



LAGOS STATE UNIVERSITY, EPE CAMPUS

FACULTY OF ENGINEERING

DEPARTMENT OF ELECTRONIC AND COMPUTER ENGINEERING

ECE 314MICROPROCESSOR FUNDAMENTALS AND APPLICATIONS

2018/2019 RAIN SEMESTER

INSTRUCTIONS: ATTEMPT ANY FOUR(4)QUESTIONS TIME: 2HRS

#### QUESTION ONE

- (a) Define a program counter. How is it useful in program execution? (5 marks)
- (b) Give a detailed description of the history of the microprocessor (6 marks)
- (c) With the aid of a suitable diagram, explain the generic structure of the microprocessor.(6 marks)
- (d) What is an instruction set? (4 marks)
- (e) Write instructions to load the hexadecimal numbers 65H in register C, and 92H in the accumulator A. Display the number 65H at PORT0 and 92H at PORT1. (4 marks)

#### QUESTION TWO

- (a) What is meant by polling? Differentiate between software and hardware polling. (6 marks)
- (b) What do you mean by internal and external data bus? How are the two related in the 8088 microprocessor? (5 marks)
- (c) Define segmentation. What are its advantages and how is segmentation implemented in a typical microprocessor. (6 marks)
- (d) Mention the four (4) types of segment registers you know. (4 marks)
- (e) Describe the function of a microprocessor in a system?(4 marks)

#### QUESTION THREE

- (a) Explain the working principles of a handshake output port. (3 marks)
- (b) Why are status signals provided in a microprocessor?(4 marks)
- (c) (i) Distinguish between DRAMs and SRAMs. (4 marks)  
(ii) Why are DRAMs said to employ address multiplexing? (5 marks)
- (d) Differentiate between real and protected modes of an Intel microprocessor. (4 marks)
- (e) List out the nine flags of the 8086 microprocessor. (5 marks)

#### QUESTION FOUR

- (a) Explain the following  
(i) NEG (2 marks)  
(ii) TEST (2 marks)  
(iii) DAA (2 marks)
- (b) What is an interrupt? (2 marks)  
(i) Differentiate between maskable interrupt and non-maskable interrupt (2 marks)  
(ii) How many memory locations can be addressed by a microprocessor with 14 address lines? (2 marks)
- (c) What is SIM and RIM? Set Interrupt Mask (4 marks)
- (d) Mention three (3) functions of SIM and RIM. (6 marks)
- (e) Give the function of the accumulator. (3 marks)

#### QUESTION FIVE

- (a) What is a co-processor? Explain its use in a typical microprocessor based system. (4 marks)
- (b) Highlight the reason why the data bus is bi-directional and the address bus in unidirectional. (4 marks)

- (c) Discuss in details the functions of the core i7 microprocessor in computers. (8 marks)
- (d) With the aid of a suitable diagram, explain how a microprocessor can handle interrupt request. (5 marks)
- (e) What is a bus? (4 marks)

#### QUESTION SIX

- (a) Explain how memory management is improved in the Pentium microprocessor. (5 marks)
- (b) Pentium processor has a superscalar architecture. Discuss the statement briefly. (6 marks)
- (c) What is opcode fetch cycle? (5 marks)
- (d) Draw the block representation of a programmable temperature controller and display for industrial applications. (5 marks)
- (e) What is the main use of the READY pin? (4 marks)



LAGOS STATE UNIVERSITY  
FACULTY OF ENGINEERING  
DEPARTMENT OF ELECTRONIC & COMPUTER ENGINEERING  
B.Sc. IN ELECTRONIC & COMPUTER  
2018/2019 SECOND SEMESTER EXAMINATIONS

COURSE CODE: - ECE 310

COURSE TITLE: - INTRODUCTION TO COMMUNICATIONS & BROADCASTING

INSTRUCTIONS: - Answer any THREE questions

TIME ALLOWED: -02:00 Hrs.

**MOBILE PHONES OR ANY OTHER ELECTRONIC GADGET IS STRICTLY PROHIBITED**

**QUESTION 1 [25 marks]**

- a. What is "frequency hopping"? Why and how is it employed in terrestrial communications? [3,2,4 marks] ✓  
b. (i) What is "capture effect" in CDMA? [2 marks]  
(ii) Differentiate between Multiplexing, Multiple Access and Broadcasting [1,1,1 marks] ✗  
c. What network topology employs broadcasting technique? Discuss three (3) basic types of network topology available [1,6 marks]  
d. Mention five (5) technical issues concerning the movement of information across a network medium [4 marks]

**QUESTION 2 [25 marks]**

- a. (i) what could be the possible effect If a TV signal is improperly matched to the impedance of either the transmitter or receiver? [2,2 marks]  
(ii) What are the methods of achieving (i) above? [2,2 marks]  
b. How does the image scanning techniques of NTSC and PAL TV standards differ? [1,5 marks]  
c. (i) What is modulation? [3,3 marks]  
(ii) How does the coloured TV camera read and process images for transmission? [5 marks]  
d. Why and how is the Ethernet prone to data collision? Offer a solution to this problem [2,4 marks]  
e. What is: (i) Frame? (ii) Packet? (iii) Datagram? (iv) Message? (v) Data unit?

**QUESTION 3 [25 marks]**

- a. Briefly discuss the operational and characteristic features of the Fixed Assignment Multiple Access Technique. [3,3,3 marks]  
b. Discuss the Spread Spectrum modulation and demodulation in CDMA. [6,4 marks]  
c. What is "handoff" in telecommunication? Compare the handoff technique employed in TDMA to that of the CDMA. [2,4 marks]

**QUESTION 4 [25 marks]**

- a. (i) What is "aspect ratio" of a TV screen? [2,5 marks].  
(ii) If a HDTV receiver is 32 inches wide, determine its actual dimension [2,2 marks]  
b. (i) What is Matching in telecommunications and is it necessary? [6 marks]  
(ii) Distinguish between Client/server, Peer-to-peer and Multi-tier network architectures [4 marks]  
c. (i) Compare hierarchical address space against flat address space names [4 marks]  
(ii) Discuss the switching technique employed in the Internet [4 marks]

**QUESTION 5 [25 marks]**

- a. Define "flow control" in communication. Discuss the methods of combating network congestion. [2,6 marks]  
b. (i) Distinguish between connection-and connectionless-oriented communication services. [4 marks]  
(ii) What is data encapsulation? [2 marks]  
c. Using the OSI reference model, discuss communication between two end systems. [7 marks] ✓  
d. What would you consider the key benefits of packet switching method? Mention the factors a router would take into account when deciding which node to send a Datagram packet in transit to. [2,2 marks].

