 10 MINUTES READING TIME

TIME:

DATE:

INSTRUCTIONS TO STUDENTS:

1. You are allowed 10 minutes **EXTRA** reading time to familiarize, evaluate and study the requirements being asked in all the problems before starting to write your solutions.
2. Begin each answer on a **fresh page**, avoid too many erasures and use both sides of the answer sheet.
3. Write your **candidate number** at the top of each attached answer sheet.
4. Write clearly the number(s) of the question(s) attempted on the top of each sheet.
5. Insert all written foolscaps, graph paper, drawing paper, etc. in their correct sequence and secure with string.
6. **Candidates are warned not to open any Basic Science lecture notes. Any attempt to do so and was caught shall be subject to academic disciplinary action.**
7. Use black or blue ball pen in answering, pencils are not allowed except for drawing figures.
8. **All questions are compulsory.**
9. Minimum Final Examination marks is 50%

TOTAL NUMBER OF PAGES:

1 | DAT 513 PROFESSIONAL STUDIES (TRIMESTER 1, 2018)

QUESTION 1: ARCHITECTURAL PROFESSIONAL BODIES (20 MARKS)

- a) Explain the abbreviation CAA and their role. (5 marks)
- b) Connections of benefit are required in a globalizing world and the value of CAA is sustained by the commonalities of network.
What are these **values**? (5 marks)
- c) Members of the Fiji Association of Architects shall be governed by the ----- and ----- that represents the standard of Professional Conduct to which the members must adhere. (5 marks)
- d) Briefly explain the following:
i. Professional Conduct
ii. Professional Misconduct
iii. Partnership and Corporation
iv. Client
v. Employer (5 marks)

QUESTION 2: SERVICES PROVIDED BY AN ARCHITECT (20 MARKS)

- a) Briefly explain the five (5) main services provided by the architect. (5 marks)
- b) An Architect can be engaged or appointed to undertake other services such as **Surveys and Investigations**. Describe five (5) types of work to be carried out by the Architect subject to this appointment (10 marks)
- c) Administration and Management of Building Projects carried out on site requires supervision, monitoring and reporting. List the staff and their roles on site during construction of building projects (5 marks)

QUESTION 3: **CONSULTANTS**

(20 MARKS)

a) Most Consultants are represented by an association or society and these organisations have rules and regulations, codes of conduct, fee guides and other services provided for the benefit of their members..

Name five (5) consultants and their different roles

(15 marks)

b) Explain how consultants can be appointed.

(5 marks)

QUESTION 4: **TYPES OF CONTRACT AND INSURANCE** **(20 MARKS)**

a) List the three (3) main documents for a typical construction contract.

(6 marks)

b) Define the following:

- i. Simple Contracts
- ii. Deeds

(4 marks)

c) List and Explain the three (3) types of Contract

(6 marks)

a) What is the main purpose of the following insurances? **Explain two (2)** from list below

- i. Workers Compensation Insurance
- ii. Professional Indemnity Insurance
- iii. Public Liability Insurance

(4 marks)

QUESTION 5:

ESTIMATING & COST PLANNING

(20 MARKS)

a) The accuracy of an estimate for a project depends on a number of factors; List the three (3) main factors.

(6 marks)

b) DEFINITIONS:

The National Public Works Conference has developed a Standard Form of Building Cost Analysis and Standard Method of measurement of building Areas

What do the abbreviations stand for? These are listed for building areas. Unit measurement for each is the square meter.

- i. G.F.A
- ii. F.E.C.A.
- iii. U.C.A.
- iv. U.F.A
- v. B.A.

(10 marks)

c) Briefly describe two (2) ways how a client usually states his cost budget.

(4 marks)

THE END