  
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 FACULTY OF ENGINEERING  
 DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING  
 ECI 310 - ELECTRICAL MACHINES TIME: 2HRS  
 SECOND SEMESTER EXAMINATION - 2015/2016 SESSION  
 INSTRUCTION: ANSWER ANY FOUR QUESTIONS

QUESTION ONE ✓ (15)

- |       |  |          |
|-------|--|----------|
| A(i)  | What is Armature Reaction? (2marks)  | (3marks) |
| (ii)  | Give three (3) effects of the armature flux on the main field flux (4marks)  | (2marks) |
| (iii) | Briefly explain Commutating flux (2marks)  |          |
| B(i)  | Describe the need for commutation in DC machines (4marks)  |          |
| (ii)  | Give expressions for the de-magnetizing and cross magnetizing ampere turns per pole and define all the terms used in the expression (4marks)   |          |
| (iii) | A 22.38KW, 440V, 4-pole wave-wound d.c. shunt motor has 840 armature conductors and 140 commutator segments. Its full-load efficiency is 88% and the shunt field current is 1.8A. If the brushes are shifted backward through 1.5 segments from the geometrical neutral axis, find the de-magnetizing and distorting amp turns/pole. (10marks) |          |

QUESTION TWO ✓ (10)

- |      |  |  |
|------|--|--|
| A(i) | List the essential parts of a practical generator. (7marks)  |  |
| (ii) | With the aid of diagrams illustrate the different DC generator configurations. (5marks) ✓ (10)   |  |
| B(i) | List and explain five losses in a DC generator. (5marks)   |  |
| (ii) | A four pole loop wound DC shunt generator has a useful flux per pole of 0.07Wb. The armature winding consists of 2100 turns each of 0.04ohm resistance. Calculate the terminal voltage when turning at 900 rpm. If the armature current is 50A. (8marks) |  |

QUESTION THREE ✓ (10)

- |      |  |  |
|------|--|--|
| A(i) | Derive the expression for starting torque. (10marks)   |  |
| (ii) | State the condition for maximum starting torque. (5marks)  |  |
| B    | The star connected rotor of an induction motor has a stand still impedance of $(0.4 + jA)$ ohms per phase and the rheostat impedance per phase is $(6 + jz)$ ohms. The motor has an induced emf of 80V between slip rings at standstill when connected to its normal supply voltage. Find (5marks) |  |
| (i)  | Rotor current at standstill with the rheostat in the circuit. (5marks)   |  |
| (ii) | When the slip rings are short-circuited and motor is running with a slip 5%. (5marks)  |  |

QUESTION FOUR ✓ (15)

- |       |   |  |
|-------|---|--|
| A(i)  | With the aid of an appropriate diagram explain the working principle of a motor (3marks)                  |  |
| (ii)  | Give an expression for the voltage equation and define all terms in the equation. (2marks) ✓ (10)         |  |
| (iii) | From the above expression, derive the condition for maximum power developed by the motor. (6marks) ✓ (12) |  |
| B(ii) | Distinguish between Series and Shunt motors (4marks)  |  |

A four-wire system

- a. (i) what could be the function of receiver?  
 b. How does the image size change?  
 c. (i) What is modulation?  
 d. Why and how is the colour added?  
 e. What is: (i) Frame; (ii) Packed  
 a. Briefly discuss the operation of television.  
 b. Discuss the Spurious signals.  
 c. What is the Spurious signal?

armature and the currents of  $50A$  and  $1.0A$  respectively. It has 640 conductors. Its resistance is  $0.1\Omega$ . Assuming drop of 1 volt per brush, find:

- (a) Total torque
  - (b) Useful torque
  - (c) Useful flux/pole
  - (d) Rotational losses
  - (e) efficiency
- (10 marks)

#### QUESTION FIVE

✓✓ 25

- A(i) State the four conditions for parallel operation of transformers (4marks)  
 (ii) Describe how a typical open-circuit experiment is carried out in the laboratory (9marks)

B In a no-load test of a single phase transformer, the following test data were obtained:

- Primary Voltage =  $220V$
- Secondary Voltage =  $110V$
- Primary Current =  $0.7A$
- Power Input =  $5W$

Find the following

- (a) Turns ratio
- (b) Magnetizing component of no-load current
- (c) Working or (ss) component
- (d) Iron loss

Given the resistance of primary winding is  $0.4\Omega$  (12 marks)

#### QUESTION SIX

✓✓ 25

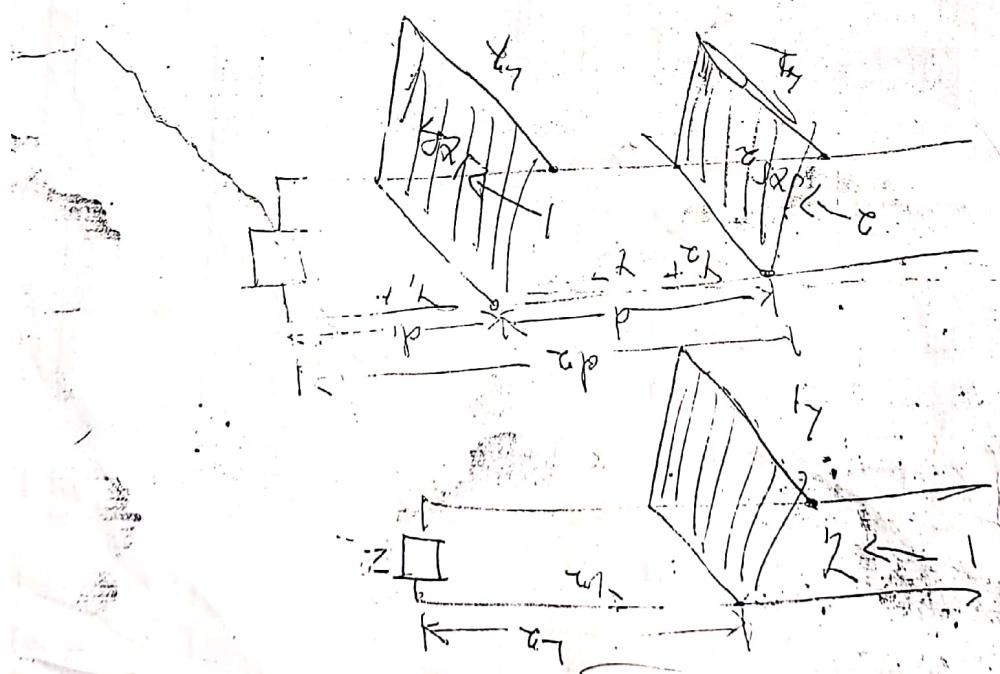
- A(i) Explain back emf and state its significance. (5marks)

- (ii) State the conditions for maximum power. (5marks)

B(i) State the voltage equations of a motor. (5marks)

(ii) State the characteristic curves of a motor. (5marks)

- (iii) What is a DC motor? (5marks)





# LAGOS STATE UNIVERSITY

ELECTRONIC AND COMPUTER ENGINEERING DEPARTMENT

B.Sc Electronic and Computer Engineering Second Semester Examination 2018/2019 Session

ECE 316: Electrical Machine

Instruction: Answer four questions, at least one in each section.

Time:- Two Hours

NOTE: No phone(s) or any other electrical gadget in the examination hall.

## SECTION A

### QUESTION ONE

- (a) (i) Mention six (6) essential Parts of a practical generator  
(ii) A 4 pole, long shunt, compound generator supplies 100A at a terminal voltage of 500V. If armature resistance is  $0.02\Omega$ , series field resistance is  $0.04\Omega$  and shunt field resistance  $100\Omega$ . Find the generated EMF. Take drop per brush as 1V. Neglect armature reaction.

$$\frac{1}{0.04} + \frac{1}{100}$$

### QUESTION TWO

- (i) State four causes of armature heating in a D.C generators.  
(ii) When a generator is being driven at 1200rpm, the generated EMF is 125V. Determine the generated EMF.  
(a) If the field flux is decreased by 10% with the speed remaining unchanged, and  
(b) If the speed is reduced to 1100rpm. The field flux remaining unchanged.

## SECTION B

### QUESTION THREE

- (i) State advantages and disadvantages of a D.C series motor  
(ii) A 220V D.C. machine has an armature resistance of  $0.5\Omega$ , if the full load armature current is 20A. Find the induced EMF when the machine acts as a motor

### QUESTION FOUR

- (i) State 3 methods of controlling the speed of a D.C motor  
(ii) A D.C series motor couple to a fan, the motor draws 25A and run at 300rpm at terminal voltage of 220V and no external resistance, torque of the fan is proportional to the square of the speed, If  $R_a = 0.6\Omega$  and  $R_f = 0.4\Omega$ . Calculate the EMF, the output power and the torque.

## SECTION C

### QUESTION FIVE

- (i) Give reasons why transformer are essential to power systems.  
(ii) A 10KVA distribution transformer has a 240V secondary winding. The equivalent internal resistance of this transformer referred to that winding is  $0.048\Omega$ . The core loss of this transformer is 75W. At what KVA Load will this transformer operate at maximum efficiency.

### QUESTION SIX

- (i) Explain by reference to fundamental theory the factors which determine the choice of a suitable material for the core of a power transformer.  
(ii) The maximum flux density in the core of a 250/300V, 50hz single-phase transformer is  $1.2\text{wb}/\text{m}$ , If the EMF per turn is 80volt, determine:-  
(a) The primary and secondary turns  
(b) Area of the core



**Lagos State University**  
**Faculty of Engineering**  
**Electronic and Computer Engineering**  
**2<sup>nd</sup> Semester Examination 2018/2019 Session**  
**ECE 302 Analog Electronics**  
**Time: 2 hours**

**Instructions:**

- Answer any three questions.
- Do not write anything other than your matric number and name on any part of your question paper during the entire period of this examination.
- You must not bring to the examination hall phone(s) or any other communication gadget(s)

**QUESTION 1**

- a. Explain the two types of feedback commonly used in electronic circuits (4 Marks)
- b. Why negative feedback (NFB) is needed in amplifiers (5 Marks)
- c. Explain the principle of NFB and the problems with NFB in amplifier (9 Marks)
- d. The performance of a power transistor is closely dependant on its ability to dissipate the heat generated at the collector base junction. In order to minimising the problem of heat in transistors, explain the two methods that are mainly used (7 Marks)

**QUESTION 2**

- a. What is transistor Biasing (5 Marks)
- b. List and Explain the different modes of transistor base biasing in detail (with diagram, etc.) (15 Marks)
- c. Enumerate the advantages of Transistor (5 Marks)

**QUESTION 3**

- a. Briefly explain in detail the two basic types of transistors. (10 Marks)
- b. An NPN BJT common-emitter inverting amplifier is shown in Fig Q3a. Assume the parameters of the transistor are  $\beta_F = 100$ ,  $V_T = 25mV$ , and  $V_A = 100V$ . (i) If  $I_C = 0.5mA$  and  $V_{CE} = 3V$ , find the small signal model parameter values for  $g_m$ ,  $r_\pi$  and  $r_o$ . (7 Marks)
- c. If the  $g_m$  of the MOSFET is  $0.1m A/V$ , Find the mid-band gain and the location of all zeros and poles of the circuit shown in Fig Q3b. (8 Marks)

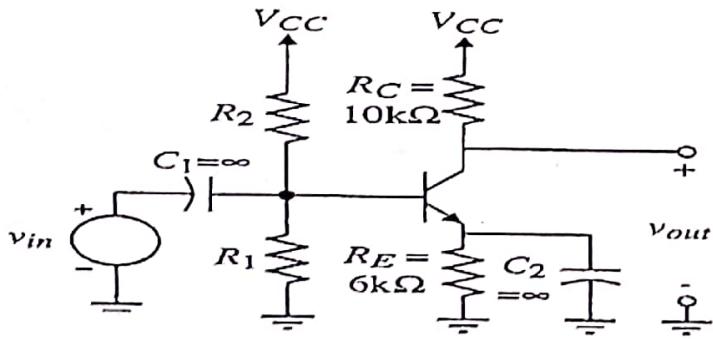


Fig Q3a.

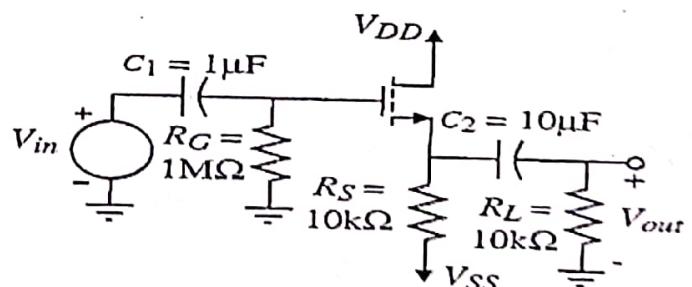
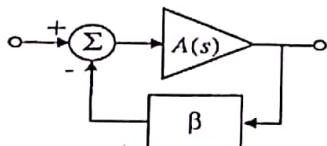


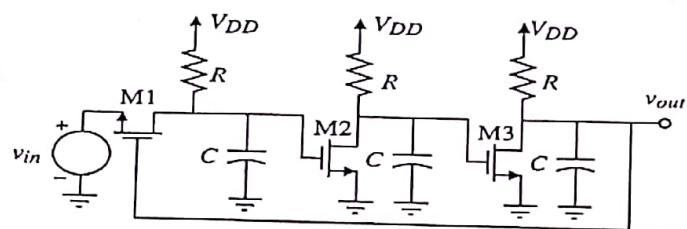
Fig Q3b.

### QUESTION 4

- a. The amplifier in the feedback circuit shown has a transfer function  $A(s) \frac{100}{\frac{s}{10^5} + 1}$ . What Value of  $\beta$  will increase the upper 3db frequency by a factor of 10 for the closed loop gain. What is the closed loop, low frequency gain. (7 Marks)

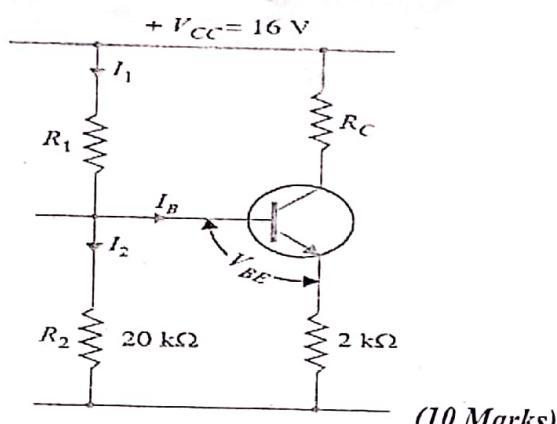


- b. Find the loop gain of the amplifier shown below. Assume that  $g_m = 1mS$  and  $r_{ds} = \infty$  for all MOSFETs and that  $R = 10 k\Omega$  and  $C = 100nF$



(8 Marks)

- c. An n-p-n transistor circuit shown in Fig.4 has  $\alpha = 0.985$  and  $V_{BE} = 0.3V$ . If  $V_{CC} = 16V$ , calculate  $R_1$  and  $R_C$  to place Q point at  $I_C = 2mA$ ,  $V_{CE} = 6$  volts.



(10 Marks)

### QUESTION 5

- a. As an engineer in your company assuming your company needs to purchase transistors for a project, kindly explain the differences between JFET and Bipolar transistor to your director. (10 Marks)
- b. Find out the operating point current and voltage values ( $I_{DQ}$  and  $V_{DSQ}$ ) for a self-biased JFET having the supply voltage  $V_{DD} = 20V$  and maximum value of drain current as 12 mA. (7 Marks)
- c. Calculate the value of source resistance  $R_S$  required to self-bias a n-JFET such that  $V_{GSQ} = -3V$ . The n-JFET has maximum drain-source current  $I_{DSS} = 12$  mA, and pinch off voltage,  $V_p = -6V$  (8 Marks)



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DEPARTMENT OF ELECTRONIC & COMPUTER ENGINEERING  
B.Sc. IN ELECTRONIC & COMPUTER  
2018/2019 SECOND SEMESTER EXAMINATIONS

COURSE CODE: - ECE 310

COURSE TITLE: - INTRODUCTION TECOMMUNICATIONS & BROADCASTING

INSTRUCTIONS: - Answer any THREE questions

TIME ALLOWED: -02:00 Hrs.

***MOBILE PHONES OR ANY OTHER ELECTRONIC GADGET IS STRICTLY PROHIBITED***

**QUESTION 1** [25 marks]

- a. What is "frequency hopping"? Why and how is it employed in terrestrial communications? [3,2,4 marks]
- b. (i) What is "capture effect" in CDMA? [2 marks]  
(ii) Differentiate between Multiplexing, Multiple Access and Broadcasting [1,1,1 marks]
- c. What network topology employs broadcasting technique? Discuss three (3) basic types of network topology available [1,6 marks]
- d. Mention five (5) technical issues concerning the movement of information across a network medium [4 marks]

**QUESTION 2** [25 marks]

- a. (i) what could be the possible effect If a TV signal is improperly matched to the impedance of either the transmitter or receiver? [2,2 marks]  
(ii) What are the methods of achieving (i) above? [2,2 marks]
- b. How does the image scanning techniques of NTSC and PAL TV standards differ? [1,5 marks]
- c. (i) What is modulation?  
(ii) How does the coloured TV camera read and process images for transmission? [3,3 marks]
- d. Why and how is the Ethernet prone to data collision? Proffer a solution to this problem? [5 marks]
- e. What is: (i) Frame? (ii) Packet? (iii) Datagram? (iv) Message? (v) Data unit?

**QUESTION 3** [25 marks]

- a. Briefly discuss the operational and characteristic features of the Fixed Assignment Multiple Access Technique. [3,3,3 marks]
- b. Discuss the Spread Spectrum modulation and demodulation in CDMA. [6,4 marks]
- c. What is "handoff" in telecommunication? Compare the handoff technique employed in TDMA to that of the CDMA. [2,4 marks]

**QUESTION 4** [25 marks]

- a. (i) What is "aspect ratio" of a TV screen?  
(ii) If a HDTV receiver is 32 inches wide, determine its actual dimension [2,5 marks].
- b. (i) What is Matching in telecommunications and is it necessary?  
(ii) Distinguish between Client/server, Peer-to-peer and Multi-tier network architectures [2,2 marks]
- c. (i) Compare hierarchical address space against flat address space names [6 marks]  
(ii) Discuss the switching technique employed in the Internet [4 marks]
- (ii) Discuss the switching technique employed in the Internet [4 marks]

**QUESTION 5** [25 marks]

- a. Define "flow control" in communication. Discuss the methods of combating network congestion. [2,6 marks]
- b. (i) Distinguish between connection-and connectionless-oriented communication services.  
(ii) What is data encapsulation? [4 marks]
- c. Using the OSI reference model, discuss communication between two end systems. [2 marks]
- d. What would you consider the key benefits of packet switching method? Mention the factors a router would take into account when deciding which node to send a Datagram packet in transit to. [7 marks]
- account when deciding which node to send a Datagram packet in transit to. [2,2 marks].

## LAGOS STATE UNIVERSITY

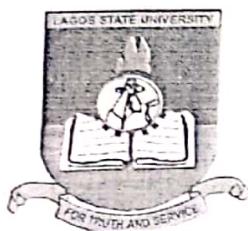
## Faculty of Engineering

## Electronic and Computer Engineering

2<sup>nd</sup>Semester Examination 2018/2019 Session

ECE 308 Digital Electronics

Time: 2½ hours

**Instructions:**

- Answer any two questions in Section A and any two questions in Section B. Answer Section A and Section B on separate answer booklets.
- Do not write anything other than your matri number and name on any part of your question paper during

**STUDENTS ARE NOT ALLOWED TO BRING PHONE(S) OR ANY OTHER ELECTRONIC GADGET TO THE EXAMINATION HALL**

**SECTION A**

- Answer any two questions in this section.

**QUESTION 1**

- What is meant by Oscillator and the Principle of Oscillators **(7 Marks)**
- Explain what you understand about the following in digital electronics: (i). an Adder, (ii). Binary Coded Decimal **(8 Marks)**
- Using circuit diagram, truth table and boolean expression explain in detail the design and working of Half Adder **(10 Marks)**

**QUESTION 2**

- Write short note on any five characteristics of Logic Families that you know **(10 Marks)**
- What are Integrated Circuits and its application **(5 Marks)**
- Resistor-transistor logic (RTL) is a class of digital circuits built using resistors as the input network and bipolar junction transistors (BJTs) as switching devices. Write on RTL implementation, advantages and limitations. **(10 Marks)**

**QUESTION 3**

- Write short note on the principle and working of Junction Field Effect Transistor (JFET) **(10 Marks)**
- A JFET in Fig.3a has values of  $V_{GS(\text{on})} = -8V$  and  $I_{DSS} = 16 \text{ mA}$ . Determine the values of  $V_{GS}$ ,  $I_D$  and  $V_{DS}$  for the circuit. **(5 Marks)**
- For the JFET in Fig. 3b,  $V_{GS(\text{on})} = -4V$  and  $I_{DSS} = 12 \text{ mA}$ . Determine the minimum value of  $V_{DD}$  required to put the device in the constant-current region of operation. **(5 Marks)**

+ 10 V

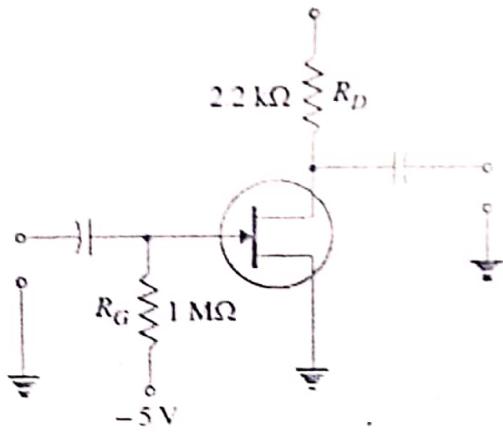


Fig. 3a

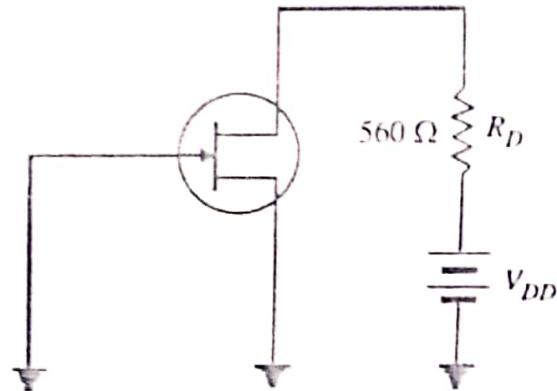


Fig. 3b

## SECTION B

- Answer any two questions in this section.

### QUESTION 4

A sequential circuit has one input ( $x$ ) and one output ( $y$ ). The state diagram is shown in Fig. 4. Design the sequential circuit using D flip-flops by taking the following steps.

- Deduce the State Table in the usual two formats.(7 Marks)
- Use Karnaugh map to deduce the state equations (four equations).(12 Marks)
- Hence, draw the D flip flop based hardware circuit diagram to implement the state equations.(6 Marks)

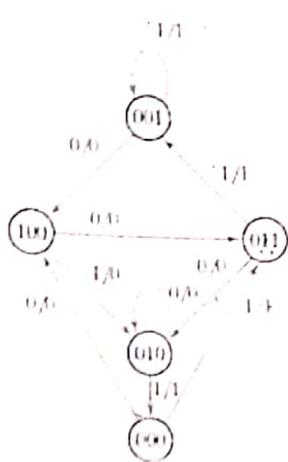


Fig. 4

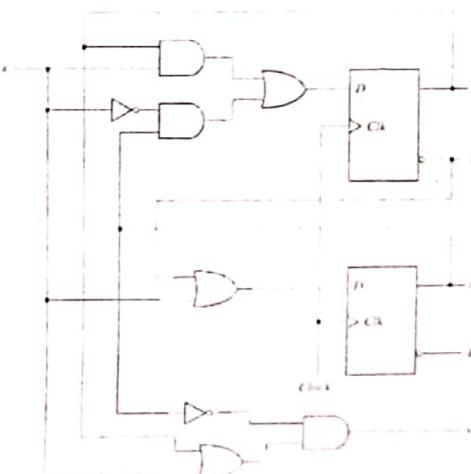


Fig. 5  
QUESTION 5

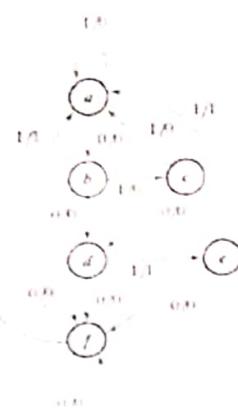


Fig. 6

A sequential circuit is shown in Fig. 5.

- Deduce the state equations (three equations).(6 Marks)
- Deduce the State Table in the usual two formats.(6 Marks)
- Draw the State Diagram.(5 Marks)
- Input sequence 11011110110 is applied to this sequential circuit as shown in Table 5 with the initial state 00 as indicated in the table. Copy and complete the table by determining the output sequence and subsequent states.(8 Marks)

Table 5

| State  | 00 |   |   |   |   |   |   |   |   |   |   |
|--------|----|---|---|---|---|---|---|---|---|---|---|
| Input  | 1  | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | X |
| Output |    |   |   |   |   |   |   |   |   |   |   |

### QUESTION 6

- A sequential circuit has one input ( $x$ ) and one output ( $y$ ). The state diagram is shown in Fig. 6. Reduce the number of states. Show the various state tables as you carry out the reduction of number of states. Draw the reduced state diagram.(14 Marks)
- Four large tanks at a chemical plant contain different liquids being heated. Liquid-level sensors are being used to detect whenever the level in tank A or tank B rises above a predetermined level. Temperature sensors in tanks C and D detect when the temperature in either of these tanks drops below a prescribed temperature limit. Assume that the liquid-level sensor outputs A and B are HIGH when the level is satisfactory and LOW when the level is too high. Also, the temperature sensor outputs C and D are HIGH when the temperature is satisfactory and LOW when the temperature is too low. Using Karnaugh map, design a logic circuit that will detect whenever the level in tank A or tank B is too high at the same time that the temperature in either tank C or D is too low. (11 Marks)

LAGOS STATE UNIVERSITY  
FACULTY OF ENGINEERING  
DEPARTMENT OF ELECTRONIC & COMPUTER  
B.Sc. DEGREE IN ELECTRONIC & COMPUTER ENGINEERING  
2016/2017 FIRST SEMESTER EXAMINATIONS

COURSE CODE: - ECE 313

DATE: - April 11, 2017

COURSE TITLE: - COMPUTER ARCHITECTURE IN ENGINEERING

INSTRUCTIONS: - (i) Answer Question ONE and any other THREE Questions

(ii) NO JOTTING OR SCRIBBLING ON THIS PAPER.

TIME ALLOWED: - 2 Hrs.

QUESTION ONE [25 marks]

- a. (i) What computer architecture?  
(ii) What is "locality of reference" and how is this phenomenon resolved? [2,2,2 marks]
- b. (i) Discuss Microcomputer stack store system [4 marks]  
(ii) Write an assembly language program to evaluate  $(A.B) + (C.D)$  [5 marks]
- c. (i) Can we interrupt an interrupt? Discuss [1,3 marks]  
(ii) What are the objectives of an operating system? [2 marks]
- d. Briefly discuss the concept of Virtual memories [4 marks]

QUESTION TWO [15 marks]

- a. Discuss ways of data exchange between the microcomputer system and input/output devices [6 marks]
- b. Differentiate between the following:
  - (i) Assembler, compiler and interpreter [3 marks]
  - (ii) Machine, assembly and high-level languages. [3 marks]
  - (iii) Address, data and control buses [3 marks]

QUESTION THREE [15 marks]

- c. (i) Briefly discuss the 2 ways of converting an assembly language program into a machine language  
(ii) List 6 types of assemblers available [4,3 marks]
- d. Write an assembly language program to divide 1A034H by 1002H [7 marks]

QUESTION FOUR [15 marks]

- a. (i) What is memory management unit? [2 marks]  
(ii) What are its functions and what led to its invention? [2,1 marks]  
(iii) What is an Instruction word? [1 marks]
- b. What are the functions of the following: (i) Execution unit  
(ii) Bus Interface unit? [2,3 marks]
- c. Write an assembly language program to evaluate  $F=D(D+E)$   
(Assume D, E, and F are stored in memory locations 0, 1 and 2 respectively. Also assume that there are general purpose registers called A and B). [4 marks]

QUESTION FIVE [15 marks]

- a. Write an assembly language program to multiply 3A52H by 2B14H [5 marks]
- b. Discuss briefly the following:
  - (i) Open versus Closed architectures [3 marks]
  - (ii) RISC versus CISC [3 marks]
- c. (i) What is an instruction set? [1 marks]  
(ii) Differentiate between Harvard and Von Neumann architectures [2 marks]

QUESTION SIX [15 marks]

- a. What is System Software? Discuss the types of system software available [2,6 marks]
- b. (i) Differentiate between concurrency and multitasking [2 marks]  
(ii) Explain the "Implicit" nature of the Operating System [2 marks]  
(iii) Differentiate between multiprocessing and multiprogramming [3 marks]



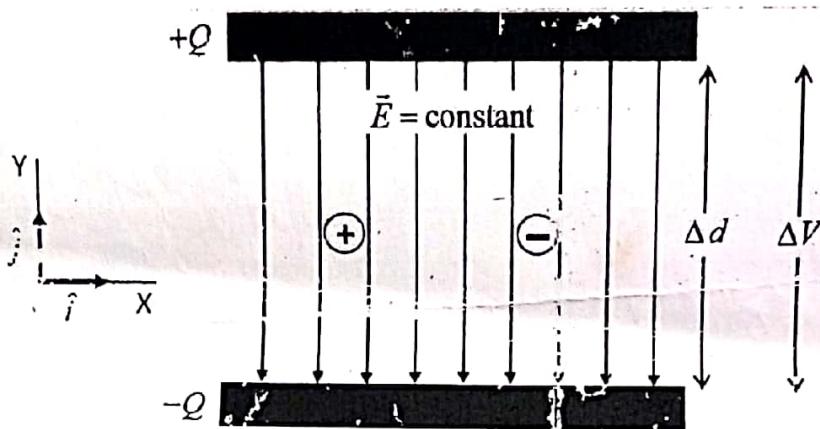
LAGOS STATE UNIVERSITY  
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DEPARTMENT OF ELECTRONIC & COMPUTER ENGINEERING  
SECOND SEMESTER EXAMINATION 2018/2019 ACADEMIC SESSION  
ECE 320: ELECTROMAGNETIC FIELDS AND WAVES

**Instruction:** (i) Answer question one and any other two  
 (ii) You must not bring to the examination hall phone(s) or  
 any other communication gadget(s)

**Time Allowed:** 2hrs

### QUESTION ONE

- (a) Using Fig. Q1, briefly discuss how electric charges move in a uniform electric field. Assume the potential difference,  $\Delta V = 1000V$  and the plate separation,  $\Delta d = 20mm$ . [10 marks]



**Fig. Q1**

- (b) Briefly explain the following laws: (i) Coulomb's law (ii) Faraday's law of electromagnetic induction  
 (iii) Ampere's law (iv) Divergence's theorem. [2, 2, 2, 2 marks]

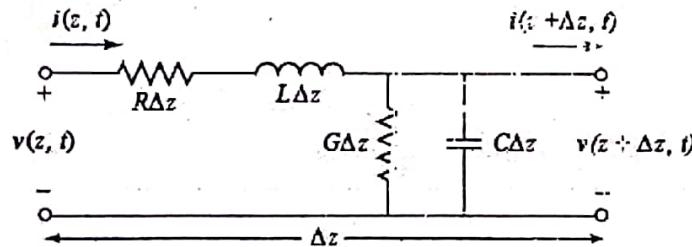
- (c) Starting from the first pair of Maxwell's equation, show that  $\nabla \cdot J_0 = -j\omega \frac{\epsilon_0}{\epsilon} P$ . [8 marks]

- (d) Show that the power flow on the coaxial line may be computed from the Poynting vector as

$$P = \frac{1}{2} \int_s \vec{E} \times \vec{H}^* ds. [4 \text{ marks}]$$

### QUESTION TWO

- (a) (i) Briefly explain a transmitting antenna, using schematic representation. [2 marks]  
 (ii) Obtain the time domain form of the transmission line equations also known as telegrapher equations in Fig. Q2. [8 marks]



**Fig. Q2**

- (b) Compute the skin depth of (i) aluminium, (ii) copper, (iii) gold, and (iv) silver at a frequency of 10 GHz. Also, interpret the results in terms of the current flow.  
 $(\sigma_a = 3.816 \times 10^7, \sigma_c = 5.813 \times 10^7, \sigma_g = 4.098 \times 10^7, \sigma_s = 6.173 \times 10^7)$  [2, 2, 2, 2 marks]

### QUESTION THREE

- (a) Briefly explain the following terms: (i) Ionosphere propagation (ii) VLF propagation (iii) Wave equation (iv) Transmission line.
- (b) State the properties of electromagnetic wave propagation. [2, 2, 2, 2 marks]
- (c) A plane wave propagating in a lossless dielectric medium has an electric field given as  $E_x = E_0 \cos(\omega t - \beta z)$  with a frequency of 5.0 GHz and a wavelength in the material of 4.0 cm. Determine (i) the propagation constant, (ii) the phase velocity, (iii) the relative permittivity of the medium, and (iv) the wave impedance. [4 marks]
- (d) [8 marks]

### QUESTION FOUR

- (a) Briefly discuss (i) Dipole moment (ii) Equation of continuity (iii) Wave propagation on a transmission line.
- (b) Show that  $W_{TM} = \frac{1}{j\omega\epsilon_0} \nabla T \times \hat{a}$ . [2, 3, 3 marks]
- (c) The fields of a traveling TEM wave inside the coaxial line of Fig. Q4 can be expressed as  $\bar{E} = \frac{V_0 \hat{\rho}}{\rho \ln(\frac{b}{a})} e^{-\gamma z}, \quad \bar{H} = \frac{\varphi I_0}{2\pi\rho} e^{-\gamma z}$ . Determine the transmission line parameters. [4 marks]
- (d) [8 marks]

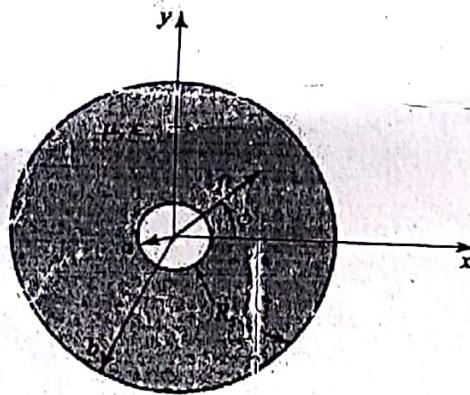


Fig.Q4

key feature at transverse term  
 waves do not detect by electron  
 if if " polarise  
 if if " require medium for propagation

$$\text{for aluminum: } \sqrt{\frac{1}{\pi \times 10^9 \times 4\pi \times 10^{-7}}} \times 3.816 \times 10^7 \\ = 8.147 \times 10^{-7} \text{ m}$$

$$\text{for copper: } \sqrt{\frac{1}{\pi \times 10^9 \times 4\pi \times 10^{-7}}} \times 5.813 \times 10^7 \\ = 6.603 \times 10^{-7} \text{ m}$$

$$\text{for gold: } \sqrt{\frac{1}{\pi \times 10^9 \times 4\pi \times 10^{-7}}} \times 4.098 \times 10^7 \\ = 7.86 \times 10^{-7} \text{ m}$$

$$\text{for silver: } \sqrt{\frac{1}{\pi \times 10^9 \times 4\pi \times 10^{-7}}} \times 6.173 \times 10^7 \\ = 6.406 \times 10^{-7} \text{ m}$$

ECE 313



LAGOS STATE UNIVERSITY  
FACULTY OF ENGINEERING  
DEPARTMENT OF ELECTRONIC & COMPUTER  
B.Sc. DEGREE IN ELECTRONIC & COMPUTER ENGINEERING  
2017/2018 FIRST SEMESTER EXAMINATIONS

COURSE CODE: ECE 313

COURSE TITLE: - COMPUTER ARCHITECTURE IN ENGINEERING

INSTRUCTIONS: - (i) Answer any THREE questions

(ii) NO JOTTING OR SCRIBBLING ON THIS PAPER.

TIME ALLOWED: - 2:00 Hrs.

QUESTION ONE [25 marks]

- a. (i) What is software? [3, 2 marks]  
(ii) What are the objectives of an operating system?  
b. Briefly discuss the 2 ways of converting an assembly language program into a machine language [4, 3 marks]  
(ii) List 6 types of assemblers available  
c. With the aid of a well-labeled diagram describe the principle of operation of a typical ROM [6 marks]  
~~ayoint~~ d. Use a truth table to design a functional 4-to-1 multiplexer with an enable line and chip selectors [7 marks]

QUESTION TWO [25 marks]

- a. (i) What is memory management unit? [2 marks]  
(ii) What are its functions and what led to its invention? [2 marks]  
(iii) Differentiate between compilers, assemblers and interpreters [3 marks]  
b. What are the functions of (i) the execution unit (ii) The Bus Interface Unit? [2, 3 marks]  
(iii) What necessitated the introduction of the BIU? What is the relationship between the EU and the BIU? [3, 3 marks]  
~~Key point~~ c. Write an assembly language program to evaluate  $Z = X(X+Y)$  [5 marks]  
(Assume X, Y, Z are stored in memory locations 0, 1 and 2 respectively. Also assume that there are general purpose registers called A and B).

QUESTION THREE [25 Marks]

- a. (i) What computer architecture? [3 marks]  
(ii) Differentiate between Data word and Instruction word [3 marks]  
(iii) Discuss ways of data exchange between the microcomputer system and Input /output devices [7 marks]  
b. (i) What is "locality of reference" and how is this phenomenon resolved? [3, 2 marks]  
(ii) Write an assembly language program to take in 20, 8-bit samples of data, and store in memory.  
(Assume memory storage address is 1000H and port 00H) [7 marks]

QUESTION FOUR [25 marks]

- a. What is System Software? Discuss the types of system software available [2, 6 marks]  
b. What is Operating System? Discuss the various types of Operating System you know [2, 6 marks]  
c. (i) What is "True Concurrency"? [2 marks]  
(ii) Differentiate between concurrency and multitasking [2 marks]  
(i) Explain the "Implicit" nature of the Operating System [2 marks]  
(ii) Differentiate between multiprocessing and multiprogramming [2, 3 marks]

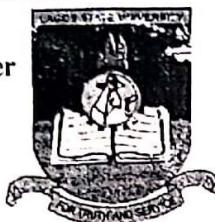
QUESTION FIVE [25 Marks]

- a. Write an assembly language program to multiply 3A62H by 2B14H [5 marks]  
~~✓~~ Discuss Microcomputer stack store system [6 marks]  
c. (i) As a computer architect, you are required to develop an efficient secondary memory unit. What would be your principal design goals? [3 marks]  
(ii) List the factors that you would put into consideration in order to realize your design goal? [5 marks]  
(iii) Distinguish between processor, main and secondary memories. [6 marks]

DEPARTMENT OF ELECTRONIC & COMPUTER ENGINEERING  
 LAGOS STATE UNIVERSITY  
 SECOND SEMESTER 2018/2019 B. Sc. DEGREE EXAMINATIONS

Course: ECE 312- Signals and Systems  
 Instruction: Answer Question 1 and any other  
 Two Questions

Time Allowed: 2 Hours



Question 1 (Compulsory).

(a) Explain the following terms:

- (i) Signal
- (ii) Memory less System
- (iii) Non-Linear System
- (iv) Time-invariant System

(b) Sketch the waveforms of the following Signals:

- (i)  $x(t) = 2e^{-2t} u(t+11) P_{14}(t+5)$
- (ii)  $z(t) = 7u(3-t)\text{Sinc}(t)$
- (iii)  $y(n) = -3u(n+1) + 3u(n-5) - 3\delta(n-5)$
- (iv)  $x(n) = 4\delta(n-2) - 3u(n+1) + 2u(n-6) + u(n-7)$

(c) Determine the convolution of

- (i)  $f(t) = 3P_5(t-2)$  and  $h(t) = -2P_1(t)$
- (ii)  $f(n) = 2u(n) - 2u(n-3) - 2\delta(n-2)$  and  $h(n) = \delta(n) + \delta(n-2)$

Question 2.

- (a) Obtain from first principle the Trigonometric Fourier Series of the periodic signal shown in Fig Q2(a). Sketch the frequency spectrum.
- (b) Obtain the Fourier Transform of the non-periodic signal shown in Fig Q2(b). Sketch the frequency spectrum.

Question 3.

- (a) Obtain from first principle the Discrete Fourier Series of the periodic Discrete-time signal shown in Fig Q3(a).
- (b) Obtain the Fourier Transform of the non-periodic Discrete-time signal shown in Fig Q3(b).

Question 4.

- (a) Explain what you understand by the term "Impulse Response".
- (b) From first principles, determine that the Laplace Transform of  $f(t) = 3\sin(\omega t)$ .

(c) Given that  $G(s) = \frac{12(s+2)}{s^2 + 4s + 3}$ , obtain the inverse Laplace Transform,  $g(t)$ .

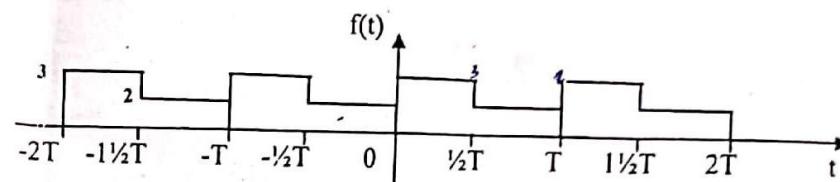


Fig Q2(a)

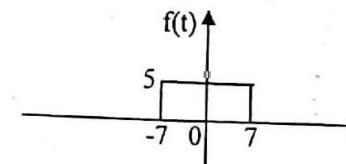


Fig Q2(b)

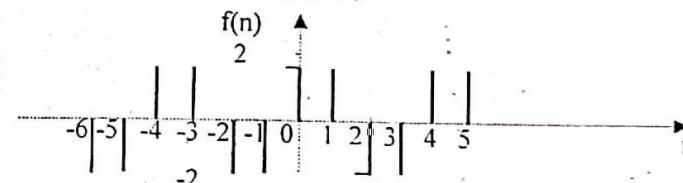


Fig Q3(a)

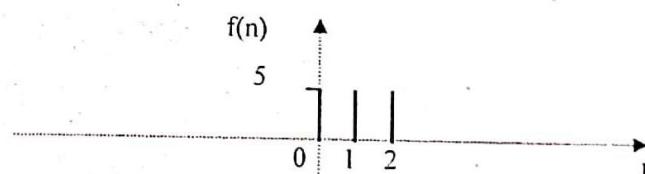


Fig. Q3(b)

Question 5.

- (a) Explain what you understand by the term "Region of Convergence".
- (b) Show that the Z Transform of  $f(n) = 3^n u(n)$  is  $F(z) = \frac{z}{z-3}$ . State the region of convergence.
- (c) Given that  $G(z) = \frac{8}{z^2 - 8z + 12}$ , obtain and sketch the Inverse Z Transform,  $g(n)$ .



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LAGOS STATE UNIVERSITY, EPE CAMPUS  
FACULTY OF ENGINEERING  
DEPARTMENT OF ELECTRONIC AND COMPUTER ENGINEERING  
ECE 314MICROPROCESSOR FUNDAMENTALS AND APPLICATIONS  
2018/2019 RAIN SEMESTER

INSTRUCTIONS: ATTEMPT ANY FOUR(4)QUESTIONS TIME: 2HRS

**QUESTION ONE**

- (a) Define a program counter. How is it useful in program execution?  
(5 marks)
- (b) Give a detailed description of the history of the microprocessor  
(6 marks)
- (c) With the aid of a suitable diagram, explain the generic structure of the microprocessor.(6 marks)
- (d) What is an instruction set? (4 marks)
- (e) Write instructions to load the hexadecimal numbers 65H in register C, and 92H in the accumulator A. Display the number 65H at PORT0 and 92H at PORT1. (4 marks)

**QUESTION TWO**

- (a) What is meant by polling? Differentiate between software and hardware polling.  
(6 marks)
- (b) What do you mean by internal and external data bus? How are the two related in the 8088 microprocessor? (5 marks)
- (c) Define segmentation. What are its advantages and how is segmentation implemented in a typical microprocessor.  
(6 marks)
- (d) Mention the four (4) types of segment registers you know.  
(4 marks)
- (e) Describe the function of a microprocessor in a system?(4 marks)

**QUESTION THREE**

- (a) Explain the working principles of a handshake output port. (3 marks)
- (b) Why are status signals provided in a microprocessor?(4 marks)
- (c) (i) Distinguish between DRAMs and SRAMs. (4 marks)  
(ii) Why are DRAMs said to employ address multiplexing?  
(5 marks)
- (d) Differentiate between real and protected modes of an Intel microprocessor. (4 marks)
- (e) List out the nine flags of the 8086 microprocessor. (5 marks)

**QUESTION FOUR**

- (a) Explain the following  
(i) NEG (2 marks)  
(ii) TEST (2 marks)  
(iii) DAA (2 marks)
- (b) What is an interrupt? (2 marks)  
(i) Differentiate between maskable interrupt and non-maskable interrupt (2 marks)  
(ii) How many memory locations can be addressed by a microprocessor with 14 address lines? (2 marks)
- (c) What is SIM and RIM? (4 marks)
- (d) Mention three (3) functions of SIM and RIM. (6 marks)
- (e) Give the function of the accumulator. (3 marks)

**QUESTION FIVE**

- (a) What is a co-processor? Explain its use in a typical microprocessor based system. (4 marks)
- (b) Highlight the reason why the data bus is bi-directional and the address bus in unidirectional. (4 marks)

- (c) Discuss in details the functions of the core i7 microprocessor in computers. (8 marks)
- (d) With the aid of a suitable diagram, explain how a microprocessor can handle interrupt request. (5 marks)
- (e) What is a bus? (4 marks)

#### QUESTION SIX

- (a) Explain how memory management is improved in the Pentium microprocessor. (5 marks)
- (b) Pentium processor has a superscalar architecture. Discuss the statement briefly. (6 marks)
- (c) What is opcode fetch cycle? (5 marks)
- (d) Draw the block representation of a programmable temperature controller and display for industrial applications. (5 marks)
- (e) What is the main use of the READY pin? (4 marks)